Date: 15th Dec 2023

Research Internships @RCOEM

Our college is offering **Research Internships** to the students of **VIII semester BE**. These internships are designed to enhance the knowledge of the students and to provide them a professional research experience. The selected interns are required to work full time on the project for one full semester under the supervision of faculty guides and are exempted from regular VIII semester classes. However, these students are required to complete the applicable winter term and/or all other perquisites mentioned by their department.

The following internships are available to the students by the concerned faculty guides who will work as Principal Investigators (PI). For detailed information regarding these projects the students are requested to contact the concerned guide.

The students who are interested in these Research Internships are requested to contact the respective faculty guides **on or before 23rd December 2023.**

Following internships are available:

SN	Name of Project	Faculty Guide	View Details
1	Advancements in Cyber-Physical Systems: Enhancing Interconnectivity and Security	Dr. A. V. Chandak	P1
2	Design and development of a cloud-enabled medication reminder device	Prof. R. A. Deshmukh	P2
3	An Information Extraction and Summarization System for Dental Caries	Ms. Bhagyashree Hambarde	P3
4	Information Extraction from Document Corpus using semantic intelligence techniques to solve user search queries.	Prof. Ashwini Zadgaonkar	P4
5	A Deep Learning Approach to Precision Cardiac Arrhythmia Detection from Electrocardiogram (ECG) Signals	Dr. Deepali M. Kotambkar	P5
6	Damage Characterization of composite plate under low velocity impact using AI and ML techniques.	Dr. Deepali M. Kotambkar	P6
7	Human Pose Estimation in low-resolution large video streams	Prof. Kaushik Roy	P7

8	Human Action Recognition for semantic event predictions in sports domain	Prof. Kaushik Roy	P8
9	Mobile Application for patient life intervention	Dr. M. B. Chandak-PI, Dr. S. Hira (Co-PI) Dr. Rekha Rattan (Co-PI), Dr. Prathmesh Kalambe (Co-PI), AIIMS Nagpur	P9
10	Hyperspectral imaging systems for quality assessment of fruit, vegetables and mushrooms	Dr. M. B. Chandak / Dr. Swati Hira	P10
11	Coal Quality Classification using Hyper spectral Imaging	Dr. M. B. Chandak / Dr. Swati Hira	P11
12	Dataset creation in the area of Image Processing	Dr. Shailendra S. Aote	P12
13	Logo detection and Counting occurrences of logo in an video	Dr. Shailendra S. Aote	P13
14	Blockchain based Self Sovereign Identity (SSI) & Zero Knowledge Proof (ZKP)	Dr. A. R. Raipurkar, Prof. P. R. Pardhi	P14
15	Moving Object Detection in Infrared Imagery	Mr. Dilipkumar A. Borikar	P15
16	A deep learning based flying object detection model	Dr. Pravin Sonsare, Dr. Khushboo Khurana	P16
17	Cost Saving Cloud Based Model for Industries Using IoT	Dr. Urmila Shrawankar	P17
18	SecureTrans: A Framework for Ensuring Trustworthy Data Transmission over Cloud with Blockchain	Dr. Urmila Shrawankar	P18
19	Short Message Transliteration into Hindi/Marathi language Language	Dr. Urmila Shrawankar	P19
20	Missing words Prediction during Speech-to-Text Conversion	Dr. Urmila Shrawankar	P20
21	DeepFake Detection	Dr. Urmila Shrawankar	P21
22	A Multicriteria Heuristic Approach to Enhance Cloud Computing Performance	Dr. Urmila Shrawankar	P22
23	Translator for Number Images in Multiple Languages	Dr. Urmila Shrawankar	P23

24	Cross Modal (Bi-lingual) text recognition from natural scene Images	Dr. Urmila Shrawankar	P24
25	Experimental optimization of manufacturing process using novel coolant and use of modern computational techniques.	Dr. Yogesh V. Deshpande	P25
26	Productivity improvement in Solar photovoltaic cells generation and its techniques	Mr. Sachin Pund	P26
27	Reliability Analysis	Dr. A.S. Chatpalliwar	P27
28	Application of advanced algorithms for green machining of Aircraft materials- a step towards sustainable manufacturing	Dr. Yogesh V. Deshpande, Dr. T. A. Madankar	P28
29	Design and Simulation of Channel Model for 5G Wireless Communication Systems	Dr. (Mrs.) Mridula Korde	P29
30	ML based analysis of Resonator for space application	Prof. Shubham Anjankar, Electronics Engineering Dr. Suresh Balpande, CSE (ALML) Dr. Prasanna Deshpande, Electronics and Communication	P30
31	ML based analysis of RF MEMS switch for space application	Prof. Shubham Anjankar, Electronics Engineering Dr. Suresh Balpande, CSE (ALML) Dr. Deepak Khuslani, Electronics and Communication	P31
32	Optical Digital Pupilometer for dieses detection	Dr. Jayu P. Kalambe	P32
33	Design of system for Phenylketonuria (PKU) detection	Dr. Jayu P. Kalambe	P33
34	Design of POC device for Biochemical analysis	Dr. Jayu P. Kalambe	P34

35	Development of sensor for Heavy metal ions detection	Prof. Anju Gupta	P35
36	Development of Tracking Device	Dr . Vivek khetade	P36
37	Design and development of point-of-care device for biomedical application	Mr. Jitendra B. Zalke	P37
38	Development of Biomedical Instrumentation System for cardiac application	Dr. J.A.Shrawankar	P38
39	Detection of Large-Scale Tampered Region of a Forgery Image	Dr. Bhumika Neole	P39
40	Forecasting Signal Strength: Predictive Modeling for Enhanced Connectivity	Ms. Ashwini Zadgaonkar, Ms. Bhagyashree Hambarde, Ms. Sruthi Nair	P40
41	Eye Image Analysis	Dr. (Mrs.) Richa R. Khandelwal	P41
42	Design an IoT Based Office Security System	Dr. (Mrs.) Richa R. Khandelwal	P42
43	Analysis and Design of Visualization of Database using Power BI Tool	Dr. (Mrs.) Richa R. Khandelwal	P43
44	Implementation of Image Processing Algorithms using Hardware Platform	Dr. (Mrs.) Richa R. Khandelwal	P44
45	Car Number plate recognition and Parking Management System	Dr. Rohini S. Ochawar	P45
46	Crop damage assessment using open source optical data due to hailstorm or unseasoned raining	Dr. Rohini S. Ochawar	P46
47	Computational Complexity Reduction for AI-ML Applications	Prof. Pankaj.U. Joshi Prof. Vipul S. Lande	P47
48	Development of Neuron Processing Unit using VEDIC Arithmetic	Dr. Pankaj.U. Joshi V. S. Lande	P48
49	Development of modified viscometer for the measurement of viscosity of fluid	Dr Bhalchandra M Hardas (PI), Dr Mangesh Godbole (Co-PI)	P49
50	Machine Learning in Antenna Design: An Overview on Machine Learning Concept and Algorithms.	Prof. Archana Tiwari	P50

51	Deep Learning based system module for estimation and analysis of channel state information (CSI).	Ms. Prachi Rane	P51
52	Predictive Models for Disease Outbreaks	Prof. Snehal Laddha	P52
53	Deep Reinforcement Learning for Cybersecurity Operations	Prof. Snehal Laddha	P53
54	Optimizing Predictive Maintenance with Edge AI in Industrial IoT	Prof. Snehal Laddha	P54
55	ML based analysis of energy harvester for space application	Prof. Shubham Anjankar, Dr. Suresh Balpande	P55
56	Fraud Transaction Detection using Machine learning	Prof. Lokesh M. Heda	P56
57	Obstacle Detection on Rail Tracks using Deep Learning Model and Edge Computing.	Prof. Lokesh M. Heda	P57
58	IoT-Based Child Safety System	Prof. Lokesh M. Heda, Dr. Pankaj U. Joshi	P58
59	Deployment of Deep Learning Model on Hardware Platform	Prof. Lokesh M. Heda, Dr. Pankaj U. Joshi	P59
60	Image Restoration technique using Swin Transformer	Dr.(Mrs.) Kanchan Dhote	P60
61	Data Driven Assessment and rehabilitation Exercise Physiotheory (SPINE)	Prof. Pravin Dwaramwar	P61
62	Design and Development of IoT based Patient Health Monitoring System	Dr. Rakesh K Kadu	P62
63	Genetic Algorithm for Text Mining	Dr. Supriya Gupta Bani	P63
64	Secure and Resilient IoT Devices: A Multifaceted Approach to Cybersecurity	Prof. Firdous Sadaf M. Ismail & Dr. Rashmi Welekar	P64
65	Examining the Convergence of Artificial Intelligence and Cybersecurity to Strengthen Detection and Response to Attacks	Prof. Firdous Sadaf M. Ismail	P65
66	Elevating Security Measures: AI-ML-Driven Detection and Response Systems for Mitigating Social Networking Attacks	Prof. Firdous Sadaf M. Ismail	P66
67	Supply chain threats prevention software for applications	Dr. Rashmi Welekar	P67

68	Indigenous SIEM Framework: Empowering Endpoint Security for Unconnected Networks	Dr. Charanjeet Dadiyala	P68
69	GuardianAI: Detecting and Neutralizing Deepfake Threats for Media Integrity	Dr. Charanjeet Dadiyala	P69
70	Systematic Review and analysis of NFS Algorithms	Dr. Rashmi Welekar	P70
71	Design and implementation of complete shopping assistant for visually impaired person	Dr. Shubhangi Neware	P71
72	Image classification using graph neural network (GNN).	Dr. Pravin Sonsare & Dr. Khushboo Khurana	P72
73	Medical report generation using Generative AI	Dr. A. J. Agrawal	P73
74	Obstacle distance estimation for self driving car	Dr. A. J. Agrawal	P74
75	Investigate security challenges in Internet of Things (IoT) devices and propose strategies for securing IoT ecosystems.	Prof. Ashwini Mate	P75
76	A Machine Learning approach to Predict sensitivity of a Bio-FET Biosensor	Dr. Chithraja Rajan	P76
77	A Machine Learning approach to Predict Electrical Characteristics of a Low power Semiconductor Device	Dr. Chithraja Rajan	P77
78	Design of a Comprehensive Easy-Fast and AI-Supported Disease Recognition & Prediction Model and Quick Responding System in a Re-Designed Health-Care Eco System.	Prof. Deepa Das	P78
79	Hyperspectral Image Analysis of Food Products Using Machine Learning and Deep Learning	Prof. Neha P. Lanke	P79
80	Development of a Drone Detection System	Dr. Nisarg Gandhewar	P80
81	Development of an Generative AI Based Virtual Dressing Room	Dr. Nisarg Gandhewar	P81
82	Development of an fruit wax coating identification System	Dr. Nisarg Gandhewar	P82
83	Model for improving the performance of low resolution images using (Super Resolution Method) Deep Learning	Prof. Pranali R. Dandekar	P83
84	Model for improving the performance of Tiny face detection Deep Learning technique.	Prof. Pranali R. Dandekar	P84
85	Automation of pre-processing of big data	Prof. Priya Parkhi	P85

86	Human-robot collaboration using reinforcement learning from human feedback (RLHF)	Prof. Priya Parkhi	P86
87	Precision Agriculture Using an Intelligent Irrigation Control System	Mr. Durgesh M Sharma	P87
88	Women's Empowerment through AI: Discovering Data Analytics for Predictive Safety Solutions and Applications	Dr. Amit Pimpalkar	P88
89	An Innovative Framework for Identification and Classification of DNA Sequences in Human Genomics	Dr. Amit Pimpalkar	P89
90	A System for Condensing and Simplifying Textual Information using Natural Language Approach in Regional Language	Dr. Amit Pimpalkar	P90
91	Object identification and real time tracking	Mr. Abhishek Sahu	P90
92	Driver Drowsiness Detection	Prof. Snehal Awachat	P92
93	Clinical Event Recognition	Prof. Snehal Awachat	P93
94	Development of an Android Application for Assessing Soil Nutrients	Prof. Suresh Balpande	P94
95	Development of colour dataset for soil nutrients using colorimetry technique	Prof. Suresh Balpande	P95
96	A portable soil pH measuring device based on machine learning model and Arduino	Prof. Suresh Balpande	P96
97	Machine Learning based automation of non-parameterised structural design analysis	Prof. Suresh Balpande	P97
98	AI Generated Text Detection using deep learning	Dr. Yogesh Thakare	P98
99	Harvest Horizon: Weather and Temperature Forecast for Agriculture	Dr. Yogesh Thakare	P99
100	MFANEDH: Multimodal Fusion of MRI, PET, CT, and Ultrasound Using Advanced Neural Architectures for Enhanced Early Detection of Heart Cancer	Prof. Kiran S. Khandare	P100
101	Deep learning approach for creation of fusion art	Dr. Vasundhara Rathod	P101
102	ML based analysis of flexible substrate of antenna for wearable application	Prof. Archana Tiwari Prof. Shubham Anjankar Dr. A. A. Khurshid	P102

103	Predicting forest fire using multispectral satellite data	Prof. Aarti Karandikar	P103
104	AI-Companion	Dr. Gaurav Goyal	P104
105	Analysis of Power Sharing between Hybrid Energy Storage System for Motor Load	Dr. Gaurav Goyal	P105
106	Analysis of DC- DC converter for Fuel Cell System	Dr. (Mrs) P.V. Kapoor	P106
107	INDUCTION MOTOR FAULT DIAGNOSIS USING MACHINE LEARNING ALGORITHM	Dr. (Mrs) P.V. Kapoor, Dr. U.B. Mujumdar	P107
108	Real Time estimation of State of Charge (SoC) of Li-Ion battery using Machine Learning Algorithm.	Dr. Uday B.Mujumdar	P108
109	Real time monitoring and control of Li-Ion battery using Texas Instruments' (TI) BQ76940 Evaluation module.	Dr. Uday B.Mujumdar	P109
110	Design and development of DC-DC Bidirectional converter using micro-controller for DC micro-grid and EV applications	Dr. (Mrs) V. A. Huchche	P110
111	Data Driven Assessment and rehabilitation Exercise Physiotheory (Shoulder)	Prof. Pravin Dwaramwar	P111
112	Al and Computer vision in X-ray Analysis	Prof. Pravin Dwaramwar	P112
113	Design and Fabrication of an Environmentally Sustainable Incinerator for Sanitary Napkin Disposal and Women Health Management	Dr. Tripti B. Gupta (PI)	P113
114	Experimental investigations on the performance of Laser cutting machining parameters for different materials.	Dr. Ashish Urade	P114
115	DESIGN & FABRICATION OF MICRO UATV FOR STEALTH SURVEILLANCE AND DEFENCE APPLICATION	Dr. Vishal Shukla	P115
116	Development of automatic tyre condition monitoring system for Indian expressways	Dr. Sandeep Joshi	P116
117	A system of IoT Devices to prevent under-loading / overloading of Railway wagons	Dr. Vishal Shukla	P117
118	Development of coordinate measuring machine using Pick & Place BRABO Robot	Dr. Vishal Shukla, Dr. Alok Jha	P118
119	Impact of Environmental Temperature Variation, Ranging from Room Temperature to Sub-Zero Liquid	Nitin Gudadhe	P119

	Nitrogen Conditions, on the Microstructure and Mechanical Properties of High-Strength Low-Alloy (HSLA) Steel Weldment.		
120	Experimental Investigations on the Performance of Manufacturing Exeution System (MES)	Dr. P. B. Shiwalkar, Dr. Y. M. Sonkhaskar,	P120
121	Development PV solar cooking system for domestic applications	Dr. Sandeep Joshi	P121
122	Design and Development of Solar Powered Adsorption Cooling System for Horticultural Products	Prof. S. A. Patil (PI), Dr. S. S. Joshi (Co-PI)	P122
123	Exploratory Research on Agri-voltaic Systems	Dr. Sandeep Joshi	P123

Dr. D. S. Adane
Dean R&I

Dr. R. S. Pande
Principal

1. Title of the Project	Advancements in Cyber-Physical Systems: Enhancing Interconnectivity and Security
Name of the Principal Investigator (PI), Department	Dr. A. V. Chandak
Place of Work/Department	Information Technology
Brief description of the project	This research aims to investigate and innovate within the realm of Cyber-Physical Systems (CPS), focusing on enhancing interconnectivity and security measures. CPS integration in various domains has led to transformative advancements; however, the increasing complexity and interdependence of these systems have raised critical challenges about connectivity robustness, resilience against cyber threats, and optimized performance. This research intends to explore novel methodologies and technologies to address these challenges, aiming to contribute to the sustainable evolution and security of CPS.
Expected outcomes of the project	• Proposed enhancements in CPS interconnectivity will result in improved system integration, facilitating seamless interaction among diverse components. • Explore approaches for seamless integration of CPS across different domains (healthcare, transportation, manufacturing, etc. • Develop strategies to ensure real-time data exchange and synchronization among distributed CPS components. • Investigate techniques for intrusion detection and response within CPS environments.
Possible learning outcomes for the interns	• Understanding CPS Fundamentals: Gain in-depth knowledge of the foundational concepts, principles, and components of Cyber-Physical Systems. • Interdisciplinary Insights: Acquire a multidisciplinary understanding by exploring the integration of computer science, engineering, networking, and security principles within CPS. • System Design and Integration: Develop skills in designing and integrating diverse CPS components across various domains, emphasizing seamless interconnectivity.

	• Cybersecurity Techniques: Acquire proficiency in implementing security frameworks, encryption methodologies, and intrusion detection systems tailored for CPS.

Requirements from the interns	
UG / PG Program (Branch)	UG and PG
Discipline	Students from Information Technology, CSE, CSE(AIML), CSE(Data Science), CSE(Cyber Security), ECE, ENCS
Technical background (eg. Courses that should have been done, topics that should have been known)	Knowledge of Operating Systems and Security
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Problem Solving, Programming

Name and Signature of PI & Co-PI Name & Signature of Head of Department

2. Title of the Project	Design and development of a cloud-enabled medication reminder device
Name of the Principal Investigator (PI), Department	Prof. R. A. Deshmukh
Place of Work/Department	Electronics Engineering, RCOEM, Nagpur
Brief description of the project	The system takes the shape of a lid that replaces the cap from a standard pill vial with a smart, cloud-enabled medication reminder device. Coupled with a plug-in nightlight, the system provides visual, audible, email, text, and phone alerts to support medication management and to promote medication adherence and compliance. When it's time to reorder medication, a button at the base of the lid allows users to send refill requests to their local pharmacy.
Expected outcomes of the project	1. Prototype of a cloud-enabled medication reminder device 2. Fully functional cloud interface 3. User manual of the product
Possible learning outcomes for the interns	1. Product design 2. System integration 3. Technical writing

Requirements from the interns	
UG / PG Program (Branch)	UG Program, Electronics Engineering
Discipline	Electronics Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	1. Basic electronics 2. Computer Networks 3. Internet of Things
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	1. Hands-on on WiFi enabled embedded platforms 2. Expertise in embedded C, C++ programming 3. Experience on PCB designing tools 4. Proficiency in technical writing

Name and Signature of PI & Co-PI Name & Signature of Head of Department

3. Title of the Project	An Information Extraction and Summarization System for Dental Caries
Name of the Principal Investigator (PI), Department	Bhagyashree Hambarde
Place of Work/Department	Data Science
Brief description of the project	In the biomedical and healthcare sphere, leveraging automatic text summarization enables researchers and medical practitioners to efficiently utilize their time by accessing a broader array of information in shorter durations. This system proves invaluable for analysing dental images, extracting crucial features from the images, and seamlessly converting them into concise text summaries.
Expected outcomes of the project	The dental status will be automatically articulated in textual form. **Outcomes:** Research Publications
Possible learning outcomes for the interns	Deep Learning Networks, Natural Language Processing, Image Analysis

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Data Science, Computer Science and Engineering, AIML
Technical background (eg. Courses that should have been done, topics that should have been known)	CNN
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming

Bhagyashree Hambarde — Prof. Aarti Karandikar

Name and Signature of PI — Name & Signature of Head of Department

4. Title of the Project	Information Extraction from Document Corpus using semantic intelligence techniques to solve user search queries.
Name of the Principal Investigator (PI), Department	Prof. Ashwini Zadgaonkar, Assistant Professor, CSE(Data Science)
Place of Work/Department	CSE(Data Science) Department
Brief description of the project	Semantic intelligence techniques involve understanding the meaning and context of words, phrases, and concepts within a given text or document corpus. When applied to information extraction for solving user search queries, these techniques aim to comprehend the intent behind user queries and retrieve relevant information from a large document collection. Traditional search engines rely on keyword matching. Semantic search engines, on the other hand, understand the intent behind a query by considering context, synonyms, and relationships between words. They use semantic indexing, knowledge graphs, and ontologies to provide more accurate and contextually relevant results. ML algorithms can be trained to understand semantic relationships and patterns within a document corpus. These algorithms can then assist in information retrieval by predicting relevant documents based on learned semantic similarities. n summary, employing semantic intelligence techniques for information extraction involves a combination of NLP, semantic analysis, entity recognition, knowledge graphs, and advanced machine learning methods. These approaches collectively provide more accurate and contextually relevant information from a document corpus.
Expected outcomes of the project	• An effective IE system portable across multiple domains. • Efficient semantic searching algorithm design

Possible learning outcomes for the interns	• Scopus/SCI paper publication • Research Proposal

Requirements from the interns	
UG / PG Program (Branch)	CSE/CSE(AIML)/CSE(DS)/CSE(Cyber)
Discipline	Computer Science and Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Natural Language Processing, Applied Natural language Processing, Machine learning tools, Knowledge graph
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming, Advanced machine learning algorithms, Knowledge Graph construction techniques

Name and Signature of PI

Prof. Ashwini V. Zadgaonkar

Name & Signature of Head of Department

Prof. Aarti Karandikar

5. Title of the Project	A Deep Learning Approach to Precision Cardiac Arrhythmia Detection from Electrocardiogram (ECG) Signals.
Name of the Principal Investigator (PI), Department	Dr. Deepali M. Kotambkar Electronics Engineering
Place of Work/Department	Electronics Engineering
Brief description of the project	A Deep Learning Approach to Precision Cardiac Arrhythmia Detection from Electrocardiogram (ECG) Signals, focuses on leveraging advanced neural networks to enhance the accuracy and reliability of cardiac arrhythmia detection. **Objective of the Project** The purpose of this innovative approach aims to develop a highly precise model, ensuring early and reliable identification of irregular heart rhythms. By harnessing the power of deep learning, the project aims to contribute significantly to the improvement of diagnostic capabilities in cardiovascular health, ultimately enhancing patient care and outcomes.
Expected outcomes of the project	Publication/Patent
Possible learning outcomes for the interns	At the conclusion of the research project, the intern will demonstrate the ability to By employing AI and ML techniques, intern can gain insights to Develop A Deep Learning model to achieve Precision Cardiac Arrhythmia Detection from Electrocardiogram (ECG) Signals .
Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	EN, EC, EDT, CS, IT,ME
Technical background (eg. Courses that should have been done, topics that should have been known)	Basics of AI and ML applications and Digital Image Processing.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Programming Skills Python.

Dr. Deepali M. Kotambkar
Name and Signature of PI

Name & Signature of Head of Department

6. Title of the Project	Damage Characterization of composite plate under low velocity impact using AI and ML techniques.
Name of the Principal Investigator (PI), Department	Dr. Deepali M. Kotambkar Electronics Engineering
Place of Work/Department	Electronics Engineering
Brief description of the project	The damage characterization of composite plates under low-velocity impact involves using Artificial Intelligence (AI) and Machine Learning (ML) techniques to analyze and predict the effects of impact on these materials. **Objective of the Project** The purpose of this statement is to characterise various defects in composite plate subjected to low velocity impact under different boundary conditions.
Expected outcomes of the project	Publication/Patent
Possible learning outcomes for the interns	At the conclusion of the research project, the intern will demonstrate the ability to 1. By employing AI and ML techniques, intern can gain insights into the complex relationship between impact conditions and damage in composite materials. 2. This approach allows for more accurate predictions and better understanding of the structural response to low-velocity impacts, ultimately enhancing the design and durability of composite structures.
Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	EN, EC, EDT, CS, IT,ME
Technical background (eg. Courses that should have been done, topics that should have been known)	Basics of AI and ML applications and Digital Image Processing.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Programming Skills Python.

Dr. Deepali M. Kotambkar
Name and Signature of PI

Name & Signature of Head of Department

7. Title of the Project	Human Pose Estimation in low-resolution large video streams
Name of the Principal Investigator (PI), Department	Prof. Kaushik Roy, Department of Cyber Security
Place of Work/Department	Department of Cyber Security
Brief description of the project	This work involves recognition and estimation of Human Poses in live video streams recorded with a low-resolution camera. This project has rich potential in various domains like live surveillance systems, assisted living, sports domain, patient monitoring, Human-Computer interaction and Smart Manufacturing process, etc.
Expected outcomes of the project	The aim is to develop advanced algorithms that can overcome the limitation of accurately recognizing human activities in low-resolution videos. One of the aims is to develop efficient algorithms that can handle real-time human activity recognition processing for large video streams.
Possible learning outcomes for the interns	1) Proficiency in Image processing techniques 2) Proficiency in Deep Learning frameworks 3) Ability to design and apply Deep learning models to real life scenarios.

Requirements from the interns	
UG / PG Program (Branch)	UG Program
Discipline	Computer Science/ Information Technology/ Electronics and Communication
Technical background (eg. Courses that should have been done, topics that should have been known)	1) Image processing techniques 2) Deep learning frameworks
Specific skill set	1) Programming 2) Theoretical reasoning

Name and Signature of PI & Co-PI Name & Signature of Head of Department

8. Title of the Project	Human Action Recognition for semantic event predictions in sports domain
Name of the Principal Investigator (PI), Department	Prof. Kaushik Roy, Department of Cyber Security
Place of Work/Department	Department of Cyber Security
Brief description of the project	This work involves recognition and estimation of Human Poses in a certain sports like football, cricket, etc. This project can be used to predict events by recognition of different human poses of a sports person. This work will be able to suggest correct postures once they are identified.
Expected outcomes of the project	To develop advanced algorithms that can overcome the limitation of accurately recognizing human poses in sports domain. To provide event predictions after detecting real-time human activities.
Possible learning outcomes for the interns	4) Proficiency in Image processing techniques 5) Proficiency in Deep Learning frameworks 6) Ability to design and apply Deep learning models to real life scenarios.

Requirements from the interns	
UG / PG Program (Branch)	UG Program
Discipline	Computer Science/ Information Technology/ Electronics and Communication
Technical background (eg. Courses that should have been done, topics that should have been known)	3) Image processing techniques 4) Deep learning frameworks
Specific skill set	3) Programming 4) Theoretical reasoning

Name and Signature of PI & Co-PI Name & Signature of Head of Department

9. Title of the Project	Mobile Application for patient life intervention
Name of the Principal Investigator (PI), Co-PI's Department	Dr. M. B. Chandak- PI, Dr. S. Hira (Co-PI) Dr. Rekha Rattan (Co-PI), Dr. Prathmesh Kalambe (Co-PI), AIIMS Nagpur
Place of Work/Department	Computer Science and Engineering
Brief description of the project	Interventions to promote health and well-being based on the construction of psychological resources can positively impact the daily life of users and foster human flourishing. Nowadays, mobile health represents a safe way to support health research and implement evidence-based psychological interventions. The present study aims to evaluate the effectiveness of a mobile app-based intervention program (OneUS) designed to cultivate positive emotions and positive thinking to improve overall well-being. Over the past decade, there has been a steady increase of the number of mobile and web-based applications that enable people with mental disorders to self-regulate their mental health needs, to feel autonomous, and to take responsibility for their own care. To the best of our knowledge, no current reviews explore the features of self-care applications used for mental disorders. The purpose of this work is to explore the characteristics of novel mobile applications utilized for mental health self-care.
Expected outcomes of the project	Web based Model for life intervention.
Possible learning outcomes for the interns	Design and Analyse the Deep learning algorithms. Understand use and working of NVIDIA Server. Implement Deep learning models on high performance computing system.

Requirements from the interns	
UG / PG Program (Branch)	UG Students
Discipline	CS/IT/EC
Technical background	Image Processing, Machine Learning, Neural Network
Specific skill set	Python Programming, *Image Processing, Cloud, Web development*

Dr. M. B. Chandak Principal Investigator Dean Academics RCOEM, Nagpur	Dr. Swati Hira Co-PI Assistant Professor RCOEM, Nagpur	Dr. Rekha Rattan Co-PI RnD Department RCOEM, Nagpur	Dr. Ramchand Hablani HOD CSE RCOEM, Nagpur

10. Title of the Project	Hyperspectral imaging systems for quality assessment of fruit, vegetables and mushrooms
Name of the Principal Investigator (PI), Department	Dr. M. B. Chandak / Dr. Swati Hira
Place of Work/Department	Computer Science and Engineering
Brief description of the project	Over the last two decades, research in hyperspectral imaging has been increasing and its use in horticulture is expected to be spreading in the coming years. The emerging techniques are currently gaining interest of the research community. However, there are still challenges to the applicability. In this review our task is to demonstrate that hyperspectral imaging can be used as an effective tool for fruit, vegetables and mushrooms in assessing quality parameters related to well defined variables that can be analysed in the laboratory, as well as complex properties such as maturity, ripeness, detection of biotic defects, physiological disorders, mechanical damages, and sensory quality.
Expected outcomes of the project	Web based Model to classify fruits, vegetables and mushrooms
Possible learning outcomes for the interns	Understand hyper spectral imaging camera working and its use. Understand use and working of NVIDIA Server. Implement Deep learning models on high performance computing system. Design and Analyse the Deep learning algorithms.

Requirements from the interns	
UG / PG Program (Branch)	UG Students
Discipline	CS/IT/EC
Technical background	Image Processing, Machine Learning, Neural Network
Specific skill set	Python Programming, *Image Processing, Cloud, Web development*

Dr. Swati Hira Hablani — Principal Investigator, *Assistant Professor*

Dr. M. B. Chandak — Co-Principal Investigator, *Dean Academics*

Dr. Ramchand — *HOD CSE RCOEM, Nagpur*

RCOEM, Nagpur RCOEM, Nagpur

11. Title of the Project	Coal Quality Classification using Hyper spectral Imaging
Name of the Principal Investigator (PI), Department	Dr. M. B. Chandak / Dr. Swati Hira
Place of Work/Department	Computer Science and Engineering
Brief description of the project	Spectral technology is used extensively for classifying and analyzing minerals and ores. Spectral data gives the power to see the colors in the visible spectrum as humans (red, green, and blue), goldfish (infrared), and bumblebees (ultraviolet). The higher the level of spectral detail in hyperspectral images, the better your ability to see the invisible. One of the most crucial aspects of analyzing a hyperspectral image is its classification, which involves classifying each pixel (spatial point) vector. Researchers have paid a lot of attention to this aspect. Therefore, searching for alternative, fast, and reliable processes or equipment using modern technology is a quest for researchers worldwide. Also, online and instant identification of coal quality is helpful for Thermal power plants, coal washery & other plant operations for controlling the quality of output products.
Expected outcomes of the project	Web based Model to classify coal.
Possible learning outcomes for the interns	Understand hyper spectral imaging camera working and its use. Understand use and working of NVIDIA Server. Implement Deep learning models on high performance computing system. Design and Analyse the Deep learning algorithms.

Requirements from the interns	
UG / PG Program (Branch)	UG Students
Discipline	CS/IT/EC
Technical background	Image Processing, Machine Learning, Neural Network
Specific skill set	Python Programming, *Image Processing, Cloud, Web development*

Dr. Swati Hira Hablani — *Project Coordinator*

Dr. M. B. Chandak — *Project Leader*

Dr. Ramchand — *HOD CSE*

Assistant Professor Dean Academics RCOEM, Nagpur
RCOEM, Nagpur RCOEM, Nagpur

12. Title of the Project	Dataset creation in the area of Image Processing
Name of the Principal Investigator (PI), Department	**Dr. Shailendra S. Aote** CSE Department
Place of Work/ Department	CSE
Brief description of the project	Image processing has wide areas of industrial applications. To get the desired results on any problem, it necessary to train the algorithm on sufficient amount of data. Lot of datasets are already available in market. This project aims to create the dataset by using web scrapping or cameras. After collecting the data, it is required to annotate and process it. This processed data can be used by researchers for proving the algorithmic performance.
Expected outcomes of the project	Research paper
Possible learning outcomes for the interns	Real life problem definition, modelling, simulation implementation.

Requirements from the interns	
UG / PG Program (Branch)	**UG** (Any)
Discipline	Any
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep learning, Image Processing, Algorithms
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming

Dr. S. S. Aote
Principle Investegator

Ramchand Hablani
Head of Department

13. Title of the Project	Logo detection and Counting occurrences of logo in an video
Name of the Principal Investigator (PI), Department	**Dr. Shailendra S. Aote** CSE Department
Place of Work/ Department	CSE
Brief description of the project	Video processing is widely used domain and having applications in different industries. Let us consider, in a live cricket match, any news channel calculates fees to the client based on number of times any logo appears in a complete duration. It is necessary to differentiate between different logos and calculate the duration for which the logo appears in a particular duration of time.
Expected outcomes of the project	Research paper
Possible learning outcomes for the interns	Real life problem definition, modelling, simulation implementation.

Requirements from the interns	
UG / PG Program (Branch)	**UG**, CSE / IT/ Allied branches(Any)
Discipline	Any
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep learning, Image Processing, Algorithms
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming

Dr. S. S. Aote
Principle Investigator

Ramchand Hablani
Head of Department

14. Title of the Project	Blockchain based Self Sovereign Identity(SSI) & Zero Knowledge Proof (ZKP)
Name of the Principal Investigator (PI), Department	Dr. A. R. Raipurkar CSE Department, RCOEM Nagpur Prof. P. R. Pardhi CSE Department, RCOEM Nagpur
Place of Work/Department	CSE Department
Brief description of the project	Blockchain based Self-Sovereign Identities (SSI) are identity management systems that appoints users as the sole manager of their digital identities. Users of an SSI system are allowed to request digital credentials from issuers, and present a minimised set of data attributes to verifiers. Once issued to the user, digital credentials are only kept by the users, or a third-party appointed by the user. Users can authenticate the presented attributes by providing a Zero-Knowledge Proof (ZKP) of valid issuer signatures on their credentials to the verifiers.
Expected outcomes of the project	• To build transparent and immutable digital identity systems • Implementation of ZKP in building SSI • Polygon Tack ID use case for digital identity system.
Possible learning outcomes for the interns	• Blockchain based implementation in identity management systems • Use of PolygoID for the self sovereign identity • Implementation of Smart Contract for blockchain based SSI

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	CSE/IT/EC
Technical background (eg. Courses that should have been done, topics that should have been known)	• Basic knowledge of Cryptography & Network Security • Blockchain fundamentals
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	• Basic React • Solidity Programming • JAVA

Name and Signature of PI

Name & Signature of Head of Department

15. Title of the Project	Moving Object Detection in Infrared Imagery
Name of the Principal Investigator (PI), Department	Dilipkumar A. Borikar Assistant Professor, Computer Sc. & Engg. Department
Place of Work/Department	Research Lab, CSE Department
Brief description of the project	The advancements in Deep Neural Networks have enthused a new life in the realm of vision-based object detection and proper classification. The problem of identifying the objects in the multi-object scenes provides for the prospective area of betterment in detection and localization. The detection accuracy in vision-based RGB imagery is not accurate in night-scene images. The thermal infra-red images (and videos) based detection will sync well in both day- and night- scenes. Use of deep learning-based techniques will ease the effectiveness of the detection.
Expected outcomes of the project	Paper publication in referred conference or journal.
Possible learning outcomes for the interns	The intern will be able to ... 1. Review papers published in referred journals to compile a report. 2. Demonstrate the object detection on labelled dataset. 3. Analyse the performance with other existing model (s).

Requirements from the interns	
UG / PG Program (Branch)	UG from CSE and Allied Branches
Discipline	CSE
Technical background (eg. Courses that should have been done, topics that should have been known)	Image Processing Basics Python
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Programming (Python) Preferred: (1) Database Concepts & ETL (2) Knowledge of basic ML algorithms

Dilipkumar A. Borikar
Name and Signature of PI

Dr. Ramchand Hablani
Name & Signature of Head of Department

16. Title of the Project	A deep learning based flying object detection model
Name of the Principal Investigator (PI), Department	Dr. Pravin Sonsare and Dr. Khushboo Khurana
Place of Work/Department	Computer Science and Engineering Department
Brief description of the project	The project aims to develop a system for detection and recognition of various flying objects in images and videos with maximized accuracy and minimum inference time.
Expected outcomes of the project	1. To design and train a model to perform flying object detection 2. To classify flying objects in the presence of background like sky, clouds, trees, etc in different environment conditions. The output will be a bounding box with the coordinates of the detected object (coordinate w.r.t center of the frame) and its label.
Possible learning outcomes for the interns	Intern will able to 1. Design and experiment with deep learning and computer vision based models for object detection. 2. Use NVIDIA-DGX server for training the deep learning models. 3. Perform optimization of model.

Requirements from the interns	
UG / PG Program (Branch)	UG (Computer Science and Engineering)
Discipline	Computer Science and Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Fundamentals of Deep learning
Specific skill set (eg. Programming, theoretical reasoning, constructing	Programming in python, tensorflow or pytorch.

mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	

Name and Signature of PI & Co-PI Name & Signature of Head of Department

17. Title of the Project	**Cost Saving Cloud Based Model for Industries Using IoT**
Name of the Principal Investigator (PI), Department	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	In some industries processes are done manually. People need to be physically present whole time to monitor all processes and activities carried out in industry. Which overall affects the total cost of an Industry. Cloud and IoT technologies can be used in industries to automate all the tasks in the Industry. The integration of Internet of Things (IoT) and cloud computing in industries offers a wide range of benefits, contributing to increased efficiency, enhanced decision-making, and improved overall performance by doing all the works automatically. This helps to reduce the overall cost in industries and provide cost saving model for Industries.
Expected outcomes of the project	The outcomes of the project can have a significant impact on the efficiency, scalability, and overall cost of industry process. Some key outcomes may include: • Cost saving model for Industries • Improved Resource Utilization • Enhanced Scalability • Minimized Latency through Edge Computing • Long-Term Sustainability and Innovation
Possible learning outcomes for the interns	At the end of this project, Interns will be able to • Understand Industrial Internet of Things (IIoT) concepts, including the integration of sensors, actuators, and communication technologies in industrial settings. • Acquire foundational knowledge of cloud computing principles, architectures, and service models, and understand how they apply to industrial IoT solutions. • Understand the economic considerations involved in Industrial IoT projects, including cost-effective cloud models, resource optimization, and strategies for reducing operational expenses. • Acquire practical skills by working on hands-on projects involving the implementation of Industrial IoT solutions, from device configuration to cloud integration and analytics
Requirements from the interns	
UG / PG Program (Branch)	UG / PG Program, CSE / DS / AIML / CyS / IT
Discipline	Computer Science and Engineering
Technical background	Cloud Computing, Internet of Things, Use of Cloud Simulators
Specific skill set	Programming, Handling Simulators

Name and Signature of PI

Dr. Urmila Shrawankar (PI)
Professor, CSE (DS)

Name & Signature of Head of Department
CSE (DS)

18. Title of the Project	**SecureTrans**: A Framework for Ensuring Trustworthy Data Transmission over Cloud with Blockchain
Name of the Principal Investigator (PI), Department	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	The project aims to establish a robust framework, named " SecureTrans" designed to enhance the security of data transmission in Internet of Things (IoT) systems over cloud infrastructure. This is achieved through the incorporation of advanced security measures, specifically leveraging blockchain technology and consensus mechanisms. This project addresses the critical need for securing data transmission in IoT environments over cloud infrastructure. By combining blockchain technology and consensus mechanisms, the SecureTrans framework establishes a trustworthy and resilient foundation, safeguarding the confidentiality, integrity, and availability of data throughout its journey from IoT devices to the cloud.
Expected outcomes of the project	**1. Enhanced Data Security:** Implementation of end-to-end encryption for secure data transmission from IoT devices to the cloud. **2. Tamper-Resistant Data Integrity:** Use of blockchain technology to establish an immutable and transparent ledger, ensuring data integrity. Also provide to provide transparency in data transactions and a traceable history of activities. **3. Improved Trust and Reliability:** Integration of consensus mechanisms to validate data authenticity, fostering trust in the system. **4. Automated Security Protocols:** Utilization of smart contracts on the blockchain to automate security measures, access control, and data validation. **5. Interoperability:** Support for diverse IoT devices and platforms to enhance interoperability within IoT ecosystems. **6. Security Best Practices:** Delivery of insights and best practices to influence industry standards and guidelines for secure IoT data transmission.

Possible learning outcomes for the interns	**1. Blockchain Integration:** Understanding the practical application of blockchain technology in enhancing data security and integrity. **2. Consensus Mechanisms:** Gaining hands-on experience with consensus mechanisms and their role in establishing trust in IoT data transmission. **3. Smart Contract Development:** Acquiring skills in developing and deploying smart contracts for automating security protocols and validation processes. **4. End-to-End Encryption:** Learning the implementation of robust encryption protocols for securing data during transmission. **5. Best Practices in IoT Security:** Understanding and contributing to best practices that can influence the broader field of IoT security.
Requirements from the interns	
UG / PG Program (Branch)	UG / PG Program CSE / DS / AIML / CyS / IT
Discipline	Computer Science and Engineering
Technical background	Cloud Computing, Blockchain Technology
Specific skill set	Programming, theoretical reasoning, use of Simulator

Name and Signature of PI

Dr. Urmila Shrawankar (PI)
Professor, CSE (DS)

Name & Signature of Head of Department
CSE (DS)

19. Title of the Project	Short Message Transliteration into Hindi/Marathi language Language
Name of the Principal Investigator (PI), Department	Dr. Urmila Shrawankar, Professor, CSE(Data Science)
Place of Work/Department	CSE(Data Science) Department
Brief description of the project	Messages refers to short-word conversations with people, which gave rise to new message jargon. This lessens the effort required to type the entire message. There is no regional language keyboard on gadgets nowadays. People find keypads uncomfortable, if they are present at all. As a result, message jargon creates havoc when hindi/marathi language messages are typed using English alphabets. Different typing languages may be used, which can cause misunderstandings. Converting a compressed message to its usual, transliterated form, which aids in message understanding ,saving phone memory. This work only takes into consideration Hindi /Marathi languages.
Expected outcomes of the project	• Paper Publication • Prototype development
Possible learning outcomes for the interns	• Understanding of NLP techniques for text processing. • NLU platform for regional languages

Requirements from the interns	
UG / PG Program (Branch)	CSE/CSE(AIML)/CSE(DS)/CSE(Cyber)
Discipline	Computer Science and Engineering
Technical background	Natural Language Processing
Specific skill set	Python Programming, Natural Language Generation techniques

Name and Signature of PI

Dr. Urmila Shrawankar

Name & Signature of Head of Department

Prof. Aarti Karandikar

Name and Signature of Co-PI

Prof. Ashwini V. Zadgaonkar

20. Title of the Project	**Missing words Prediction during Speech-to-Text Conversion**
Name of the Principal Investigator (PI), Department	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	Nowadays, Speech-to-Text technology plays an important role in our everyday life. The speech to text technology effectively takes speech input and converts it into text. This technology is mostly used in communication devices like mobile phones. Speech is the easiest way for human-to-human interaction but when humans communicate through a machine, while converting speech-to-text, some errors may occur due to the missing words or wrong recognition of words and hence meaning may change from converted text. To overcome this issue, prediction of appropriate word and constructing context based meaningful phrases are proposed.
Expected outcomes of the project	To predict missing word during mobile/online communication.
Possible learning outcomes for the interns	• Learn and implement Natural Language Processing (NLP), Automatic Speech Recognition (ASR), Machine Learning (ML) technology • Developing error free applications based on this technology
Requirements from the interns	
UG / PG Program (Branch)	**UG / PG (CSE / DS / AIML/ CyS/ IT)**
Discipline	**CSE**
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic knowledge of Natural Language Processing, Machine Learning, Programming and Tools
Specific skill set	Programming, theoretical reasoning etc.

Name and Signature of PI & Co-PI

Dr. Urmila Shrawankar (PI)
Professor, CSE (DS)

Name & Signature of Head of Department
CSE (DS)

Ms.Pallavi Hiwarkar (Co-PI)
Asst. Prof., CSE (DS)

21. Title of the Project	DeepFake Detection
Name of the Principal Investigator (PI)	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	• DeepFake is an AI-based technique for synthesizing human images. It involves using Generative Adversarial Networks (GANs) to combine and superimpose existing images and videos onto source images or videos, creating highly realistic fake content. • DeepFake Detection is the task of detecting fake videos or images that have been generated using deep learning techniques. • DeepFake is created by combining and superimposing existing images and videos onto Source images or videos using deep learning techniques.
Expected outcomes of the project	• It aims at discovering the distorted truth of the deep fakes. • It will reduce the Abuses' and misleading of the common people on the world wide web. • It will distinguish and classify the video as DeepFake or pristine. • Its Provide a easy to use system for used to upload the video and distinguish whether the video is real or fake
Possible learning outcomes for the interns	• Students will be able learn the emerging technology of AI • Students will be able learn about python new libraries and Generative Adversarial Networks • Students will be able to develop software to differentiate fake and real videos.
Requirements from the interns	
UG / PG Program (Branch)	**UG / PG (CSE / DS / AIML/ CyS/ IT)**
Discipline	**Computer Sci & Engg.**
Technical background (eg. Courses that should have been done, topics that should have been known)	AI techniques, Image Processing, Python
Specific skill set	Programming, theoretical reasoning.

Name and Signature of PI & Co-PI

Dr. Urmila Shrawankar (PI)
Professor, CSE (DS)

Ms.Priya Khobragade (Co-PI)
Asst. Prof., CSE (DS)

Name & Signature of Head of Department
CSE (DS)

22. Title of the Project	A Multicriteria Heuristic Approach to Enhance Cloud Computing Performance
Name of the Principal Investigator (PI), Department	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	Cloud computing is a distributed, virtualized, scalable, and ubiquitous computing paradigm. It is used to assess large-scale scientific applications in the form of scientific workflows. The workflows would be scheduled and managed using a multicriteria-based approach in the proposed method. Cluster based approach could be used to provide fault tolerance in data intensive tasks. Load sharing mechanism would manage the energy efficiency.
Expected outcomes of the project	The goal of the suggested systems is to enhance the following aspects of a cloud-based environment: • Reduce the execution time • Minimize the execution cost • Decrease the energy consumption
Possible learning outcomes for the interns	Interns would be able to: • Understand the mechanism of cloud based environment. • Relate to how resources are scheduled and manage in clouds.
Requirements from the interns	
UG / PG Program (Branch)	**UG / PG (CSE / DS / AIML/ CyS/ IT)**
Discipline	**Computer Sci & Engg.**
Technical background (eg. Courses that should have been done, topics that should have been known)	Cloud Computing
Specific skill set	Programming, theoretical reasoning, use of Simulator

Name and Signature of PI & Co-PI

Dr. Urmila Shrawankar (PI)
Professor, CSE (DS)

Name & Signature of Head of Department
CSE (DS)

Ms. Reetu Gupta (Co-PI)
Asst. Prof., CSE (DS)

23. Title of the Project	**Translator for Number Images in Multiple Languages**
Name of the Principal Investigator (PI), Department	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	India is a multilingual nation where people speak many languages and use many scripts for writing numerals. People are unable to read numerical text from one language to another due to a lack of language proficiency. This suggested approach uses natural language processing (NLP) to handle the issue of reading numerical text from one language to another. Optical characters are used to extract text and numbers from pictures. Number text is translated from one regional language to another using a rule-based technique. Speech synthesis will be utilized to produce the text in voice form.
Expected outcomes of the project	To translate number text from one regional language to another regional language and also giving pronunciation to English number text and regional language number text. Google currently has a translator for regional text conversion but not for numbers.
Possible learning outcomes for the interns	Learn and implement technology Natural language processing , Neural Network design for character Recognition, rule based approach, speech synthesis, machine learning.

Requirements from the interns	
UG / PG Program (Branch)	UG/PG/CSE/DS/CySec/AIML
Discipline	Computer Science and Engineering
Technical background	Natural Language Processing, Machine Learning
Specific skill set	Python programming, simulators, theoretical reasoning

Name and Signature of PI & Co-PI

Dr.Urmila Shrawankar (PI)

Ms.Sruthi Nair(Co-PI)

Prof.A.Karandikar
Head of Department
CSE(Data Science)

24. Title of the Project	Cross Modal (Bi-lingual) text recognition from natural scene Images
Name of the Principal Investigator (PI) Department	Dr. Urmila Shrawankar CSE (DS)
Place of Work/Department	Shri Ramdeobaba College of Engineering and Management
Brief description of the project	With an ever increasing demand in digital world, when there is a need of image document analysis and processing then accurate text identification and recognition has become an important key area. For language variations like Bi-lingual or multilingual scripts can be used for extraction which range from simple to complex images. This project can be designed to focus the challenges and complex issues of text recognition in bilingual natural scene images. Major crucial factors needs to be discovered and mentioned which become the bottlenecks in correct and accurate recognition.
Expected outcomes of the project	• Design and implementation of cross modal algorithms • Bi-lingual text recognition from the natural scene images
Possible learning outcomes for the interns	Students can be able to understand how language processor works with the help of multilingual scripts
Requirements from the interns	
UG / PG Program (Branch)	**UG / PG (CSE / DS / AIML/ CyS/ IT)**
Discipline	**Computer Sci & Engg.**
Technical background	Natural Language Processing
Specific skill set	Programming, theoretical reasoning

Name and Signature of PI & Co-PI

Dr. Urmila Shrawankar (PI)
Professor, CSE (DS)

Name & Signature of Head of Department
CSE (DS)

Ms. Vaishali Katkar (Sahare) (Co-PI)
Asst. Prof., CSE (DS)

25. Title of the Project	**Experimental optimization of manufacturing process using novel coolant and use of modern computational techniques.**
Name of the Principal Investigator (PI), Department	**Dr. Yogesh V. Deshpande (PI)** Department of Industrial Engineering, RCOEM (**Mob No: 9096192751**)
Place of Work/Department	Vertical milling centre, CIIIT, RCOEM, NAGPUR Workshop, Department of Industrial Engineering, RCOEM, Nagpur
Brief description of the project	➢ **Development** of **novel environmental friendly metalworking fluids** is a desired of **manufacturing sectors**. In present work, **new coolant** can be recommended for **experimental optimization** of any **machining process.** ➢ The use of **recently developed modern computational techniques** will be **preferred for analysis** of work results. For more information regarding previous publication, pl refer https://www.scopus.com/authid/detail.uri?authorId=57201073732
Expected outcomes of the project	➢ Developed novel cooling would be useful to industrial sector ➢ Saving cost and develop environmental friendly system
Possible learning outcomes for the interns	The possible learning outcomes for the interns are as follows: ➢ To study and use advanced optimization tools ➢ To patent/publish the research results in SCI/SCOPUS indexed journals

Requirements from the interns	
UG / PG Program	UG/PG
Discipline	Any branch of Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	No restriction, only elementary knowledge is required.
Specific skill set (eg.	No restriction, only elementary knowledge is required.

Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment's such as CRO, Electron Microscope etc.)	

Dr. Yogesh V. Deshpande (PI)

Department of Industrial Engineering, RCOEM

Dr. M. M. Gupta

Name & Signature of Head of Department

26. Title of the Project	**Productivity improvement in Solar photovoltaic cells generation and its techniques.**
Name of the Principal Investigator (PI), Department	**Prof. Sachin Pund (PI)** Department of Industrial Engineering, RCOEM (**Mob No: 9423101930**)
Place of Work/Department	Department of Industrial Engineering, RCOEM, Nagpur
Brief description of the project	Optimization plays an important role in optimizing production cost. It has potential to save around 30% Production cost by reducing down Material handling cost. There will be Different combinations and Dimensions need to analyze. Initial part of this work is started; the later Part of research is to be investigated.
Expected outcomes of the project	Development of novel technique of Optimization, which will be justified and validated through advanced computerized Programming.
Possible learning outcomes for the interns	The possible learning outcomes for the interns are as follows: 3. **To learn cost effectiveness of Solar photovoltaic cells generation, various modeling and optimization** tools. 4. **To implement the advanced algorithms** in experimental environment. 2. To optimize the process parameters **and present the research results in conferences and journals**

Requirements from the interns	
UG / PG Program	UG/PG
Discipline	**Any branch of Engineering**
Technical background (eg. Courses that should have been done, topics that should have been known)	Applications of Interdisciplinary.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment's such as CRO, Electron Microscope etc.)	Students from Interdisciplinary could apply…

Prof. Sachin S. Pund — Name and Signature of PI

Dr. M. M. Gupta — Name & Signature of Head of Department

27. Title of the Project	Reliability Analysis
Name of the Principal Investigator (PI), Department	Dr. A.S. Chatpalliwar Industrial Engineering
Place of Work/Department	Industrial Engineering
Brief description of the project	Reliability is defined as the probability that a product, system, or service will perform its intended function adequately for a specified period of time, or will operate in a defined environment without failure. Various techniques involved in reliability analysis are Failure mode effect analysis, Bath tub curve analysis and Reliability testing. Project focuses on understanding the various parameters associated with the reliability of product and its detailed analysis.
Expected outcomes of the project	To understand the methodology of identifying various failure and failure modes. To quantify the reliability and suggest any improvement during design, manufacturing and working phase of the product.
Possible learning outcomes for the interns	Students will understand various distributions and its application in failure analysis, its interpretation. Students will able to use various reliability testing and analysis techniques. Students will able apply the knowledge of reliability analysis start from the designing phase of product and improve the reliability of the product.

Requirements from the interns	
UG / PG Program (Branch)	UG Program
Discipline	Industrial, Mechanical, Electrical, Civil, Electronics
Technical background (eg. Courses that should have been done, topics that should have been known)	Statistics
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Simulation and statistical Software.

Dr. A. S. Chatpalliwar

Name and Signature of PI

Dr. M. M. Gupta

Name & Signature of Head of Department

28. Title of the Project	**Application of advanced algorithms for green machining of Aircraft materials- a step towards sustainable manufacturing**
Name of the Principal Investigator (PI), Department	**Dr. Yogesh V. Deshpande (PI)** Department of Industrial Engineering, RCOEM (**Mob No: 9096192751**) **Dr. T. A. Madankar (Co-PI)** Department of Industrial Engineering, RCOEM (**Mob No: 9822714973**)
Place of Work/Department	Department of Industrial and Mechanical Engineering, RCOEM, Nagpur
Brief description of the project	➢ **Manufacturing processes pollute the environment** and **consumes energy**; it is comprehensible that more research is needed. Therefore, a step towards **sustainable manufacturing of Aircraft materials using advanced algorithms is planned** in this research**.** ➢ **This work is divided into 3 parts. 2 parts of work are almost completed;** the later part of research is to be investigated. **In sessions 2021-22 & 22-23, students from Mechanical, Electrical & Engg had published 2 papers in SCI and 2 in SCOPUS indexed journals** based on green manufacturing review, modelling, experimentation and use of advanced computational techniques.
Expected outcomes of the project	➢ Application of sustainable approach for machining of aircraft materials ➢ Manufacturing society would be benefited by getting research outcomes ➢ Saving cost and develop pollution free environment using sustainable machining
Possible learning outcomes for the interns	The possible learning outcomes for the interns are as follows: ➢ To learn various **modeling and optimization** tools ➢ To implement the advanced algorithms in experimental environment ➢ To present the research results in **SCI/SCOPUS indexed journals**

Requirements from the interns	
UG / PG Program	UG/PG
Discipline	Any branch of Engineering

Technical background (eg. Courses that should have been done, topics that should have been known)	No restriction, only elementary knowledge is required.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment's such as CRO, Electron Microscope etc.)	No restriction, only elementary knowledge is required.

Dr. Yogesh V. Deshpande (PI)

Department of Industrial Engineering, RCOEM

(Dr. T. A. Madankar (Co-PI)

Department of Industrial Engineering, RCOEM

Dr. M. M. Gupta

Name and Signature of PI & Co-PI

Name & Signature of Head of Department

29. Title of the Project	Design and Simulation of Channel Model for 5G Wireless Communication Systems
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Mridula Korde
Place of Work/Department	Department of Electronics and Communication
Brief description of the project	The standardization process of the fifth generation (5G) wireless communications has recently been accelerated. The increasing of enormous smart phones, new complex scenarios, large frequency bands, massive antenna elements and dense small cells will generate big datasets and bring 5G communication to the era of big data. This research will investigate various applications of big data analytics, especially machine learning algorithms in wireless communications and channel modeling. We propose a big data and machine learning enabled wireless channel model framework. The proposed channel model will be based on artificial neural networks (ANNs). This project will focus on 1. To study of the basic propagation mechanisms affecting the performance of wireless communication systems 2. To design and simulation of wireless channel model under the severe constraints of fading and multipath propagation.
Expected outcomes of the project	Research paper based on innovative channel modelling
Possible learning outcomes for the interns	After working on the research project, interns will be able to •apply knowledge of communication engineering domain to develop channel model •perform and analyse simulations under extensive experimental conditions •communicate research results with academic standards orally as well as in writing.

Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	EC,EN

Technical background (eg. Courses that should have been done, topics that should have been known)	Fundamental knowledge of Analog and Digital Communication Systems, Wireless Communication, Probability Theory, Machine learning algorithms
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs,)	Design tools like MATLAB, Python

Name and Signature of PI & Co-PI

Dr. (Mrs.) Mridula Korde

Name & Signature of Head of Department

Dr. D.J.Dahigaonkar

30. Title of the Project	**ML based analysis of Resonator for space application**
Name of the Principal Investigator (PI), Department	Prof. Shubham Anjankar, Electronics Engineering Dr. Suresh Balpande, CSE (ALML) Dr. Prasanna Deshpande, Electronics and Communication
Place of Work/Department	Electronics Engineering
Brief description of the project	Data set generation use SRIM/TRIM software and ML based analysis of different material based energy harvester for space applications.
Expected outcomes of the project	Research Paper
Possible learning outcomes for the interns	Data set creation, ML based applications

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	CSE, CSE(ALML), CSE(DS), ECS
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic of ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python programming

Name and Signature of PI & Co-PI Name & Signature of Head of Department

31. Title of the Project	ML based analysis of RF MEMS switch for space application
Name of the Principal Investigator (PI), Department	Prof. Shubham Anjankar, Electronics Engineering Dr. Suresh Balpande, CSE (ALML) Dr. Deepak Khuslani, Electronics and Communication
Place of Work/Department	Electronics Engineering
Brief description of the project	Data set generation use SRIM/TRIM software and ML based analysis of different material based energy harvester for space applications.
Expected outcomes of the project	Research Paper
Possible learning outcomes for the interns	Data set creation, ML based applications

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	CSE, CSE(ALML), CSE(DS), ECS
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic of ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python programming

Name and Signature of PI & Co-PI Name & Signature of Head of Department

32. Title of the Project	Optical Digital Pupilometer for dieses detection
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Jayu P. Kalambe
Place of Work/Department	Department of Biomedical Engineering, RCOEM, Nagpur
Brief description of the project	Focus of this work will be to develop a low cost Digital Pupilometer for ICU patient. Specifically IR camera will be fitted into the spectaculars to take the in-depth images from Eye which can be further analyse using image processing for dieses detection.
Expected outcomes of the project	Low cost Digital Pupilometer Development
Possible learning outcomes for the interns	To enrich the basic knowledge of device design, 3D printing , Image capturing and analysis

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics that should have been known)	Understanding of Basic electronics devices
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Interested in development of system using electronic component

Dr. (Mrs.) J. P. Kalambe

Supervisor & Head of Department

33. Title of the Project	Design of system for Phenylketonuria (PKU) detection
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Jayu P. Kalambe
Place of Work/Department	Department of Biomedical Engineering, RCOEM, Nagpur
Brief description of the project	Phenylketonuria (PKU) is a rare genetic disorder that interferes with the body's ability to digest the amino acid phenylalanine. We propose to use non-invasive techniques to detect the levels of phenylalanine which will lead to detection of PKU. The sample are taken from sweat, urine or breathe of the infant. The sensors will be functionalized and the readout method will be developed for detection purpose. Experimentation will be carried out to verify the proposed approaches. Early & Non-invasive detection will help to provide quick treatment to infant.
Expected outcomes of the project	In this project we will design and fabricate the system for detection of PKU.
Possible learning outcomes for the interns	To enrich the basic knowledge of sensor & system design

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics that should have been known)	Understanding of Basic electronics devices, sensors & systems
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Interested in development of system using electronic component, Chemical analysis

Dr. (Mrs.) J. P. Kalambe

Supervisor & Head of Departmen

34. Title of the Project	Design of POC device for Biochemical analysis
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Jayu P. Kalambe
Place of Work/Department	Department of Biomedical Engineering, RCOEM, Nagpur
Brief description of the project	POC for some dieses (Kidney, heart) detection using biochemical analysis of blood
Expected outcomes of the project	In this project POC device will be developed for dieses detection
Possible learning outcomes for the interns	To enrich the basic knowledge of POC , sensor & system design

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics that should have been known)	Understanding of Basic electronics devices, sensors & systems
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Interested in development of system using electronic component, Chemical analysis

Dr. (Mrs.) J. P. Kalambe

Supervisor & Head of Department

35. Title of the Project	Development of sensor for Heavy metal ions detection
Name of the Principal Investigator (PI), Department	Prof. Anju Gupta Biomedical Engineering
Place of Work/Department	Centre for Microsystems
Brief description of the project	This project based on paper based / PCB based IDE sensor, read out circuit, and mobile app design for heavy metal ions detection.
Expected outcomes of the project	It will be useful for water quality measurement.
Possible learning outcomes for the interns	1) Intern will able to design low cost paper/ PCB based sensor 2) Intern will able to design Electronic Circuit 3) Intern will able to design mobile application

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	Electronics engg, Electronics and Communication, Computer science, Electrical engg ,Biomedical Engg
Technical background (eg. Courses that should have been done, topics that should have been known)	Electronic Circuit, Chemistry, Mobile app
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Programming skill, Electronic Circuit design

Prof. Anju Gupta

Signature of Head of Department

36. Title of the Project	Development of Tracking Device
Name of the Principal Investigator (PI), Department	Dr . Vivek khetade Biomedical Engineering
Place of Work/Department	Centre for Microsystems
Brief description of the project	Focus of this work is to develop the tracking device through optical or electromagnetic concept. The movment of the tip of tool in 3D images needs to be tracked. Tools is connected to be through the USB port.
Expected outcomes of the project	It will be used for cutting the damaged tissues of human body part.
Possible learning outcomes for the interns	1) Intern will able to design Electronic Circuit

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	Electronics engg, Electronics and Communication, Computer science, Electrical engg ,Biomedical Engg
Technical background (eg. Courses that should have been done, topics that should have been known)	Electronic Circuit, fundamental of optical devices, electromagnetic waves fundamental , image modalities
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python based Programming skill, Electronic Circuit design

Dr . Vivek khetade

Signature of Head of Department

37. Title of the Project	Design and development of point-of-care device for biomedical application.
Name of the Principal Investigator (PI), Department	Jitendra B. Zalke
Place of Work/Department	Biomedical Engineering
Brief description of the project	Design and development of point-of-care sensor/device for measurement of Glucose/Albumin concentration.
Expected outcomes of the project	Sensor design for POC device
Possible learning outcomes for the interns	Intern will learn to design low cost paper / PCB based sensor, its testing and analysis

Requirements from the interns	
UG / PG Program (Branch)	UG Program (ENCS/E&C/Biomedical Engineering)
Discipline	ENCS/E&C/Biomedical Engineering
Technical background (e.g. Courses that should have been done, topics that should have been known)	Basics of Electronics
Specific skill set (e.g. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Basics of Electronics

Jitendra B. Zalke Name & Signature of Head of Department

38. Title of the Project	Development of Biomedical Instrumentation System for cardiac application
Name of the Principal Investigator (PI), Department	Dr. J.A.Shrawankar (Department of Biomedical Engineering)
Place of Work/Department	Department of Biomedical Engineering
Brief description of the project	Now a days cardiac arrest is a life threatening at early age. So there is a need of developing an electronic system for early detection of cardiac arrest and monitoring. In this project intern will be asked to develop/assemble the various cardiac related devices like sensors, controller and communication units .
Expected outcomes of the project	Development of hardware for cardiac monitoring system.
Possible learning outcomes for the interns	Understanding of cardiovascular system and ECG Interpretation of ECG and related abnormalities

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Electronics, Biomedical, Electronics Communication
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic knowledge of electronic circuit design is needed.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Basic knowledge of circuit interfacing and programming needed.

Dr. J.A.Shrawankar Name & Signature of Head of Department

39. Title of the Project	Detection of Large-Scale Tampered Region of a Forgery Image
Name of the Principal Investigator (PI), Department	Dr. Bhumika Neole
Place of Work/Department	Department of Electronics and Communication Engineering
Brief description of the project	Basic theme of the research work is to understand the different forgery detection methods. The aim is to propose new approach to detect and localize the large scale (deep fakes) tampered region in a forger image or forger video system. Active image forgery detection involves two major approaches digital watermarking and signatures. These are two techniques used in active forensic techniques to inject legitimate information into images. Passive detection techniques can be applied for detection of small or large areas of tampering as it relates with prior knowledge of authentication where we need the database of various possibilities of one kind of image. Finding the region of forgery with shadow or reflection consist new research. With the invention of new communication technologies, new features and facilities are provided in a smart healthcare framework. The features and facilities aim to provide a seamless, easy-to-use, accurate, and real-time healthcare service to clients. As health is a sensitive issue, it should be taken care of with utmost security and caution. This article proposes a new medical image forgery detection system for the healthcare framework to verify that images related to healthcare are not changed or altered. The system works on a noise map of an image, applies a multi-resolution regression filter on the noise map, and feeds the output to support-vector-machine-based and extreme-learning-based classifiers. The noise map is created in an edge computing resource, while the filtering and classification are done in a core cloud computing resource. In this way, the system works seamlessly and in real time. The bandwidth requirement of the proposed system is also reasonable.
Expected outcomes of the project	The performance based on the proposed detection technique for finding tampered region of forger image and would be derived as to how the proposed system is better than the existing ones.

Possible learning outcomes for the interns	To understand the different forgery detection methods.

Requirements from the interns	
UG / PG Program (Branch)	UG Program EC
Discipline	EC
Technical background (eg. Courses that should have been done, topics that should have been known)	Digital Signal Processing, Image Processing
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	MATLAB, Python

Name and Signature of PI Name & Signature of Head of Department

40. Title of the Project	Forecasting Signal Strength: Predictive Modeling for Enhanced Connectivity
Name of the Principal Investigator (PI), Department	Ashwini Zadgaonkar, Bhagyashree Hambarde, Sruthi Nair
Place of Work/Department	CSE- Data Science
Brief description of the project	This system delves into forecasting signal strength across diverse environments. Unveil the journey of harnessing historical data, extracting critical features, and crafting models that decode the nuances of signal strength variations. Specifically, a model that focuses on the ITU-R model's calculation of signal coverage prediction in a mobile channel—which is utilized to train the ANN to lower average deviations—will be constructed. Furthermore, the signal can be well interpreted by NLP techniques to be converted to textual form.
Expected outcomes of the project	The signal deviations can be minimised and its status will be automatically articulated in textual form. **Outcomes:** Research Publications, Patent
Possible learning outcomes for the interns	Machine Learning, Deep Learning Networks, Natural Language Processing

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Data Science, Computer Science and Engineering, AIML
Technical background	Machine Learning, Natural Language Processing
Specific skill set	Python Programming, theoretical reasoning, simulators

Ashwini Zadgaonkar

Bhagyashree Hambarde

Sruthi Nair

Name and Signature of PI

Prof. Aarti Karandikar

Name & Signature of Head of Department

41. Title of the Project	Eye Image Analysis
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Richa R. Khandelwal
Place of Work/Department	Department of Electronics and Computer Science, RCOEM, Nagpur
Brief description of the project	Many important eye diseases as well as systemic diseases manifest themselves in the retina. While a number of other anatomical structures contribute to the process of vision. Under this work analysis of eye images will be performed.
Expected outcomes of the project	Developed project can analyze eye images for various studies.
Possible learning outcomes for the interns	After working on the research project, Interns will be able to • learn and then apply knowledge related to Image Processing • implement algorithms contentedly using simulation tools and experimental environment • communicate research results with academic standards orally as well as in writing.

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics that should have been known)	Fundamentals of image processing.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Interns should have the basic knowledge of implementation of algorithms in Python.

Dr. (Mrs.) R. R. Khandelwal

Supervisor Head of Department

42. Title of the Project	Design an IoT Based Office Security System
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Richa R. Khandelwal
Place of Work/Department	Department of Electronics and Computer Science, RCOEM, Nagpur
Brief description of the project	Focus of this work will be to develop a low cost and efficient solution for small offices.
Expected outcomes of the project	Develop model to design Office Security System
Possible learning outcomes for the interns	After working on the research project, Interns will be able to • learn and apply knowledge related to IoT • implement algorithms contentedly using simulation tools and experimental environment • communicate research results with academic standards orally as well as in writing.

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics that should have been known)	Understanding of IoT, Arduino, Rasberry Pi standard models
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Interested in development of system using Arduino/Rasberry Pi models

Dr. (Mrs.) R. R. Khandelwal

Supervisor Head of Department

43. Title of the Project	Analysis and Design of Visualization of Database using Power BI Tool
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Richa R. Khandelwal
Place of Work/Department	Department of Electronics and Computer Science, RCOEM, Nagpur
Brief description of the project	The amount of data gathered by entities has increased dramatically due to the digitization or digitalization of their operational activities along with the evolution of new technologies such as the IoT (Internet of Things). This vast amount or volume of data has no or little value unless it can be accessed and processed effectively; therefore, the proper velocity of a variety of data to be measured, processed, and communicated is a fundamental variable to be reached for a viable dataset to be used in decision-making problems or as parameters for performance indicators. Business intelligence (BI) systems have become increasingly essential for entities to make educated judgments about their operational procedures, as they efficiently arrange and transform data into knowledge that serves as the foundation for decision-making . This work will deal with the interactive visualization of database using Microsoft Power BI Tool with different modules and will focus on operations of Microsoft Power BI, types of data sources available in Tool and its different related types of visual insights or context.
Expected outcomes of the project	Well designed dashboard for quick analysis and data visualization
Possible learning outcomes for the interns	To enrich the basic knowledge of data visualization and analytics. Well developed dashboard that can help in decision making.

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics	-

that should have been known)	
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Data set preparation skill

Dr. (Mrs.) R. R. Khandelwal

Supervisor Head of Department

44. Title of the Project	Implementation of Image Processing Algorithms using Hardware Platform
Name of the Principal Investigator (PI), Department	Dr. (Mrs.) Richa R. Khandelwal
Place of Work/Department	Department of Electronics and Computer Science, RCOEM, Nagpur
Brief description of the project	Under this work image processing algorithms will be implemented on Hardware platform and their performance will be evaluated.
Expected outcomes of the project	Developed system that can analyze image processing operations.
Possible learning outcomes for the interns	After working on the research project, Interns will be able to • enrich the basic knowledge of image processing algorithm implementation on hardware platform. • communicate research results with academic standards orally as well as in writing.

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	All Engineering Branches
Technical background (eg. Courses that should have been done, topics that should have been known)	Fundamentals of image processing and machine learning.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Students should have the basic knowledge of implementation of algorithms in Python. Interested in development of system using image feature extraction and machine learning that can improve the performance and time required to process the images.

Dr. (Mrs.) R. R. Khandelwal

Supervisor

Head of Department

45. Title of the Project	Car Number plate recognition and Parking Management System
Name of the Principal Investigator (PI), Department	Dr. Rohini S. Ochawar, Electronics Engg.
Place of Work/Department	Electronics Engg.
Brief description of the project	This system can provide a comprehensive solution to the intricate parking in cities. This system may include car detection, number plate detection and recognition, slot detection, slot allocation, in real-time. This progressive system starts with car detection where it detects multiple cars then it detects car's number plate simultaneously, by number plate it will convert image into text format where it'll get car's registered number. In tandem the slot detection and allocation process will take place and slots will be allotted to the car users. All functions can be controlled by the system administrator on website.
Expected outcomes of the project	1. Research paper publication in scopus/ wos 2. Indigenous system development
Possible learning outcomes for the interns	Upon working with this project, the students will have knowledge about 1. Image acquisition 2. Object detection 3. Object Recognition 4. Number plate recognition

Requirements from the interns	
UG / PG Program (Branch)	UG student from 1. Computer Science Engg. 2. AI/ML 3. Data Science 4. Cyber Security 5. Electronics and Communication 6. Electronics Engg.
Discipline	Students from above discipline can apply
Technical background	1. Python 2. Machine learning course
Specific skill set	Programming in Python

Name and Signature of PI & Co-PI Name & Signature of Head of Department

46. Title of the Project	Crop damage assessment using open source optical data due to hailstorm or unseasoned raining
Name of the Principal Investigator (PI), Department	Dr. Rohini S. Ochawar, Electronics Engg.
Place of Work/Department	Electronics Engg.
Brief description of the project	The unseasonal rains can damage the crops like anything. Recently, in Maharashtra, this unseasoned raining have caused extensive crop damage, affecting **3.9 lakh hectares across 22 districts**. A system needs to be developed to assess the crop damage assessment. In this project an open source optical image data of crops is used to assess the crop damage due to hailstorm or unseasoned raining. The project shall be in association with Maharashtra Remote Sensing Application Centre (MRSAC), Nagpur
Expected outcomes of the project	3. Research paper publication in scopus/ wos 4. Indigenous/open source system development for assessment of crop damage
Possible learning outcomes for the interns	Upon working with this project, the students will have knowledge about 5. Image acquisition 6. Object detection 7. Object Recognition 8. Analysis of crop damage

Requirements from the interns	
UG / PG Program (Branch)	UG student from 7. Computer Science Engg. 8. AI/ML 9. Data Science 10. Cyber Security 11. Electronics and Communication 12. Electronics Engg.
Discipline	Students from above discipline can apply
Technical background	3. Python 4. Machine learning course
Specific skill set	Programming in Python

Name and Signature of PI & Co-PI Name & Signature of Head of Department

47. Title of the Project	Computational Complexity Reduction for AI-ML Applications
Name of the Principal Investigator (PI), Department	Prof. Pankaj.U. Joshi Prof. Vipul S. Lande
Place of Work/Department	Electronics Engineering
Brief description of the project	Multipliers are the fundamental building blocks of any neural network algorithm. The recent research literature shows that the training and inference of DNN using floating point 32-bit computations can be replaced by integer arithmetic of 8bit computations. To further explore, we can introduce approximations in computations of weights of model in AI ML algorithms. This can open up the avenues for power reduction, area reductions and fast computations for AI/ML applications. Suggest the improvements to gain advantage in terms of efficient resource utilization/Fast computations/power reductions.
Expected outcomes of the project	Building AL-ML application for data Classification Testing the performance of the AI-ML application for actual and approximate weights. To suggest the optimized model for applications domain like image processing, speech processing, medical signal processing etc.
Possible learning outcomes for the interns	At the end of the research project, intern will demonstrate ability to 1. Reduce the computational complexity for AI-ML applications 2. Trade off accuracy and computational complexity

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	EN, EC, CS, IT, AIML, DS
Technical background	Basics of AI an ML applications, Frameworks, Computer Organization/ Embedded Systems
Specific skill set	Should be able to write a code in C, Python

Name and Signature of PI & Co-PI Name & Signature of Head of Department

48. Title of the Project	Development of Neuron Processing Unit using VEDIC Arithmetic
Name of the Principal Investigator (PI), Department	Dr. Pankaj.U. Joshi V. S. Lande
Place of Work/Department	Electronics Engineering
Brief description of the project	This research project aims to explore the efficiency of Neuron Processing Units (NPUs) designed with traditional modern multipliers versus those incorporating Vedic multipliers. The project will involve implementing and comparing the performance of neural network units using both multiplier architectures, with a focus on Vedic arithmetic principles. The primary goal is to assess the potential benefits of Vedic arithmetic in terms of computational speed, power efficiency, and overall performance for NPU applications.
Expected outcomes of the project	• A detailed analysis of the performance differences between the NPU using Vedic multipliers and the one using modern multipliers. • Insight into the trade-offs in terms of speed, power consumption, and accuracy.
Possible learning outcomes for the interns	Students will learn about • Neural network architecture and design principles. • Implementation skills in Verilog, Python and C for performance analysis and comparison.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	Electronics, Electronics and Communication, Computer Science, AI-ML, DS, IT
Technical background	Digital Circuits, Machine Learning Basics
Specific skill set	Basics of Python, C and Verilog HDL

Name and Signature of PI & Co-PI Name & Signature of Head of Department

49. Title of the Project	**Development of modified viscometer for the measurement of viscosity of fluid**
Name of the Principal Investigator (PI), Department	Dr Bhalchandra M Hardas (PI), RCOEM Dr Mangesh Godbole (Co-PI) , DB college of Pharmacy, Nagpur
Place of Work/Department	Department of Electronics Engg , RCOEM Dadasaheb Balpande college of Pharmacy, Nagpur
Brief description of the project	Viscometer is an instrument which measures the viscosity (Resistance) of fluid. It contains a probe which needs to be dipped in to the solution; internally it contains a rotating motor, and a display unit. The rotation speed (rpm) needs to be set to check the viscosity. When a probe is dipped in to liquid and the motor is started, the motor gives the reading in Centi poise. The proposed project envisages designing and developing modified viscometer for the measurement of viscosity of fluid. Viscosity is a key indicator of quality in a wide range of biotech applications, from pharmaceuticals and mechanical devices to medical laboratories and research centers. Viscosity measurement is important when it comes to determining a wide range of data points.
Expected outcomes of the project	Need to develop: 1. Develop a motor which can rotate in solution. 2. Develop a software which can convert the resistance into viscosity unit centi poise or poise
Possible learning outcomes for the interns	Interns will able to learn various pharmaceutical applications based on viscosity.

Requirements from the interns	
UG / PG Program (Branch)	UG Interns
Discipline	EN/ECE/MECH
Technical background (eg. Courses that should have been done, topics that should have been known)	Instrumentation/Mechatronics
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Programming ,CRO, DSO

Name and Signature of PI & Co-PI Name & Signature of Head of Department

50. Title of the Project	Machine Learning in Antenna Design: An Overview on Machine Learning Concept and Algorithms.
Name of the Principal Investigator (PI), Department	Prof. Archana Tiwari
Place of Work/Department	Electronics Engineering
Brief description of the project	With the growth and wide variety of available data, advanced processing, and affordable data storage, machine learning is witnessing great attention in finding optimized solutions in various fields. Machine learning techniques are currently taking a major part of the ongoing research, and expected to be the key player in today's technologies. The aim of the project is to investigates the applications of machine learning in antenna design.
Expected outcomes of the project	1. To apply ML in antenna design and investigate the results using machine learning in antenna design, compared to the conventional design methods 2. A paper publication in reputed journal/ Conference (SCI /Scopus /WOS).
Possible learning outcomes for the interns	This internship will help student: 1. To develop the understanding in the field of Machine Learning and Data Analysis. 2. It provides an active participation in the electronics industry where advance antennas are essential equipment such as in Samsung, Apple etc. 3. To develop skill and understanding on how to write and publish research paper which will be helpful at a great extent in their post-graduation.

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	EN, EC, Biomedical, CS and all allied branches of CS
Technical background (eg. Courses that should have been done, topics that should have been known)	Graduate level studies in the field of 1. Basics of AI an ML 2. Antennas design

Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Student should have following skill sets: 1. Programming Language : Python, 2. Machine Learning 3. Antenna design tools such as CST/HFSS

Name and Signature of PI & Co-PI Name & Signature of Head of Department

51. Title of the Project	Deep Learning based system module for estimation and analysis of channel state information (CSI).
Name of the Principal Investigator (PI), Department	Prachi Rane
Place of Work/Department	Department of Electronics Engineering
Brief description of the project	CSI represents the characteristics of communication link between transmitters and receiver. Channel characteristics include fading, path loss, interference, Doppler Shift, power decay with distance etc. Transmitted signals are typically reflected and scattered, arriving at the receiver along multiple paths. Due to the mobility of the transmitter, the receiver, or the scattering objects, the channel changes over time. The receiver has to correctly decode the incoming data symbols. So, channel estimation is required to compensate for the distortion introduced in the symbols, as they travel through the channel. Deep learning based module design is expected for estimation and analysis of CSI.
Expected outcomes of the project	Computationally efficient Neural Network architecture design using Deep learning. Parameter Estimation and analysis e.g. BER performance.
Possible learning outcomes for the interns	1. Study of the fundamentals of wireless communication 2. Intern will able to design Deep learning Neural Network architectures for specific application.

Requirements from the interns	
UG / PG Program (Branch)	Computer Science, AI ML, Data Science Engg., Electronics Engg., Electronics and Communication Engg.
Discipline	Electronics Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic Knowledge of Deep Learning and Wireless Communication.
Specific skill set	Python Programming/ MATLAB

(eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	

Name and Signature of PI & Co-PI

Name & Signature of Head of Department

52. Title of the Project	Predictive Models for Disease Outbreaks
Name of the Principal Investigator (PI), Department	Prof. Snehal Laddha
Place of Work/Department	Electronics Engineering
Brief description of the project	• Utilize interpretable models to predict and explain the spread of infectious diseases. • Integrate data from healthcare records, mobility patterns, and environmental factors. • Objectives: Support early intervention, optimize resource allocation in healthcare systems, and enhance public health preparedness.
Expected outcomes of the project	Research publication in SCI/Scopus/ESCI Journals
Possible learning outcomes for the interns	Interns will learn to develop interpretable models using healthcare, mobility, and environmental data to predict infectious disease outbreaks. They will gain expertise in data integration, model interpretability, and collaborate with public health agencies to support early intervention and optimize resource allocation.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	EN, EC, CS, IT, BIOMEDICAL, DS, CYBER
Technical background (eg. Courses that should have been done, topics that should have been known)	Interns should possess a strong background in data science or related fields, with proficiency in programming languages like Python or R.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	A demonstrated willingness to learn and experiment with new technologies, methodologies, and problem-solving approaches is an essential requirement. Adaptability and a proactive attitude towards tackling challenges are highly valued.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

53. Title of the Project	Deep Reinforcement Learning for Cybersecurity Operations
Name of the Principal Investigator (PI), Department	Prof. Snehal Laddha
Place of Work/Department	Electronics Engineering
Brief description of the project	Apply deep reinforcement learning to optimize decision-making in cybersecurity operations. Explore the use of reinforcement learning for adaptive and autonomous response.
Expected outcomes of the project	Research publication in SCI/Scopus/ESCI Journals
Possible learning outcomes for the interns	Interns will acquire hands-on expertise in implementing deep reinforcement learning for adaptive and autonomous cybersecurity response, engaging in interdisciplinary collaboration with cybersecurity experts. They will develop skills in data pre-processing, model optimization, and ethical considerations, fostering a proactive mindset for continuous learning in dynamic cybersecurity environments.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	EN, EC, CS, IT, BIOMEDICAL, DS, CYBER
Technical background (eg. Courses that should have been done, topics that should have been known)	Interns should have a strong technical background in machine learning, deep learning, and Python programming. Familiarity with cybersecurity concepts and data pre-processing techniques are essential for effective project engagement.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	A demonstrated willingness to learn and experiment with new technologies, methodologies, and problem-solving approaches is an essential requirement. Adaptability and a proactive attitude towards tackling challenges are highly valued.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

54. Title of the Project	Optimizing Predictive Maintenance with Edge AI in Industrial IoT
Name of the Principal Investigator (PI), Department	Prof. Snehal Laddha
Place of Work/Department	Electronics Engineering
Brief description of the project	It integrates machine learning models optimized for edge computing to enable real-time equipment failure predictions, reducing latency, improving privacy, and enhancing operational efficiency in industrial settings. By processing data locally, it aims to achieve seamless edge-to-cloud integration and ensure privacy-preserving analytics while maintaining energy-efficient edge devices.
Expected outcomes of the project	Research publication in SCI/Scopus/ESCI Journal/Patent
Possible learning outcomes for the interns	Interns will gain hands-on experience optimizing machine learning models for edge computing, developing skills in privacy-preserving analytics and real-time decision-making. Additionally, they will enhance their understanding of IoT security measures and edge-to-cloud integration, fostering a comprehensive knowledge of cutting-edge technologies in industrial applications.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	All UG
Technical background (eg. Courses that should have been done, topics that should have been known)	Interns should possess a solid technical background in machine learning, edge computing, and IoT, with proficiency in programming languages like Python.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	A demonstrated willingness to learn and experiment with new technologies, methodologies, and problem-solving approaches is an essential requirement. Adaptability and a proactive attitude towards tackling challenges are highly valued.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

55. Title of the Project	ML based analysis of energy harvester for space application
Name of the Principal Investigator (PI), Department	Prof. Shubham Anjankar, Electronics Engineering Dr. Suresh Balpande, CSE (ALML)
Place of Work/Department	Electronics Engineering
Brief description of the project	Data set generation use SRIM/TRIM software and ML based analysis of different material based energy harvester for space applications.
Expected outcomes of the project	Research Paper
Possible learning outcomes for the interns	Data set creation, ML based applications

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	CSE, CSE(ALML), CSE(DS), ECS
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic of ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python programming

Name and Signature of PI & Co-PI Name & Signature of Head of Department

56. Title of the Project	Fraud Transaction Detection using Machine learning
Name of the Principal Investigator (PI), Department	Prof. Lokesh M. Heda, Department of Electronics Engineering
Place of Work/Department	Department of Electronics Engineering
Brief description of the project	Fraud detection is a set of activities undertaken to prevent money or property from being obtained through false pretences. Fraud detection is applied to many industries such as banking or insurance. In banking, fraud may include forging checks or using stolen credit cards. Other forms of fraud may involve exaggerating losses or causing an accident with the sole intent for the pay-out. With an unlimited and rising number of ways someone can commit fraud, detection can be difficult to accomplish. Fraud detection is a critical issue for retailers determined to prevent losses and preserve customer trust. Digitalization is one of the major advancements we have in this time. The global market is at the fingertip of each and every individual through Online purchase. Both for the consumers and sellers, online market tends to give more in terms of profit as well as exposure to a larger community. With the increase in digitalization, there is also increase in the fraudulent activities happening in various domains, mainly in the retail domain. These are detrimental to the ecosystem of online transactions. Machine learning provides an intelligent option in dealing with this challenge.
Expected outcomes of the project	The expected outcome is: 1. An application to solve aforementioned problem using an advanced machine learning system that accurately and efficiently detects and prevents fraudulent activities in online retail transactions. 2. A paper publication in reputed journal/ Conference (SCI /Scopus /WOS).
Possible learning outcomes for the interns	This internship will help student: 1. To develop the understanding in the field of Machine Learning and Data Analysis 2. To develop understanding about recent development in the machine learning models. 3. To develop skill and understanding on how to write and publish research paper which will be helpful at a great extent in their postgraduation.

Requirements from the interns:

Knowledge of Machin learning and models, Python or R fundamentals, Data manipulation, and scripting.	
UG / PG Program (Branch)	BE/ B.Tech in CSE, CSE (AI&ML, Data Science)/ IT/EN/EC/MCA
Discipline	Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Students should have completed or known about following technical points: **Programming:** Topics: Python or R fundamentals, data manipulation, and scripting. **Machine Learning:** Topics: Supervised learning, unsupervised learning, anomaly detection, ensemble methods, dimensionality reduction. **Data Analysis and Visualization:** Topics: Exploratory data analysis (EDA), data visualization techniques. **Model Evaluation and Optimization:** Topics: Evaluation metrics, cross-validation, model optimization techniques. **Project Management:** Topics: Project planning, task organization, collaboration methodologies.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Student should have following skill sets: 1. Programming Language : Python, R 2. Machine Learning 3. Data Processing 4. Data Visualization 5. Model Evaluation 6. Problem - Solving

Name and Signature of PI & Co-PI Name & Signature of Head of Department

57. Title of the Project	Obstacle Detection on Rail Tracks using Deep Learning Model and Edge Computing.
Name of the Principal Investigator (PI), Department	Prof. Lokesh M. Heda, Department of Electronics Engineering
Place of Work/Department	Department of Electronics Engineering
Brief description of the project	Rail transit is developing towards intelligence which takes lots of computation resource to perform deep learning tasks. Among these tasks, object detection is the most widely used, like track obstacle detection, catenary wear, and defect detection and looseness detection of train wheel bolts. But the limited computation capability of the train onboard equipment prevents running deep and complex detection networks. The limited computation capability of the train onboard equipment prevents conducting complex deep learning tasks. Cloud computing is widely utilized to make up for the insufficient onboard computation capability. However, the traditional cloud computing architecture will bring in uncertain heavy traffic load and cause high transmission delay, which makes it fail to complete real-time computing intensive tasks. As an extension of cloud computing, edge computing (EC) can reduce the pressure of cloud nodes by offloading workloads to edge nodes. The onboard equipment on a fast-moving train is responsible for acquiring real-time images and completing a small part of the inference task. Edge computing is useful to help execute the object detection algorithm on the trackside and carry most of the computing power. YOLO model as the object detection model, since it can balance between the real-time and accurate performance on object detection compared with two-stage models.
Expected outcomes of the project	The expected outcome is: 3. An application to solve aforementioned problem in computer vision. 4. A paper publication in reputed journal/Conference (SCI /Scopus /WOS)
Possible learning outcomes for the	This internship will help student: 1. To develop deep learning algorithm for solving problem

interns	in the field of computer vision such as human detection, object detection 2. To develop skill and understanding on how to write and publish research paper which will be helpful at a great extent in their postgraduation. 3. To develop understanding about recent development in the deep learning models.

Requirements from the interns: Knowledge of Deep learning and models, Tensorflow/Pytorch and Open CV. Good command over python programming.	
UG / PG Program (Branch)	BE/ B.Tech in CSE, CSE (AI&ML, Data Science)/ IT/EN/EC/MCA
Discipline	Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Students should have completed or known about following courses: 1. Python Programming 2. Deep learning models (specifically: CNN, YOLO) 3. Computer Vision
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Student should have: 1. Excellent programming/coding skills in Python 2. Must be acquainted with libraries like OpenCV, Pandas, deepface, etc., 3. Experience of development of Deep learning models.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

58. Title of the Project	IoT-Based Child Safety System
Name of the Principal Investigator (PI), Department	Prof. Lokesh M. Heda, Dr. Pankaj U. Joshi Department of Electronics Engineering
Place of Work/Department	Department of Electronics Engineering
Brief description of the project	Safe Transit is an innovative Internet of Things (IoT) based child safety system designed to ensure the secure transit of children from home to school and back. The system incorporates advanced technologies such as face recognition and authentication mechanisms to monitor and authenticate the child's journey. The primary focus is on enhancing child safety by providing real-time tracking, secure authentication, and monitoring of the individuals involved in the child's commute.
Expected outcomes of the project	1. A robust system that significantly improves the safety of children during their commute, reducing the risk of unauthorized access. 2. Parents and school authorities can monitor the child's location and transit details in real-time through a user-friendly interface.
Possible learning outcomes for the interns	Gain hands-on experience in designing and implementing an IoT-based system, including sensor integration, data communication, and device management.

UG / PG Program (Branch)	BE/ B.Tech in CSE, CSE (AI&ML, Data Science, Cyber Security)/ IT/EN/EC
Discipline	Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Students should have completed or known about following courses: 4. Python Programming 5. Embedded systems 6. IOT
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Student should have: 4. Excellent programming/coding skills in Python 5. Must be acquainted with a knowledge of sensor interfacing and IOT 6. Basics of hardware platforms (Raspberry Pi, etc.)

Name and Signature of PI & Co-PI Name & Signature of Head of Department

59. Title of the Project	Deployment of Deep Learning Model on Hardware Platform
Name of the Principal Investigator (PI), Department	Prof. Lokesh M. Heda, Dr. Pankaj U. Joshi Department of Electronics Engineering
Place of Work/Department	Department of Electronics Engineering
Brief description of the project	This research project aims to explore and optimize the deployment of deep learning models on various heterogeneous hardware platforms. The focus will be on developing strategies to enhance model performance, reduce latency, and make efficient use of the available hardware resources. The project will consider real-world deployment scenarios, such as edge devices, to address the challenges associated with diverse computing environments.
Expected outcomes of the project	The expected outcome is: 5. Develop and validate novel strategies for deploying deep learning models that are tailored to specific hardware platforms, taking into account factors like parallelism, memory constraints, and computational efficiency. 6. A paper publication in reputed journal/ Conference (SCI /Scopus /WOS)
Possible learning outcomes for the interns	Develop expertise in using deployment frameworks like TensorFlow, PyTorch, and ONNX, understanding their deployment tools and libraries, and choosing the most suitable framework for specific hardware.

Requirements from the interns: Knowledge of Deep learning and models, Edge AI (NVIDIA Jetson Board), Tensorflow/Pytorch and Open CV. Good command over python programming.	
UG / PG Program (Branch)	BE/ B.Tech in CSE, CSE (AI&ML, Data Science)/ IT/EN/EC/MCA
Discipline	Engineering
Technical background (eg. Courses that should	Students should have completed or known about following courses:

have been done, topics that should have been known)	7. Python Programming 8. Deep learning models (specifically: CNN, YOLO) 9. Computer Vision
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Student should have: 7. Excellent programming/coding skills in Python 8. Must be aquainted with libraries like OpenCV, Pandas, deepface, etc., 9. Experience of development of Deep learning models. 10. Knowledge about NVIDIA Jetson Board and implementation on it.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

60. Title of the Project	Image Restoration technique using Swin Transformer
Name of the Principal Investigator (PI), Department	Dr.(Mrs.) Kanchan Dhote
Place of Work/Department	Electronics Engineering Department
Brief description of the project	Image restoration is a long-standing low-level vision problem that aims to restore high-quality images from low quality images (e.g., downscaled, noisy and compressed images). While state-of-the-art image restoration methods are based on convolutional neural networks, few attempts have been made with Transformers which show impressive performance on high-level vision tasks. In this project, a strong baseline model SwinIR for image restoration based on the Swin Transformer. SwinIR consists of three parts: shallow feature extraction, deep feature extraction and high-quality image reconstruction. In particular, the deep feature extraction module is composed of several residual Swin Transformer blocks (RSTB), each of which has several Swin Transformer layers together with a residual connection. We conduct The experiment will be conducted on three representative tasks: image super-resolution (including classical, lightweight and real-world image super-resolution), image denoising (including grayscale and color image denoising) and JPEG compression artifact reduction.
Expected outcomes of the project	The expected outcome is: 1. An application to solve aforementioned problem using an advanced machine learning system that accurately and efficiently detects and prevents fraudulent activities in online retail transactions. 2. A paper publication in reputed journal/ Conference (SCI /Scopus /WOS).
Possible learning outcomes for the interns	This internship will help student: 1. To develop the understanding in the field of Machine Learning and Data Analysis 2. To develop understanding about recent development in the machine learning models. 3. To develop skill and understanding on how to write and publish research paper which will be helpful at a great extent in their post graduation.

Requirements from the interns

Knowledge of Machine learning and models, Python or R fundamentals, Data manipulation, and scripting.	
UG / PG Program (Branch)	BE/ B.Tech in CSE, CSE (AI&ML, Data Science)/ IT/EN/EC
Discipline	Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Students should have completed or known about following technical points: **Programming:** Topics: Python or R fundamentals, data manipulation, and scripting. **Machine Learning:** Topics: Supervised learning, unsupervised learning, anomaly detection, ensemble methods, dimensionality reduction. **Data Analysis and Visualization:** Topics: Exploratory data analysis (EDA), data visualization techniques. **Model Evaluation and Optimization:** Topics: Evaluation metrics, cross-validation, model optimization techniques. **Project Management:** Topics: Project planning, task organization, collaboration methodologies.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Student should have following skill sets: 1. Programming Language: Python, R 2. Machine Learning 3. Data Processing 4. Data Visualization 5. Model Evaluation Problem - Solving

Name and Signature of PI Name & Signature of Head of Department

61. Title of the Project	Data Driven Assessment and rehabilitation Exercise Physiotheory(SPINE)
Name of the Principal Investigator (PI), Department	Pravin Dwaramwar Associate Professor
Place of Work/Department	Electronics Engineering
Brief description of the project	After surgery patient has to go through rehabilitation process. In India rehabilitation is neglected and has many issues like shortage of physiotherapist., Random Program, wrong Biomechanics, low productivity, poor patient compliance and lack of objectives. Hence there is a need smart systems with  For more details visit https://davidhealth.com/products/ **We will be designing SPINE Assessment and Rehabilitation device**
Expected outcomes of the project	Project is at ideation level. By the end of semester student 1) Design the Hardware architecture of the proposed machine. 2) Architecture of the Software tool for solving major issues. **A Technology Based product/ Patent/ start-up in health care**

Possible learning outcomes for the interns	Product design, Planning, hardware and software design.

Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	Mechanical 01; Electronics/ECE/Electrical : 03; IT/CS: 02
Technical background (eg. Courses that should have been done, topics that should have been known)	Ability to innovate and work with interdisciplinary field. Mechanical : CAD/CAM/CAE Electronics : Microcontroller based system design. C Programming CS/IT/MCA : Software / Mobile App design
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	

Prof. Pravin Dwaramwar — Dr. A.A.Khurshid

Name and Signature of PI & Co-PI — Name & Signature of Head of Department

62. Title of the Project	Design and Development of IoT based Patient Health Monitoring System
Name of the Principal Investigator (PI), Department	Dr. Rakesh K Kadu Information Technology
Place of Work/Department	Information Technology Department, Shri Ramdeobaba College of Engineering and Management
Brief description of the project	A Patient Health Monitoring System is a technology-driven solution designed to continuously track and manage various aspects of an individual's health. This system leverages digital tools, sensors, and software applications to collect, analyze, and present health-related data in real-time. The primary goal is to provide users, healthcare professionals, and caregivers with valuable insights into the patient's well-being, enabling proactive health management and early detection of potential issues. Key Components and Features of a Patient Health Monitoring System: 1. **Sensor Integration:** o Utilizes a variety of sensors (e.g., wearables, medical devices) to capture vital health metrics such as heart rate, blood pressure, oxygen levels, temperature, and more. 2. **Data Collection and Storage:** o Gathers and stores health data securely, often in a cloud-based system, allowing for centralized and accessible information. 3. **Real-time Monitoring:** o Provides real-time tracking of health parameters, allowing immediate awareness of any anomalies or changes in the patient's condition. 4. **Mobile Applications:** o Integrates with mobile applications that serve as user interfaces, enabling patients to view their health data, set reminders, and receive alerts. 5. **Alerts and Notifications:** o Sends timely alerts and notifications to users or caregivers for medication reminders, upcoming

	appointments, or critical changes in health readings.
Expected outcomes of the project	Following are the outcome of Patient Health Monitoring System. 1. **Continuous Monitoring:** o Enable real-time or periodic monitoring of vital signs such as heart rate, blood pressure, oxygen levels, and other relevant health parameters. 2. **Chronic Condition Management:** o Assist patients with chronic conditions in managing their health by tracking symptoms, medication adherence, and lifestyle factors. 3. **Preventive Health:** o Facilitate proactive health management by encouraging users to adopt healthy behaviors, providing health tips, and sending reminders for regular check-ups. 4. **Early Detection of Issues:** o Enable early detection of health issues by analyzing trends and anomalies in health data, allowing for timely intervention. 5. **Remote Patient Monitoring:** o Facilitate remote monitoring of patients, reducing the need for frequent in-person visits, especially for individuals with chronic illnesses or post-surgery recovery. 6. **User Education:** o Provide educational resources to users about their health conditions, medications, and general wellness practices. 7. **Communication and Collaboration:** o Enhance communication between patients and healthcare providers, allowing for secure messaging, video consultations, and data sharing. 8. **Data Analysis and Reporting:** o Offer tools for analyzing health data trends, generating reports, and sharing relevant information with healthcare professionals during consultations. 9. **Emergency Response:** o Include features for emergency response, such as

	alerting emergency contacts or healthcare providers in case of critical health readings or user-reported emergencies. 10. **User Empowerment:** o Empower users to take an active role in managing their health by providing them with actionable insights, personalized recommendations, and the ability to set health goals. 11. **Integration with Wearables:** o Integrate seamlessly with wearable devices to capture additional health data and provide a comprehensive overview of the user's health. 12. **Support for Caregivers:** o Provide features that allow caregivers or family members to monitor the health of their loved ones, especially in cases where users may require assistance. By aligning the app's features and functionalities with these objectives, you can create a Patient Health Monitoring App that addresses the specific needs of patients, healthcare professionals, and caregivers, contributing to improved health outcomes and a more connected healthcare ecosystem.
Possible learning outcomes for the interns	For students involved in developing or studying Patient Health Monitoring Systems, the learning outcomes can be diverse and cover a range of technical, practical, and ethical aspects. Here are some potential learning outcomes for students engaging with a Patient Health Monitoring System: 1. **Technical Competence:** o Students gain proficiency in developing, implementing, and maintaining health monitoring systems, acquiring skills in software development, database management, and system integration. 2. **Understanding Healthcare Technologies:** o Students develop a deep understanding of healthcare technologies, including wearable devices, sensors, and other monitoring tools used in patient health tracking. 3. **Data Management and Analysis:** o Students learn how to handle and analyze health

	data, including data processing, storage, and interpretation to extract meaningful insights. 4. **User Interface (UI) and User Experience (UX) Design:** o Students develop skills in designing intuitive and user-friendly interfaces, considering the needs of both patients and healthcare professionals. 5. **Human-Computer Interaction (HCI):** o Students learn principles of HCI to optimize the interaction between users and the Patient Health Monitoring System, considering usability, accessibility, and user feedback. 6. **Ethical Considerations in Healthcare Technology:** o Students gain insights into ethical considerations related to patient privacy, informed consent, and responsible use of health data in technology applications. 7. **Health Informatics Knowledge:** o Students acquire knowledge in health informatics, understanding how information technology is applied in the healthcare sector to improve patient outcomes and healthcare processes. 8. **Interdisciplinary Collaboration:** o Students develop skills in collaborating with healthcare professionals, understanding their needs and integrating technological solutions into existing healthcare practices. 9. **Problem-Solving and Critical Thinking:** o Students enhance problem-solving skills by addressing challenges in the development and implementation of Patient Health Monitoring Systems, fostering critical thinking in healthcare technology. 10. **Effective Communication:** o Students learn to communicate technical concepts to non-technical stakeholders, including healthcare providers, patients, and caregivers. 11. **Project Management:** o Students gain experience in project management, including planning, execution, and evaluation of

	Patient Health Monitoring System projects. 12. **Research and Innovation:** o Students are encouraged to explore and contribute to research and innovation in the field of health monitoring, staying informed about the latest advancements and contributing to the development of new technologies. These learning outcomes equip students with a multidisciplinary skill set, preparing them for careers in healthcare technology, software development, and other related fields, while also fostering an understanding of the ethical implications and social impact of their work.

Requirements from the interns	
UG / PG Program (Branch)	UG: Computer Science & Engineering, Information Technology, Data Science, Cyber Security, AI & ML
Discipline	Computer Science & Engineering, Information Technology, Data Science, Cyber Security, AI & ML
Technical background	IoT, Mobile App Development, Machine Learning, AI, Database Programming
Specific skill set	Understanding of IoT, Database Programming,

Dr. Rakesh K. Kadu
Principal Investigator

Dr. P. D. Adane
Head, Information Technology

63. Title of the Project	Genetic Algorithm for Text Mining
Name of the Principal Investigator (PI), Department	Dr. Supriya Gupta Bani (Data Science)
Place of Work/Department	CSE (Data Science)
Brief description of the project	Genetic algorithms (GAs) are optimization algorithms inspired by the process of natural selection. They can be applied to various optimization problems, including feature selection in text mining for data mining tasks. The goal is to evolve a set of features (genes) that maximize the performance of a text mining model.
Expected outcomes of the project	A new text mining process to uncover interesting term correlations. The process uses a genetic algorithm to cope with the combinatorial explosion of the term sets. The genetic algorithm identifies combinations of terms that optimize an objective function, which is the cornerstone of the process. We have tested a function designed to optimize the discriminating power of the term sets.
Possible learning outcomes for the interns	Text Information Retrieval, Optimization Analysis

Requirements from the interns	
UG / PG Program (Branch)	UG/PG Branch-Computer Science & Engineering , Data Science
Discipline	Data Science
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine learning, information retrieval

Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python , Excel, Matlab

Dr. Supriya Gupta Bani

Name and Signature of PI & Co-PI

Prof. Aarti Karandikar

Name & Signature of Head of Department

64. Title of the Project	Secure and Resilient IoT Devices: A Multifaceted Approach to Cybersecurity
Name of the Principal Investigator (PI), Department	Prof. Firdous Sadaf M. Ismail & Dr. Rashmi Welekar CSE Cyber Security Department
Place of Work/Department	CSE Cyber Security Department
Brief description of the project	The Internet of Things (IoT) has revolutionized various aspects of our lives, integrating smart devices into homes, businesses, and critical infrastructure. However, this interconnectedness presents significant security challenges, making IoT devices vulnerable to cyberattacks with potentially devastating consequences. This project aims to explore and develop novel solutions for enhancing cybersecurity in the IoT ecosystem. Current IoT security measures are often inadequate, leading to several vulnerabilities: • **Weak authentication and authorization protocols:** Many devices lack robust mechanisms for user authentication and authorization, making them susceptible to unauthorized access. • **Insecure firmware and software:** Outdated firmware and software often contain unpatched vulnerabilities, providing entry points for attackers. • **Limited data encryption:** Sensitive data exchanged between devices may not be encrypted, exposing it to eavesdropping and manipulation. • **Lack of centralized management:** The vast number of diverse IoT devices makes it difficult to manage and update them consistently, leaving them vulnerable to known threats. This project will focus on the following objectives: • Developing robust authentication and authorization protocols for IoT devices. • Exploring secure firmware and software development methodologies for enhanced security. • Investigating and implementing efficient data encryption techniques for secure data communication. • Designing a centralized management platform for streamlined

	deployment of security updates and vulnerability mitigation strategies. • Evaluating and analysing the effectiveness of proposed solutions through rigorous testing and simulations.
Expected outcomes of the project	• Development of innovative and effective solutions for enhancing security in IoT devices and ecosystems. • Improved authentication and authorization mechanisms for secure access control. • Secure firmware and software development practices for reduced vulnerability surface. • Robust data encryption techniques for protecting sensitive information in transit and at rest. • Centralized management platform for efficient deployment of security updates and vulnerability mitigation. • Protect individuals, businesses, and critical infrastructure from cyberattacks targeting IoT devices. • Increase trust and confidence in the adoption and utilization of IoT technologies. • Contribute to a more secure and resilient digital landscape for everyone. • Promote the development of secure and reliable IoT devices and services.
Possible learning outcomes for the interns	Interns will able to • Understand secure firmware and software development principles and practices. • design and develop centralized management platforms for IoT security. • Gain knowledge of vulnerability assessment and penetration testing methodologies. • Perform hands-on experience with industry-standard tools and technologies for IoT security. • Enhance critical thinking skills for evaluating and analysing security risks in IoT deployments. • Learn exposure to cutting-edge research and development in the field of IoT cybersecurity. • Build a network of professionals and researchers in the field of cybersecurity.

	• Develop and implement a secure authentication protocol for a specific type of IoT device. • Design and test a data encryption mechanism for secure communication between IoT devices. • Contribute to the development of a centralized security management platform for a large-scale IoT deployment.

Requirements from the interns	
UG / PG Program (Branch)	UG or PG (Computer Science & Engineering, CSE-Cyber Security, CSE-AIML, CSE-DS, Information Technology and Electronics & Computer Science)
Discipline	B.Tech or M.Tech
Technical background (eg. Courses that should have been done, topics that should have been known)	Computer Networks, knowledge of Cyber Security, IoT and AI-ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Network and Security Simulation tools, JAVA and Python desirable (not mandatory)

Prof. Firdous Sadaf (PI)

Dr. Rashmi Welekar (Co-PI)

Name and Signature

Dr. Rashmi Welekar

Name & Signature of Head of Department

CSE – Cyber Security

65. Title of the Project	Examining the Convergence of Artificial Intelligence and Cybersecurity to Strengthen Detection and Response to Attacks
Name of the Principal Investigator (PI), Department	Prof. Firdous Sadaf M. Ismail CSE Cyber Security Department
Place of Work/Department	CSE Cyber Security Department
Brief description of the project	The rapid advancement of artificial intelligence (AI) is transforming various industries, including cybersecurity. AI has the potential to revolutionize how cyberattacks are detected, prevented, and responded to. This research internship will explore the intersection of AI and cybersecurity, aiming to develop innovative solutions for enhanced attack detection and response. **Problem Statement** Current cybersecurity approaches often suffer from limitations, such as: • **High reliance on manual analysis:** Cybersecurity analysts are tasked with analysing vast amounts of data, leading to fatigue and potential missed threats. • **Slow and reactive response:** Traditional systems often lack the agility to respond effectively to rapidly evolving cyberattacks. • **Difficulty in detecting novel threats:** Existing solutions may struggle to identify zero-day attacks and other previously unknown threats. AI can address these limitations by: • **Automating tedious and repetitive tasks:** AI models can analyse large volumes of data, freeing up human analysts to focus on critical tasks. • **Providing real-time threat detection:** AI can analyse network activity and system behaviour in real-time, detecting anomalies and potential attacks as they unfold. • **Adapting to evolving threats:** AI models can be continuously trained on new data, improving their ability to detect novel threats

	and adapt to changes in the threat landscape. **Project Objectives** This research internship will focus on the following objectives: • Investigate the role of AI in cyberattack detection and response. • Develop AI-powered solutions for automating various cybersecurity tasks. • Design and implement machine learning models for real-time threat detection. • Evaluate the effectiveness and accuracy of proposed solutions through rigorous testing and analysis. • Explore ethical considerations and potential risks associated with using AI in cybersecurity.
Expected outcomes of the project	• Development of novel AI-powered solutions for enhancing cyberattack detection and response capabilities. • Increased efficiency and effectiveness of cybersecurity operations. • Improved detection of and response to emerging cyber threats. • Enhanced understanding of the ethical considerations associated with AI-powered cybersecurity solutions.
Possible learning outcomes for the interns	Interns will able to: • Understand AI's role in cyberattack detection and response. • Develop AI solutions for automating cybersecurity tasks. • Design and implement machine learning models for real-time threat detection. • Evaluate solution effectiveness through rigorous testing and analysis. • Explore ethical considerations and risks of using AI in cybersecurity. • Gain hands-on experience in AI application for cybersecurity. • Enhance problem-solving skills in addressing challenges. • Improve communication skills for presenting technical information. • Develop a critical mindset on ethical implications and future trends.

	• Collaborate with professionals and contribute to cybersecurity advancements. • Lay a foundation for continued learning and specialization in AI and cybersecurity.

Requirements from the interns	
UG / PG Program (Branch)	UG or PG (Computer Science & Engineering, CSE-Cyber Security, CSE-AIML, CSE-DS and Information Technology)
Discipline	B.Tech or M.Tech
Technical background (eg. Courses that should have been done, topics that should have been known)	Computer Networks, knowledge of Cyber Security and AI-ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Network and Security Simulation tools, JAVA and Python desirable (not mandatory)

Prof. Firdous Sadaf

Name and Signature of PI

Dr. Rashmi Welekar

Name & Signature of Head of Department

CSE – Cyber Security

66. Title of the Project	Elevating Security Measures: AI-ML-Driven Detection and Response Systems for Mitigating Social Networking Attacks
Name of the Principal Investigator (PI), Department	Prof. Firdous Sadaf M. Ismail CSE Cyber Security Department
Place of Work/Department	CSE Cyber Security Department
Brief description of the project	In response to the escalating threats plaguing social networking platforms, this initiative aims to fortify security measures through the implementation of state-of-the-art AI-ML-driven detection and response systems. The project focuses on leveraging advanced machine learning algorithms to detect early signs of various social networking attacks, including misinformation, cyberbullying, hate speech, phishing, and identity theft. By automating responsive actions, the system aims to efficiently contain and mitigate the impact of identified threats. Additionally, a real-time monitoring component will enable continuous analysis of social media trends, ensuring adaptability to emerging attack vectors. This project seeks to elevate the security infrastructure of social networking platforms, contributing to a safer and more secure digital landscape for users.
Expected outcomes of the project	• Improved accuracy in identifying early signs of social networking attacks through the application of advanced machine learning algorithms. • Implementation of responsive actions with a high degree of efficiency, automating the containment and mitigation of the impact associated with various attacks. • Development of a dynamic system that adapts in real-time to evolving attack vectors, ensuring resilience against emerging threats in the ever-changing landscape of social media attacks. • Enhanced Platform Security • Reduction in Response Time • Improved User Trust and Confidence • Minimization of False Positives
Possible learning	Interns will be able to

outcomes for the interns	• Gain advanced skills in implementing and fine-tuning machine learning algorithms for the detection of social networking attacks. • Develop the ability to conduct real-time analysis of social media trends, enhancing awareness and responsiveness to emerging threats. • Learn to design and implement automated response strategies to efficiently contain and mitigate the impact of identified social networking attacks. • Collaborate with professionals from various disciplines, bridging the gap between AI-ML technologies and cybersecurity applications. • Develop critical thinking skills in assessing and addressing diverse social networking attacks, including misinformation, cyberbullying, hate speech, phishing, and identity theft. • Understand the scalability of AI-ML models and integration challenges, preparing for the practical implementation of solutions on a broader scale.

Requirements from the interns	
UG / PG Program (Branch)	UG or PG (Computer Science & Engineering, CSE-Cyber Security, CSE-AIML, CSE-DS and Information Technology)
Discipline	B.Tech or M.Tech
Technical background (eg. Courses that should have been done, topics that should have been known)	Computer Networks, knowledge of Cyber Security and AI-ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Network and Security Simulation tools, JAVA and Python desirable (not mandatory)

Prof. Firdous Sadaf

Name and Signature of PI

Dr. Rashmi Welekar

Name & Signature of Head of Department

CSE – Cyber Security

67. Title of the Project	Supply chain threats prevention software for applications
Name of the Principal Investigator (PI), Department	Dr. Rashmi Welekar
Place of Work/Department	Computer Science & Engineering (Cyber Security)
Brief description of the project	Developing a software which can identify any major supply chain-based vulnerabilities present in the application and suggest changes to mitigate them
Expected outcomes of the project	Reduced vulnerability to supply chain threats, protecting the integrity and security of the supply chain. Strengthened resilience against disruptions, minimizing the impact of supply chain attacks on operations.
Possible learning outcomes for the interns	A functional tool designed to monitor, analyze, and prevent potential threats in the supply chain. Also to develop a functional prototype of the supply chain threat prevention tool, showcasing its key features and capabilities. This includes a user interface for easy interaction.

Requirements from the interns	
UG / PG Program (Branch)	UG Program
Discipline	CSE(Cyber Security)
Technical background (eg. Courses that should have been done, topics that should have been known)	Computer Security, Threat Analysis, Vulnerability Assessment
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Java, Python

Name and Signature of PI & Co-PI Name & Signature of Head of Department

68. Title of the Project	Indigenous SIEM Framework: Empowering Endpoint Security for Unconnected Networks
Name of the Principal Investigator (PI), Department	Dr. Charanjeet Dadiyala
Place of Work/Department	CSE Cyber Security
Brief description of the project	The project aims to craft an open-source-based SIEM for unconnected networks, focusing on Windows and NasvIOS, embedding diverse modules for monitoring, threat intel, and analysis, enhancing security capabilities in unconnected environments.
Expected outcomes of the project	Development of a tailored, open-source SIEM platform compatible with unconnected networks, emphasizing Windows and NasvIOS endpoints with enhanced threat detection.
Possible learning outcomes for the interns	• Gain expertise in open-source SIEM frameworks • Acquire in-depth understanding of endpoint security concepts and mechanisms, including monitoring, threat detection, and analysis. • Develop problem-solving abilities by addressing real-world challenges

Requirements from the interns	
UG / PG Program (Branch)	CSE
Discipline	Cyber Security
Technical background (eg. Courses that should have been done, topics that should have been known)	Cybersecurity fundamentals, Computer Networking, Operating Systems, Database,SIEM and Security Tools
Specific skill set (eg. Programming,	Languages like Python, Java, or scripting languages for developing and customizing software modules within the

theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	SIEM framework.

Name and Signature of PI & Co-PI

Name & Signature of Head of Department

69. Title of the Project	GuardianAI: Detecting and Neutralizing Deepfake Threats for Media Integrity	
Name of the Principal Investigator (PI), Department	Dr. Charanjeet Dadiyala	
Place of Work/Department	CSE Cyber Security	
Brief description of the project	Develop an AI-based system that detects and mitigates deepfake content to combat the spread of misinformation and protect against potential harm.The multimedia content can be text, audio, video or image manipulations.	
Expected outcomes of the project	The project strives to create an advanced AI solution for detecting and mitigating deepfake content in various multimedia formats. It aims to develop strong algorithms to identify manipulated videos, images, audio, and text. The anticipated results involve a user-friendly interface enabling users to differentiate between authentic and manipulated media.	
Possible learning outcomes for the interns	• Gain hands-on experience in AI-based deepfake detection methodologies • Acquire expertise in recognizing and analyzing multimedia content across diverse formats, enhancing skills in image processing, audio analysis, and video manipulation detection • Develop coding skills in languages such as Python or R for implementing and refining deepfake detection algorithms.	•

Requirements from the interns		
UG / PG Program (Branch)	CSE	
Discipline	CSE/ AIML/ DS/ CYSE	
Technical background (eg. Courses that should have been done, topics that	• Machine Learning and AI, Programming Skill • Computer Vision, Deep Learning Concepts	•

should have been known)		
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	• Strong coding skills in Python, R, or MATLAB for algorithm implementation and data analysis. • Understanding of deep learning principles and frameworks for AI model development. • Ability to interpret and process multimedia content, employing computer vision and signal processing techniques.	•

Name and Signature of PI & Co-PI Name & Signature of Head of Department

70. Title of the Project	Systematic Review and analysis of NFS Algorithms
Name of the Principal Investigator (PI), Department	Dr. Rashmi Welekar
Place of Work/Department	Computer Science and Engineering (Cyber Security)
Brief description of the project	Recent progress in number field sieve (NFS) has shaken the security of Pairing-based Cryptography. For the discrete logarithm problem (DLP) in finite field, the project describes the systematic review of the NFS algorithms from the following perspectives: the degree α, constant c, and hidden constant o(1) in the asymptotic complexity LQ (α, c). Using the special extended tower NFS algorithm, conducting a thorough security evaluation for all the existing standardized pairing friendly curves as well as several commonly utilized curves. Also comprehensively analysing the security and efficiency of BN, BLS, and KSS curves for different security levels
Expected outcomes of the project	This project will provide an overview of NFS algorithms for pairing based cryptography security evolution from different aspects. Also this will evaluate the security of different pairing friendly curves additionally analysing the curve-side and field-side security of BN, BLS, and KSS curves
Possible learning outcomes for the interns	Proficiency in implementing pairing-based cryptography algorithms demonstrating the ability to translate theoretical concepts in practical implementation and getting a theoretical understanding of pairing-based cryptography along with this also evolving the skills of problem solving and experimental evaluation.

Requirements from the interns	
UG / PG Program (Branch)	B. Tech. Computer Science and Engineering (Cyber Security)
Discipline	Cryptography and Security
Technical background (eg. Courses that should have been done, topics that should have been known)	Cryptography: 1. Public Key Cryptography 2. Pairing Based Cryptography Mathematics: 1. Number Theory 2. Discrete Mathematics Computer Science: 1. Algorithms and Complexity Theory 2. Programming Skills 3.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Number Field Sieve (NFS) Algorithms: 1. Algebraic Number Theory 2. Computational Complexity Security Concepts: 1. Security Protocols 2. Security Models Tools and Libraries: 1. Cryptographic libraries like OpenSSL and other such libraries in python

Name and Signature of PI & Co-PI Name & Signature of Head of Department

71. Title of the Project	Design and implementation of complete shopping assistant for visually impaired person
Name of the Principal Investigator (PI), Department	Dr. Shubhangi Neware Assistant Professor, CSE.
Place of Work/Department	Computer Science and Engineering
Brief description of the project	The proposed VI (Visually Impaired) Assistant will assist the visually impaired people in the super market. It will have modules which are Indoor navigation, Obstacle detection, handheld object recognition, Text to audio conversion. The proposed system is a smart-phone application which works fine in the low light level also. This enable visually impaired people to feel the shopping environment around them. The smart-phone-based obstacle and object detection will be used to detect various objects in the surrounding. The system also provides seamless indoor navigation implemented using available Wi-Fi access points. The system also provides security to the blind via real-time location. Proposed system will provide complete assistance for hassle free shopping to the visually impaired person. Our proposed system is reliable, affordable, practical and feasible.
Expected outcomes of the project	Research Paper in Scopus indexed journal / Patent
Possible learning outcomes for the interns	-Students will learn to perform literature survey -Students will be able to develop program using various libraries and technology. - Students will learn to develop program as per run time environment.

Requirements from the interns

UG / PG Program (Branch)	UG
Discipline	CSE
Technical background (eg. Courses that should have been done, topics that should have been known)	Python Programming OpenCV - Open Computer Vision Library OCR Database management
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Programming

Dr. Shubhangi Neware — Dr. Ramchand Hablani

Name and Signature of PI & Co-PI — Name & Signature of Head of Department

72. Title of the Project	Image classification using graph neural network (GNN).
Name of the Principal Investigator (PI), Department	Dr. Pravin Sonsare and Dr. Khushboo Khurana
Place of Work/Department	Computer Science and Engineering Department
Brief description of the project	Proteins interact with each other using the interface, which is formed by the amino acid residues from each participating protein. The protein interface prediction task is to determine whether particular residues constitute part of a protein. Generally, the prediction for a single residue depends on other neighboring residues. By letting the residues to be nodes, the proteins can be represented as graphs, which can leverage the GNN-based machine learning algorithms.
Expected outcomes of the project	A GNN-based method 1. To learn ligand and receptor protein residue representation and to merge them for pair-wise classification. 2. To predict protein interface.
Possible learning outcomes for the interns	Intern will able to 1. Learn graph neural network and pytorch geometric. 2. Design and experiment with graph neural network based models. 3. Use NVIDIA-DGX server for training models. 3. Perform optimization of model.

Requirements from the interns	
UG / PG Program (Branch)	UG (Computer Science and Engineering)
Discipline	Computer Science and Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Fundamentals of Deep learning
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Programming in python, tensorflow or pytorch, pytorch geometric.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

73. Title of the Project	Medical report generation using Generative AI
Name of the Principal Investigator (PI), Department	**Dr. A. J. Agrawal** CSE (AIML) Department
Place of Work/Department	CSE (AIML)
Brief description of the project	The ratio of availability of doctors as per the population is very low in India. The doctors have to spend lot of their time in generation of medical reports which is a nonproductive, repetitive, monotonous task. If a medical report can be generated my machine with minimal input from the treating doctors then lot of quality time of specialist doctors may be saved. Generative AI, NLP may be used to resolve the issue.
Expected outcomes of the project	Research paper
Possible learning outcomes for the interns	Real life problem definition, modelling, system design, Tools for implementation of Gen AI

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	CSE/CSE(AIML)/CSE(DS)
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep learning, Natural Language Processing
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python, NLTK, GPT, BARD, AWS

Dr. A. J. Agrawal — Dr. S. Balpande

Name and Signature of PI — Name & Signature of Head of Department

74. Title of the Project	Obstacle distance estimation for self driving car
Name of the Principal Investigator (PI), Department	**Dr. A. J. Agrawal** CSE (AIML) Department
Place of Work/Department	CSE (AIML)
Brief description of the project	One of the most fundamental issue of self driving car is the ability to judge the distance of other objects and actors around the vehicle. In road transportation things change quickly, vehicles move close to each other at high speeds. Adverse lighting and weather conditions makes the problem more challenging. A **precise and robust solution using an appropriate sensors, varied software and hardware is required.**
Expected outcomes of the project	Research paper, Patent
Possible learning outcomes for the interns	Real life problem definition, modelling, embedded system design, simulation implementation.

Requirements from the interns	
UG / PG Program (Branch)	UG CSE
Discipline	
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep learning, Image Processing, Algorithms, IOT
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Hardware programming, real time operating system management, experience of interfacing with sensors, Cloud data management

Dr. A. J. Agrawal — Dr. S. Balpande

Name and Signature of PI — Name & Signature of Head of Department

75. Title of the Project	Investigate security challenges in Internet of Things (IoT) devices and propose strategies for securing IoT ecosystems.
Name of the Principal Investigator (PI), Department	Prof. Ashwini Mate
Place of Work/Department	CSE AIML
Brief description of the project	Conduct an in-depth analysis of recent incidents and security standards to identify key security challenges in IoT devices and ecosystems. Categorize identified challenges into device-level vulnerabilities, communication insecurities, data privacy concerns, and network-level threats. Review current security solutions and protocols for IoT, assessing their effectiveness and limitations in addressing identified challenges.
Expected outcomes of the project	significant contribution to addressing the security challenges in IoT devices and fostering a more resilient and secure IoT ecosystem for both industry and end-users **Outcomes:** Patent, Research Publication
Possible learning outcomes for the interns	Simulation and Prototyping, Programing and Development, Machine Learning and data analysis, Security Testing

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Computer Science Engineering, Electronics Engineerign
Technical background (eg. Courses that should have been done, topics that should have been known)	IOT, IIOT, IOT Device Management, Machine Learning, Cloud Computing basics
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Tableau or Matplotlib/Seaborn, Arduino IDE or Platform IO

Prof. Ashwini Mate — Dr. Suresh Balpande

Name and Signature of PI & Co-PI — Name & Signature of Head of Department

76. Title of the Project	A Machine Learning approach to Predict sensitivity of a Bio-FET Biosensor
Name of the Principal Investigator (PI), Department	Dr. Chithraja Rajan
Place of Work/Department	CSE (AIML), 4th Floor, MBA Building
Brief description of the project	• Collect a diverse dataset comprising essential parameters for low-power Bio-FET. • Apply feature selection and preprocessing techniques to clean and normalize the dataset. • Employ machine learning algorithms to train a predictive model on the refined dataset. • The resulting model can then forecast the sensitivity characteristics of Bio-FET under different operational conditions.
Expected outcomes of the project	Quality paper publications in Conference and SCI journals.
Possible learning outcomes for the interns	Learning TCAD tool, ML algorithms, python coding and research paper writing skills.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	ECE, EN, BM, CS (AIML), CS
Technical background (eg. Courses that should have been done, topics that should have been known)	Electronic Devices and Circuits (EDC) and Machine Learning (ML)
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Basics of Python coding

Name and Signature of PI & Co-PI Name & Signature of Head of Department

77. Title of the Project	A Machine Learning approach to Predict Electrical Characteristics of a Low power Semiconductor Device
Name of the Principal Investigator (PI), Department	Dr. Chithraja Rajan
Place of Work/Department	CSE (AIML), 4th Floor, MBA Building
Brief description of the project	• Collect a diverse dataset comprising essential parameters for low-power semiconductor devices. • Apply feature selection and preprocessing techniques to clean and normalize the dataset. • Employ machine learning algorithms to train a predictive model on the refined dataset. • The resulting model can then forecast the electrical characteristics of low-power semiconductor devices under different operational conditions.
Expected outcomes of the project	Quality paper publications in Conference and SCI journals.
Possible learning outcomes for the interns	Learning TCAD tool, ML algorithms, python coding and research paper writing skills.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	ECE, EN, CS (AIML), CS
Technical background (eg. Courses that should have been done, topics that should have been known)	Electronic Devices and Circuits (EDC) and Machine Learning (ML)
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Basics of Python coding

Name and Signature of PI & Co-PI Name & Signature of Head of Department

78. Title of the Project	Design of a Comprehensive Easy-Fast and AI-Supported Disease Recognition & Prediction Model and Quick Responding System in a Re-Designed Health-Care Eco System.	
Name of Principal Investigator (PI)	**Prof. Deepa Das**	
Domain	Healthcare	
Brief description of the project	This approach would be beneficial for remote village areas where doctors can't reach. The primary steps include a wearable jacket integrated with android/web-based app.	
Expected outcomes of the project	Idea would be converted to product. This system would be very useful for village people **Outcome:** Patent, research publications and copyright(s).	
Possible learning outcomes for the interns	Signal processing, Machine learning, Android application development, and calibration process.	

Requirements from the interns		
UG / PG Program	UG or PG	
Discipline	Computer Science & Engineering, Electronics Engineering,	
Technical background (eg. Courses that should have been done; topics that should have been known)	Android application, Machine Learning techniques, Website interface	
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Android Programming, Machine Learning, Digital Signal Processing techniques.	

Date: 06.12.2023

Sign of Principal Investigator (PI) Head of the Dept

79. Title of the Project	Hyperspectral Image Analysis of Food Products Using Machine Learning and Deep Learning
Name of Principal Investigator (PI)	**Prof. Neha P. Lanke**
Domain	Machine learning, Deep Learning
Brief description of the project	This project will be helpful in food industry for analysing food quality parameters using machine learning and deep learning approaches.
Expected outcomes of the project	**Outcome:** Patent, Research Publications and Copyright(s).
Possible learning outcomes for the interns	Hyperspectral Image Processing, Machine Learning and Deep Learning.

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering
Technical background (eg. Courses that should have been done; topics that should have been known)	Machine Learning Techniques, Deep Learning Techniques.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Python programming, Basic Knowledge of Machine Learning and Deep Learning.

Date: 06.12.2023

Neha Lanke

Sign of Principal Investigator (PI) Head of the Dept

80. Title of the Project	Development of a Drone Detection System
Name of Principal Investigator (PI)	**Dr. Nisarg Gandhewar**
Domain	Military
Brief description of the project	The use of drones, whose origin is in the military domain, has been extended to several application fields including traffic and weather monitoring, precision agriculture. Drone intrusions have been reported more frequently these years as drones become more accessible in the market. The abuse of drones puts threats to public and individual safety and privacy. Our main aim to classify bird, plane and drone.
Expected outcomes of the project	This application would be very useful for Military. **Outcome:** Research publications and copyright(s).
Possible learning outcomes for the interns	Image processing, Machine learning, Deep learning, model training. Image annotation.

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering (AIML, DS, Cyber), IT
Technical background (eg. Courses that should have been done; topics that should have been known)	Dataset Handling, Machine learning, Deep learning techniques.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Python, Tensorflow, Pytorch, OpenCV. Image Annotation.

Date: 07.12.2023

Sign of Principal Investigator (PI) Head of the Dept

81. Title of the Project	Development of an Generative AI Based Virtual Dressing Room
Name of Principal Investigator (PI)	**Dr. Nisarg Gandhewar**
Domain	Ecommerce
Brief description of the project	Trying clothes in clothing stores is usually a time-consuming activity. Besides, it might not even be possible to try-on clothes in such cases as online shopping. The problem is simply the alignment of the user and the cloth models with accurate position, scale, rotation and ordering.
Expected outcomes of the project	This system would be very useful for ecommerce industry. **Outcome:** Research publications and copyright(s).
Possible learning outcomes for the interns	Image processing, Deep learning, Generative AI, Android application development, model training.

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering
Technical background (eg. Courses that should have been done; topics that should have been known)	Dataset Handling, Generative AI techniques, Android application.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Python, Pytorch, Tensorflow, OpenCV, Generative Adversarial Network.

Date: 07.12.2023

Sign of Principal Investigator (PI) Head of the Dept

82. Title of the Project	Development of an fruit wax coating identification System
Name of Principal Investigator (PI)	**Dr. Nisarg Gandhewar**
Domain	Food Industry
Brief description of the project	Wax coating identification on fruits is very difficult without a non-destructive method. In general, destructive methods were used to identify wax or coatings by soaking the fruit in hot water or using a mixture of vinegar and water. We need constructive method which can identify whether given fruit is wax coated or not.
Expected outcomes of the project	This system would be very useful for food industry. **Outcome:** Patent, Research publications and copyright(s).
Possible learning outcomes for the interns	Image processing, Machine learning, Deep learning, model training.

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering(AIML,DS,Cyber), IT, Electronics allied branches
Technical background (eg. Courses that should have been done; topics that should have been known)	Dataset Handling, Machine learning, Deep learning techniques.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Python, Sckitlearn, Tensorflow, OpenCV. Camera Interfacing.

Date: 07.12.2023

Sign of Principal Investigator (PI) Head of the Dept

Sign of Principal Investigator (CO-PI)

83. Title of the Project	Model for improving the performance of low resolution images using (Super Resolution Method) Deep Learning
Name of Principal Investigator (PI)	**Prof. Pranali R. Dandekar**
Domain	(Surveillance and security System) Face Recognition
Brief description of the project	The aim of this project is to build a mobile/ web application which would be implemented for processing low resolution images and also help in quality enhancement of the same.
Expected outcomes of the project	✓ Image Denoising ✓ Image Quality Enhancement ✓ Optimized Resolution ✓ Face Tracking ✓ Facial expression detection ✓ To compare proposed methods with the super resolution method, which will improve accuracy? This system would be very useful for Surveillance by face recognition systems in public places **Outcome:** Research publications and copyright(s).
Possible learning outcomes for the interns	Image processing, Deep learning, Machine Learning, Android application development,

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering,
Technical background (eg. Courses that should have been done; topics that should have been known)	Image processing, Deep learning, Machine Learning
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Python Programming, Machine Learning, Deep learning

Date: 07.12.2023

Prof Pranali R. Dandekar

Dr. S. Balpande

Sign of Principal Investigator (PI) Head of the Department CSE-AIML

84. Title of the Project	Model for improving the performance of Tiny face detection Deep Learning technique.
Name of Principal Investigator (PI)	**Prof. Pranali R. Dandekar**
Domain	(Surveillance System) Face detection and recognition
Brief description of the project	Tiny face detection in low resolution images is still a challenging task. This research work targets in detecting tiny faces in the given crowd. Pre-identification mechanism for background removal followed by deep learning method for finding Region of interest is proposed.
Expected outcomes of the project	✓ To design an algorithm for tiny face detection and face recognition model for low resolution images. ✓ Evaluating proposed method on different parameter like, Accuracy, speed, cost. ✓ To compare proposed methods with the state of art method, which will improve accuracy? This system would be very useful for Surveillance by face recognition systems in public places **Outcome:** Research publications and copyright(s).
Possible learning outcomes for the interns	Image processing, Deep learning, Machine Learning

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering,
Technical background (eg. Courses that should have been done; topics that should have been known)	Image processing, Deep learning, Machine Learning
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Python Programming, Machine Learning, Deep learning

Date: 05.12.2023

Prof Pranali R. Dandekar Dr. S. Balpande

Sign of Principal Investigator (PI) Head of the Department CSE-AIML

85. Title of the Project	**Automation of pre-processing of big data**
Name of Principal Investigator (PI)	**Prof. Priya Parkhi**
Domain	Big Data technology and Data Science.
Brief description of the project	The project aims to automate the pre-processing stage of handling Big Data. This involves the cleansing, normalization, and transformation of raw data into a format suitable for analysis. The focus is on developing efficient algorithms and processes to handle large volumes of diverse data sources, ensuring data quality and integrity.
Expected outcomes of the project	Streamlined and automated pre-processing pipelines for Big Data which will ultimately lead to improved data quality and consistency. **Outcome:** Research publications and copyright(s).
Possible learning outcomes for the interns	Big Data processing frameworks (e.g., Apache Spark).

Requirements from the interns	
UG / PG Program	UG
Discipline	Computer Science & Engineering (Artificial Intelligence and Machine learning)
Technical background (eg. Courses that should have been done; topics that should have been known)	Big Data technologies and frameworks, Understanding data formats (e.g., JSON, CSV, Parquet), Data manipulation libraries.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling	Big Data technologies and frameworks, Distributed storage tools, Data-preprocessing techniques, Python

specific laboratory equipment such as CRO, Electron Microscope etc.)	

Date: 06.12.2023

Sign of Principal Investigator (PI) — Head of the Dept

Priya Parkhi — Dr. S. Balpande

86. Title of the Project	Human-robot collaboration using reinforcement learning from human feedback (RLHF)
Name of Principal Investigator (PI)	**Prof. Priya Parkhi**
Domain	Machine Learning and Human-Computer Interaction
Brief description of the project	Development of a system where humans and robots can collaborate seamlessly using reinforcement learning techniques. The primary goal is to enable robots to learn from human feedback, improving their performance and adaptability in dynamic environments.
Expected outcomes of the project	A collaborative human-robot system which would be very useful in various industries. **Outcome:** Patent, research publications and copyright(s).
Possible learning outcomes for the interns	Reinforcement Learning, Interactive Artificial Intelligence, Machine Learning

Requirements from the interns	
UG / PG Program	UG
Discipline	Computer Science & Engineering (Artificial Intelligence and Machine Learning)
Technical background (eg. Courses that should have been done; topics that should have been known)	Machine Learning techniques
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Machine Learning techniques, Python

Date: 06.12.2023

Sign of Principal Investigator(PI)

Priya Parkhi

Head of the Dept

Dr. S. Balpande

87. Title of the Project	Precision Agriculture Using an Intelligent Irrigation Control System
Name of Principal Investigator (PI)	**Durgesh M Sharma**
Domain	Machine Learning, Fuzzy Logic, Cyber Physical Systems, IoT
Brief description of the project	The proposed module employs soft computing, utilizing soil temperature, humidity, and temperature as input parameters to control water flow, irrigation duration, and frequency that will be helpful for Farmers. Fuzzy logic processes crisp numbers for evapotranspiration, incorporating variables like wind speed, air temperature, humidity, and radiation. The inclusion of a genetic algorithm enhances the system's capabilities by forecasting water distribution and demand, managing water shortages, and meeting crop needs effectively.
Expected outcomes of the project	The concept of the product would be transformed. For farmers, this technique would be significantly beneficial. **Outcome:** Research publications and copyright(s).
Possible learning outcomes for the interns	Machine learning, Fuzzy Logic

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering
Technical background (eg. Courses that should have been done; topics that should have been known)	Machine Learning Techniques.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Machine Learning, Python

Date: 07.12.2023

Sign of Principal Investigator (PI) **Head of the Department**

88. Title of the Project	Women's Empowerment through AI: Discovering Data Analytics for Predictive Safety Solutions and Applications
Name of the Principal Investigator (PI), Department	**Dr. Amit Pimpalkar, CSE (AIML)**
Place of Work/ Department	**CSE (AIML)**
Brief description of the project	The project aims to develop a mobile application that utilizes machine learning, deep learning and wearable devices to enhance women's safety and prevent violence against women, cybercrime, online harassment, and cyberbullying. Wearable devices such as Google Glass, Fitbit, and iWatch will be used to collect data, which will be analyzed using machine learning, deep learning techniques to identify patterns and make predictions about behavior. The project's complexity is moderate, and the applicants will learn principles and basic skills for conducting research, skills for paper and patent writing, and gain knowledge in machine learning, deep learning and Android programming.
Expected outcomes of the project	The expected outcomes of the project include: 1. Predictive Safety Solutions: An AI-powered women's safety app can help prevent sexual harassment, violence, and molestation by collecting, recognizing, and interpreting patterns to provide users with pre-generated reports. For example, the app can evaluate different routes to a destination based on previously collected data and suggest the safest route. 2. Women's Health and Safety: AI can provide innovative solutions to the unique challenges faced by women, including tools for women's health and safety, career guidance and skill-building platforms, financial and business management solutions for women entrepreneurs, and education and learning resources for girls and women. AI-powered solutions can also help reduce gender inequality in various areas such as healthcare, education, and employment. 3. Femtech Companies: There are notable AI-powered companies working in the field of femtech, leveraging artificial intelligence to transform women's health. These companies use AI to provide real-world data and insights on women's and reproductive health, pre-diagnose fertility-related illnesses, endometriosis, breast cancer, and more.

Possible learning outcomes for the interns	Interns will have the opportunity to enhance a wide range of skills, including: 1. Research and critical thinking 2. Improve on their technical skills and languages proficiency 3. Writing and verbal communication 4. Develop their teamwork and leadership skills 5. Understanding the workplace and organizational concepts

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Computer Science & Engineering, Information Technology, MCA, Biomedical Engineering, Electronics Engineering, Electronics & Computer Science, Electronics & Communication Engineering, Electronics Design Technology
Technical background (eg. Courses that should have been done, topics that should have been known)	Data Structures and Algorithms, Machine Learning techniques, Data Analytics, Cyber Security, Mobile Applications Interns should also set cognitive development goals for themselves, focusing on learning and applying new knowledge and skills related to the project's domain.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Android/IOS Programming, Python Programming, Database Systems Front-end technologies like HTML, CSS, and JavaScript would be beneficial.

Dr. Amit Pimpalkar
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Email: pimpalkarap@rknec.edu
Name and Signature of PI

Dr. Suresh Balpande
Name & Signature of Head of Department

89. Title of the Project	An Innovative Framework for Identification and Classification of DNA Sequences in Human Genomics
Name of the Principal Investigator (PI), Department	**Dr. Amit Pimpalkar, CSE (AIML)**
Place of Work/ Department	**CSE (AIML)**
Brief description of the project	Identifying and classifying DNA sequences is a crucial task in genomics analysis. Deep learning models have shown great potential in this area, with various architectures being proposed to improve accuracy and efficiency. The research should introduces an innovative framework, the Efficient model, for identifying and classifying DNA sequences in genomics research. Leveraging the hierarchical learning capabilities of this model autonomously extracts intricate features from raw DNA sequences, capturing local and global patterns critical for genomic understanding.
Expected outcomes of the project	The expected outcomes of the project include: 1. The primary goal would be to achieve higher accuracy in identifying and classifying DNA sequences compared to existing models. This could be demonstrated through rigorous evaluation on benchmark datasets and comparisons with state-of-the-art models. 2. The model should exhibit robust generalization capabilities, performing well on diverse datasets and under various conditions. 3. Demonstrate the model's ability to autonomously extract hierarchical features from raw DNA sequences. This could involve showcasing its capability to capture local patterns (e.g., motifs) and global patterns (e.g., genomic structures) that are essential for a comprehensive understanding of genomics. 4. Demonstrate the practical utility of the model in real-world genomics applications. This could include its use in disease diagnosis, drug discovery, or other areas of genomic research. 5. Publish the findings in reputable scientific journals or conferences to contribute to the academic knowledge base in genomics and deep learning.
Possible learning outcomes for the interns	Interns will have the opportunity to enhance a wide range of skills, including: 1. Research and critical thinking 2. Improve on their technical skills and languages proficiency 3. Writing and verbal communication

	4. Develop their teamwork and leadership skills 5. Understanding the workplace and organizational concepts

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Computer Science & Engineering, Information Technology, MCA, Biomedical Engineering, Electronics Engineering, Electronics & Computer Science, Electronics & Communication Engineering, Electronics Design Technology
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning techniques, Data Analytics Interns should also set cognitive development goals for themselves, focusing on learning and applying new knowledge and skills related to the project's domain.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming, Database Systems Front-end technologies like HTML, CSS, and JavaScript would be beneficial.

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Name and Signature of PI

Dr. Suresh Balpande
Name & Signature of Head of Department

90. Title of the Project	A System for Condensing and Simplifying Textual Information using Natural Language Approach in Regional Language
Name of the Principal Investigator (PI), Department	**Dr. Amit Pimpalkar, CSE (AIML)**
Place of Work/ Department	**CSE (AIML)**
Brief description of the project	The project aims to develop a system that can condense and simplify textual information in regional languages using natural language processing techniques. The system will use text summarization and simplification techniques, as well as the analysis of discourse-level aspects of syntactically rewriting text. The system will practice various natural language processing techniques, including clause and appositive identification and attachment, pronoun resolution, and referring-expression generation. The project will not only lead to the development of a system that condenses and simplifies textual information but also improves comprehension for language learners and enhances topic detection and characterization in the regional language. The project will involve the use of front-end development, database management, collaboration and communication, and project management methodologies.
Expected outcomes of the project	1. The project can develop a system that condenses a given document into a required size while preserving the information contained in the original source document. 2. The system can reduce the grammatical complexity of the text while retaining its information content and meaning, making it more accessible to a wider audience. 3. Shorter, simpler sentences and a consistent format can make the content more comprehensible for language learners. 4. The project can develop a methodology to represent textual documents as probabilities of words and discover thematic information, leading to improved topic detection and characterization.

Possible learning outcomes for the interns	Interns will have the opportunity to enhance a wide range of skills, including: 1. Research and critical thinking 2. Improve on their technical skills and languages proficiency 3. Writing and verbal communication 4. Develop their teamwork and leadership skills 5. Understanding the workplace and organizational concepts

Requirements from the interns	
UG / PG Program (Branch)	UG or PG
Discipline	Computer Science & Engineering, Information Technology, MCA, Electronics & Computer Science
Technical background (eg. Courses that should have been done, topics that should have been known)	Data Structures and Algorithms, Machine Learning techniques Interns should also set cognitive development goals for themselves, focusing on learning and applying new knowledge and skills related to the project's domain.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming Front-end technologies like HTML, CSS, and JavaScript would be beneficial.

Dr. Amit Pimpalkar
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Name and Signature of PI

Dr. Suresh Balpande
Name & Signature of Head of Department

91. Title of the Project	Object identification and real time tracking
Name of the Principal Investigator (PI), Department	Abhishek Sahu
Place of Work/Department	AIML Dept
Brief description of the project	The purpose of this project is to develop a system that can identify and track a specific object of interest in real time. The system will leverage computer vision and image processing techniques to analyze a live feed and accurately identify the desired object, enabling continuous tracking as it moves within the frame.
Expected outcomes of the project	A robust object selection and tracking system capable of identifying and tracking a specific object in real time. One SCI/Scopus indexed publication
Possible learning outcomes for the interns	Get familiar with the state-of-the-art models in machine learning and may develop a novel approach to do the task

Requirements from the interns	
UG / PG Program (Branch)	Anyone
Discipline	Open to all
Technical background (eg. Courses that should have been done, topics that should have been	ML/DL algorithms (object segmentation and detection algorithms), Computer vision **Note:** Students with experience in video processing may also apply.

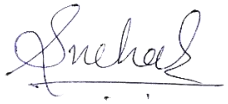
known)	
Specific skill set	ML/DL **AND/OR** Python/C++ **AND/OR** Experience on writing codes for specific development kit i.e. jetson nano, ARM Cortex.

Name and Signature of PI & Co-PI

Name & Signature of Head of Department

92. Title of the Project	Driver Drowsiness Detection
Name of the Principal Investigator (PI), Department	Prof. Snehal Awachat CSE(AIML)
Place of Work/Department	RCOEM
Brief description of the project	Revolutionary driver drowsiness detection employs Haar cascade classifiers and 3D-based mesh face landmark model to monitor yawning and blinking via webcam. Lightweight, OS-independent system triggers alerts, potentially saving lives. Integration with mobile navigation enhances accessibility.
Expected outcomes of the project	Enhanced driver safety achieved through a webcam-based drowsiness detection system. Precise monitoring of yawning and blinking, coupled with prompt alerts, ensures timely intervention. Integration with mobile navigation enhances accessibility, potentially preventing accidents and saving lives.
Possible learning outcomes for the interns	2 Scopus Conferences

Requirements from the interns	
UG / PG Program (Branch)	
Discipline	
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep Learning
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming

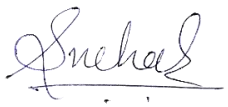


Name and Signature of PI & Co-PI

Name & Signature of Head of Department

93. Title of the Project	Clinical Event Recognition
Name of the Principal Investigator (PI), Department	Prof. Snehal Awachat CSE(AIML)
Place of Work/Department	RCOEM
Brief description of the project	Clinical event recognition with NLP involves using advanced language processing techniques to automatically identify and categorize key events in healthcare text data, improving efficiency and aiding decision-making in clinical settings.
Expected outcomes of the project	The project aims to enhance healthcare by automating clinical event recognition, leading to improved data analysis, faster decision-making, and ultimately, more efficient, and informed patient care through NLP applications.
Possible learning outcomes for the interns	2 Scopus Conferences

Requirements from the interns	
UG / PG Program (Branch)	
Discipline	
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep Learning, Natural Language Processing
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming



Name and Signature of PI & Co-PI

Name & Signature of Head of Department

94. Title of the Project	Development of an Android Application for Assessing Soil Nutrients
Name of Principal Investigator (PI)	**Prof. Suresh Balpande**
Domain	Agriculture
Brief description of the project	This approach would be beneficial for quantifying the concentration of essential elements such as nitrogen, phosphorus, potassium, organic carbon, and others in soil. The primary steps include smartphone camera integration, development of an Android application, and system calibration.
Expected outcomes of the project	Idea would be converted to product. This system would be very useful for farmers, fertiliser shop owners, and other allied agriculture businesses. **Outcome:** Patent, research publications and copyright(s).
Possible learning outcomes for the interns	Image processing, Machine learning, Android application development, calibration process

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering (AIML/DS/CS), Electronics Engineering, Biomedical Engineering, EDT, Information Technology
Technical background (eg. Courses that should have been done; topics that should have been known)	Android application, Machine Learning techniques, Website interface
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Android Programming, Machine Learning, Colour Calibration techniques.

Note: The Firebase interface and Android application are partially ready. To-do lists include UI development, data security, and connecting an Android app to the government's soil health card website.

Date: 05.12.2023

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Dept of CSE (AIML)
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Sign of Principal Investigator (PI)

Dr. Suresh Balpande
Head of the Dept

95. Title of the Project	Development of colour dataset for soil nutrients using colorimetry technique
Name of Principal Investigator (PI)	**Prof. Suresh Balpande**
Domain	Agriculture
Brief description of the project	This dataset would be used to develop an application/portable system for determining the concentration of nutrients (nitrogen, phosphorous, potassium, and organic carbon) in the soil.
Expected outcomes of the project	The concept will be transformed into a tangible thing. This approach would be very advantageous for agriculturalists. **Outcome:** Patent, and research publications
Possible learning outcomes for the interns	Colorimetry technique, Nutrients detection methods, Calibration process

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	ANY BRANCH
Technical background (eg. Courses that should have been done; topics that should have been known)	Engineering Chemistry, Colorimetric detection
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Spectrophotometer, Optical filters, Dataset Management

Date: 05.12.2023

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Sign of Principal Investigator (PI)

Dr. Suresh Balpande
Head of the Dept

Dr. Suraj Butoliya

Sign of Co-Principal Investigator (Co-PI)

96. Title of the Project	A portable soil pH measuring device based on machine learning model and Arduino
Name of Principal Investigator (PI)	**Prof. Suresh Balpande**
Domain	Agriculture
Brief description of the project	This system would be useful to determine soil pH . The pH of the soil, which may be connected to the concentration of main nutrients, might be established with the help of this approach.
Expected outcomes of the project	The concept will be transformed into a tangible thing. This approach would be very advantageous for agriculturalists. **Outcome:** Patent, and research publications
Possible learning outcomes for the interns	Colorimetry technique, Nutrients detection methods, Calibration process

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Computer Science & Engineering (AIML/DS/CS), Electronics Engineering, Biomedical Engineering, EDT
Technical background (eg. Courses that should have been done; topics that should have been known)	Engineering Chemistry, Colorimetric detection,
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Arduino programming, Colour Sensor interfacing, Machine Learning techniques, Dataset Management

Note: Preliminary designs are ready. Only implementation is to be done.

Date: 05.12.2023

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Sign of Principal Investigator (PI)

Dr. Suresh Balpande
Head of the Dept

97. Title of the Project	Machine Learning based automation of non-parameterised structural design analysis
Name of Principal Investigator (PI)	Prof. Suresh Balpande
Brief description of the project	Machine Learning scheme for the design of structure via FEA and ML tools. Neural network algorithm would be used to explore the performance boundaries of designs and achieve superior performances among the variations of complex non-parametric geometries. The proposed method will deal only the geometry information under the same environmental settings, which is far from enough for the simulation of a typical structural design. Once the model is trained, this technique can accurately predict the performance parameters without FEA analysis.
Expected outcomes of the project	Patent, research publications and copyright(s).
Possible learning outcomes for the interns	Students will learn FEA tool, ML tool and interface between two tools. Knowledge of ML techniques and its deployment for simplifying the designs.

Requirements from the interns	
UG / PG Program	UG or PG
Discipline	Any branch
Technical background (eg. Courses that should have been done, topics that should have been known)	Material science, Engineering Mechanics, FEA tool, Structural Design, Programming
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Understanding of structural device modelling, Electro-Mechanical / Electro-Mechanical structures, Machine Learning

Date: 07.12.2022

Dr. Suresh Balpande
Email: balpandes@rknec.edu (M: 8149610400)
Sign of Principal Investigator (PI)

Dr. Nisarg Gandhewar
Sign of Co-Principal Investigator (Co-PI)

Dr. Gajanan Nikhade
Sign of Co-Principal Investigator (Co-PI)

Head of the Dept

Dept of CSE (AIML)

98. Title of the Project	AI Generated Text Detection using deep learning
Name of Principal Investigator (PI)	**Dr. Yogesh Thakare**
Domain	Artificial Intelligence
Brief description of the project	This approach would be beneficial for quantifying the concentration of essential elements such as nitrogen, phosphorus, potassium, organic carbon, and others in soil. The primary steps include smartphone camera integration, development of an Android application, and system calibration.
Expected outcomes of the project	Idea would be converted to web application. This system would be very useful in academic and content-related fields by identifying instances of copied or plagiarized text. **Outcome:** research publications (SCI/SCOPUS/ESCI)
Possible learning outcomes for the interns	Machine learning, Android application/Web application development

Requirements from the interns	
UG / PG Program	UG
Discipline	Computer Science & Engineering (AIML/DS)
Technical background (eg. Courses that should have been done; topics that should have been known)	Android application, Machine Learning techniques, Website interface
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Android Programming, Machine Learning

Date: 07.12.2023

Sign of Principal Investigator (PI) Head of the Dept

99. Title of the Project	Harvest Horizon: Weather and Temperature Forecast for Agriculture
Name of Principal Investigator (PI)	**Dr. Yogesh Thakare**
Domain	Machine Learning
Brief description of the project	Our idea revolves around predicting crop growth by leveraging weather data and various environmental factors. Farmers around the world face the challenge of unpredictable weather conditions, which can significantly impact crop yields and food security. We aim to address this issue by developing an application that uses advanced machine learning algorithms to analyze historical weather data, current weather conditions, biologically effective degree days, heavy precipitation days, mean temperature, and other relevant factor, and more.
Expected outcomes of the project	Idea would be converted to Android App. This system would be very useful to provide accurate predictions of crop growth, enabling farmers to make informed decisions on planting, harvesting, and resource allocation. **Outcome:** research publications (SCI/SCOPUS/ESCI)
Possible learning outcomes for the interns	Machine learning, Android application/Web application development

Requirements from the interns	
UG / PG Program	UG
Discipline	Computer Science & Engineering (AIML/DS)
Technical background (eg. Courses that should have been done; topics that should have been known)	Android application, Machine Learning techniques, Website interface
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Android Programming, Machine Learning

Date: 07.12.2023

Sign of Principal Investigator (PI) Head of the Dept

100. Title of the Project	MFANEDH: Multimodal Fusion of MRI, PET, CT, and Ultrasound Using Advanced Neural Architectures for Enhanced Early Detection of Heart Cancer
Name of the Principal Investigator (PI), Department	Prof. Kiran S. Khandare
Place of Work/Department	CSE-AIML
Brief description of the project	1) With the rise in heart cancer cases and the consequent urgency for timely intervention, there is an increasing demand for diagnostic techniques that are not only accurate but also expedient. 2) Proposed work will introduce multi model framework for overcoming the drawback of existing diagnosis technologies. 3) Proposed work will focused not only on diagnostic robustness but will also ensure a timely detection, & reduction in diagnostic delay as comparing to the existing diagnosis technologies.
Expected outcomes of the project	Proposed research work will effectively harnesses the unique feature of each modality, resulting in significant enhancement across key diagnostic metrics. Also focused to improve the diagnostic robustness with ensuring a timely detection by reducing the diagnostic delay.
Possible learning outcomes for the interns	To provide sturdy foundation for future exploration in integrated imaging platforms, heralding a new era in patient outcomes and personalized treatment strategies.

Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	CSE, AIML, DS, CYBER, ELECTRONICS, IT
Technical background (eg. Courses that should have been done, topics that should have been known)	Courses related to Artificial Intelligence, CNN, Python Programming
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO,	Python Programming related tools knowledge

Electron Microscope etc.)	

Prof.K.S.Khandare

Name and Signature of PI & Co-PI

Dr.Suresh Balpande

Name & Signature of Head of Department

101. Title of the Project	Deep learning approach for creation of fusion art
Name of the Principal Investigator (PI), Department	Dr. Vasundhara Rathod, CSE Department
Place of Work/Department	Department of CSE, RCOEM
Brief description of the project	The project aims to use advanced ML algorithms to explore the generation and/or enhancement of hybrid artwork using techniques such as Generative Adversarial Networks (GANs)/deep neural networks to produce visually captivating compositions that surpass traditional artistic boundaries. For example: creating a fusion of kalamkari and mandala art.
Expected outcomes of the project	The project is expected to deliver a system capable of generating new art images from user specified requirements and a research paper publishing the results.
Possible learning outcomes for the interns	Research skills, image classification and generation using deep learning

Requirements from the interns	
UG / PG Program (Branch)	UG Program, CSE
Discipline	Computer Science and Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep Learning
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	The project will involve the use of image processing techniques, machine learning frameworks, and deep learning architectures. Implementation will primarily be in Python

Dr. Vasundhara Rathod — Name and Signature of PI

Dr. Ramchand Hablani — Head of Department, CSE

102. Title of the Project	ML based analysis of flexible substrate of antenna for wearable application
Name of the Principal Investigator (PI), Department	Prof. Archana Tiwari Prof. Shubham Anjankar Dr. A. A. Khurshid
Place of Work/Department	Electronics Engineering
Brief description of the project	Data set generation using SRIM/TRIM software and ML-based analysis of flexible substrate material for wearable applications.
Expected outcomes of the project	Research Paper
Possible learning outcomes for the interns	Data set creation, ML based applications

Requirements from the interns	
UG / PG Program (Branch)	UG, PG
Discipline	EN, CSE, CSE(ALML), CSE(DS), ECS, Biomedical
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic of ML
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python programming

Name and Signature of PI & Co-PI Name & Signature of Head of Department

103. Title of the Project	Predicting forest fire using multispectral satellite data
Name of the Principal Investigator (PI), Department	Prof. Aarti Karandikar, Department of Computer Science and Engineering(Data Science)
Place of Work/Department	Computer Science and Engineering(Data Science) Department
Brief description of the project	Forest fires are a common problem across the world. They destroy the trees and the wildlife. The stored carbon that is released contributes to global warming. Effective fire prevention and control systems are thus critical not just to conserve forests and wildlife, but also from the Climate Change perspective. Drones, unmanned aerial vehicle (UAV) applications and remote sensing technology can be incredibly valuable in assessing forest fire risk over large areas. In this project, a model will be developed for monitoring forest fires in tropical forests.
Expected outcomes of the project	Objective of this study is to test the applicability of integrated remote sensing data, fire detection model and GIS to predict the occurrence of forest fires.
Possible learning outcomes for the interns	After successful completion of the project, the intern will be able to: 1) integrate data from multiple sources 2) apply image processing techniques on real time data. 3) apply concepts of machine learning for solving real life problems.

Requirements from the interns	
UG / PG Program	B.Tech in CSE and allied branches

(Branch)	M.Tech CSE
Discipline	Computer Science and Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	Python programming Basic knowledge of image processing Machine learning.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Advanced python programming Mathematical and analytical thinking

Prof. A. M. Karandikar
Principal Investigator

Prof. A. M. Karandikar
HoD, CSE(Data Science)

Prof. Rohit Pawar
Co- Principal Investigator

104. Title of the Project	AI-Companion
Name of the Principal Investigator (PI), Department	Dr. Gaurav Goyal
Place of Work/Department	Electrical Engineering
Brief description of the project	This project is aimed to allow user to chat with famous personalities in the world like Elon musk, Ronaldo Albert Einstein, Joe Biden, Narendra Modi etc, and get their opinion in personalised manner. The reply should be personalised with use of the word like 'I', 'My', 'Our' by the personalities such that it will feel like the personality is talking personally with the user. This application will allow user to add personalities of their choice also.
Expected outcomes of the project	The outcome of the project will be in form of an application.
Possible learning outcomes for the interns	By development of this application the learner get hands on experience of API Integration, Building SAAS model, Integrating payment system, developing complex application architecture. It will allow learner to make a market ready application.

Requirements from the interns	
UG / PG Program (Branch)	UG-01
Discipline	Electrical
Technical background (eg. Courses that should have been done, topics that should have been known)	HTML, CSS, JavaScript and its frameworks
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	HTML, CSS, JavaScript and its frameworks

Dr.Gaurav Goyal
Principal Investigator

Dr.S.B.Bodkhe
HoD, Electrical

105. Title of the Project	**Analysis of Power Sharing between Hybrid Energy Storage System for Motor Load.**
Name of the Principal Investigator (PI), Department	Dr. Gaurav Goyal
Place of Work/Department	Energy Research Centre, Electrical Engineering
Brief description of the project	In Electric vehicle, operating at various dynamic conditions requires detailed analysis in various aspects. Various energy storage options, such as supercapacitors (SCs), batteries, fuel cells (FCs), and ultracapacitors (UCs), fall under the categories of the electric vehicles (EVs) concept. High-power-density ultracapacitors (UCs) are employed during vehicle starts and accelerations, reducing the peak power demands on the battery. This results in improved performance, extended battery life, increased efficiency, and a broader travel range.
Expected outcomes of the project	Complete hardware setup will be built to the analysis and outcome can be in form of publication.
Possible learning outcomes for the interns	1. Intern will learn to model the boost converter, bi directional converter using MATLAB. 2. Intern will get exposure to work on dSpace Microlab box.

Requirements from the interns	
UG / PG Program (Branch)	UG-02
Discipline	Electrical
Technical background (eg. Courses that should have been done, topics that should have been known)	Electric Vehicle, Power Electronics
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	MATLAB, Hardware knowledge

Dr.Gaurav Goyal
Principal Investigator

Dr.S.B.Bodkhe
HoD, Electrical

106. Title of the Project	Analysis of DC- DC converter for Fuel Cell System
Name of the Principal Investigator (PI), Department	Dr. (Mrs) P.V. Kapoor Department of Electrical Engineering
Place of Work/ Department	Energy Research Centre, Department of Electrical Engineering
Brief description of the project	This project aims to simulate and analyse dc-dc converter with closed loop control. Complete state-space analysis will be done to obtain output voltage to duty ratio transfer-functions for both ideal and non-ideal converter. PI controller is designed using root locus plots for both ideal and non-ideal cases. The project will be divided into two parts: 1. In first part study of semi-empirical model of the PEM fuel cell, including its static and dynamic behaviours. 2. In second part selection and design of suitable topology of Power converter and implementation of its control circuit to maintain constant voltage.
Expected outcomes of the project	Designed Power Converter will not only offer steady output voltage but it also helps to charge the battery.
Possible learning outcomes for the interns	After the completion of research, students will learn new technology in Control Fuel Cell Energy System. Also, they will be able to write and publish paper in reputed Conference/Journal.

Requirements from the interns	
UG / PG Program (Branch)	Undergraduate: 02 No.
Discipline	Electrical, Electronics, EC and EDT
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic knowledge of Electrical Engineering and Power Electronics
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment's such as CRO, Electron Microscope etc.)	MATLAB Simulation Tool, PCB designing tool and Microcontroller.

Dr.(Mrs) P.V. Kapoor

Name and Signature of PI

Name & Signature of Head of Department

107. Title of the Project	**INDUCTION MOTOR FAULT DIAGNOSIS USING MACHINE LEARNING ALGORITHM**
Name of the Principal Investigator (PI), Department	Dr. (Mrs) P.V. Kapoor Department of Electrical Engineering
Name of the Co-PI	Dr. U.B. Mujumdar Department of Electrical Engineering
Place of Work/Department	Energy Research Centre, Department of Electrical Engineering
Brief description of the project	The aim of the project is to develop a fault diagnosis method for induction motors using machine learning. The laboratory setup with vibration sensor and temperature sensor already exists. The intern is expected to capture the data under the fault condition and do its analysis using machine learning tool. The project will be divided into two parts: 3. Study of different types of faults in induction motor. 4. Selection and implementation of suitable machine learning algorithm for early detection of fault.
Expected outcomes of the project	Early detection and precise diagnosis of incipient faults allow preventive maintenance to be performed and provide sufficient time for controlled shutdown of the affected process. They can reduce financial losses and avoid catastrophic consequences.
Possible learning outcomes for the interns	• After the completion of research, students will learn Machine learning tools. • Capability to analyse the real time data base using machine learning algorithms.

Requirements from the interns	
UG / PG Program (Branch)	Undergraduate: 02 No.
Discipline	Electrical, CS, IT, EC, EN
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic knowledge of Electrical Engineering and Electrical Machine
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Machine Learning, ANN Tools

Dr.(Mrs) P.V. Kapoor
Name and Signature of PI

Dr. U.B.Mujumdar
Name and Signature of Co-PI

Name & Signature of Head of Department

108. Title of the Project	Real Time estimation of State of Charge (SoC) of Li-Ion battery using Machine Learning Algorithm.
Name of the Principal Investigator (PI), Department	Dr.Uday B.Mujumdar
Place of Work/Department	Energy Research Centre, Department of Electrical Engineering
Brief description of the project	Li-Ion batteries are widely used in Electric vehicle and electronic gadgets as power source. Accurate estimation of the charge stored in battery and remaining life is very important for the longer life of battery. Life cycle of Li-Ion battery is dependent on the two parameters i.e. State of charge (SoC) and State of health (SoH). The accurate estimation of these parameters is crucial for deciding charging /discharging cycles and remaining useful life of battery. The project aims at the development of Machine learning based model from the accurate estimation of SoC and SoH of the individual cell as well as battery pack.
Expected outcomes of the project	Machine learning based model for accurate estimation of Li-Ion Battery SoC under different operating conditions.
Possible learning outcomes for the interns	• Enhanced knowledge of different Python libraries used for implementing Machine leaning algorithms. • Enhanced knowledge of application of machine learning algorithms on real time data base.

Requirements from the interns	
UG / PG Program (Branch)	UG Program : 02 Interns
Discipline	Computer Science and Allied branches, Electrical, Electronics, Electronics & Communication
Technical background (eg. Courses that should have been done, topics that should have been known)	Python Programming
Specific skill set	AI/ML Tools Python Programming with Machine Learning Libraries

Dr.Uday B.Mujumdar
Department of Electrical Engineering

Dr.S.B.Bodkhe
HoD, Electrical Engineering

109. Title of the Project	Real time monitoring and control of Li-Ion battery using Texas Instruments' (TI) BQ76940 Evaluation module.
Name of the Principal Investigator (PI), Department	Dr.Uday B.Mujumdar
Place of Work/Department	Energy Research Centre, Department of Electrical Engineering
Brief description of the project	The Texas Microcontroller (TI) bq76940 is a battery management chip (BMIC) that offers a comprehensive set of features for lithium-ion battery management. The project aims at the development of microcontroller based interface for collecting critical battery parameters such as cell voltages, temperatures, total voltage, and current. The program uses the bq76940's I^2C protocol for efficient and reliable data transfer, and processes the data to provide a user-friendly interface for battery status visualization. The program development involves firmware development and testing, ensuring accuracy and reliability of data acquisition and display.
Expected outcomes of the project	A complete system for monitoring and control of Li-Ion Battery system with Cell balancing.
Possible learning outcomes for the interns	1. Development of skillsets required for interfacing the microcontroller with battery management system front end ICs. 2. Enhancement of skillsets for the development of Embedded C based Projects.

Requirements from the interns	
UG / PG Program (Branch)	UG Program : 02 Interns
Discipline	Electrical, Electronics, Electronics & Communication
Technical background	Microcontroller Programming
Specific skill set	Embedded C **Additional Skillsets** Python Programming with Machine Learning Libraries

Dr.Uday B.Mujumdar
Department of Electrical Engineering

Dr.S.B.Bodkhe
HoD, Electrical Engineering

110. Title of the Project	Design and development of DC-DC Bidirectional converter using micro-controller for DC micro-grid and EV applications
Name of the Principal Investigator (PI), Department	Dr. (Mrs) V. A. Huchche; Department of Electrical Engineering
Place of Work/Department	Energy Research Centre, Department of Electrical Engineering, RCOEM, Nagpur
Brief description of the project	DC microgrid is an attractive solution to integrate efficiently and suite better the renewable energy sources, energy storage systems, and loads at distribution level. The DC microgrid is a locally controllable system that can operate either in grid-connected mode or stand-alone operation mode, i.e., completely isolated from the main transmission system. Among dc-dc converters, isolated dc-dc converters are an attractive alternative for interfacing sources, such as photovoltaics, batteries, or fuel cells. Therefore, there is an increasing requirement for bidirectional dc-dc converters to ensure the power flow from, to, or between various energy storage elements. This project focuses on a bidirectional hybrid dc-dc converter suitable as an interface between two dc voltage buses in various applications (EV) including DC microgrids.
Expected outcomes of the project	Research outcome in the area of power electronics will be utilized in development of Bidirectional converter i. Completely developed hardware set up. ii. Control algorithm development with microcontroller.
Possible learning outcomes for the interns	Interns will get an insight into i. Hardware/PCB development. ii. Control algorithm development with microcontroller so that their skills will be developed keeping in view the need of the industry.

Requirements from the interns	
UG / PG Program (Branch)	UG (02-students)
Discipline	i. Electrical Engineering, ii. Electronics Engineering, iii. Electronics and Communication
Technical background	Basic Hardware Knowledge
Specific skill set	Programming of C

1. Dr. (Mrs.) Vijaya Huchche
2. Dr. U.B. Mujumdar

Name and Signature of PI & Co-PI

Dr. S.B. Bodkhe

Name & Signature of Head of Department

111. Title of the Project	Data Driven Assessment and rehabilitation Exercise Physiotheory(Shoulder)
Name of the Principal Investigator (PI), Department	Pravin Dwaramwar Associate Professor
Place of Work/Department	Electronics Engineering
Brief description of the project	After surgery patient has to go through rehabilitation process. In India rehabilitation is neglected and has many issues like shortage of physiotherapist., Random Program, wrong Biomechanics, low productivity, poor patient compliance and lack of objectives. Hence there is a need smart systems with  For more details visit https://davidhealth.com/products/ **We will be designing SHOULDER Assessment and Rehabilitation device**
Expected outcomes of the project	Project is at ideation level. By the end of semester student 1) Design the Hardware architecture of the proposed machine. 2) Architecture of the Software tool for solving major issues.

	A Technology Based product/ Patent/ start-up in health care in association with Physiotherapists.
Possible learning outcomes for the interns	Product design, Planning, hardware and software design.

Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	Mechanical 01; Electronics/ECE/Electrical : 02; IT/CS: 02
Technical background (eg. Courses that should have been done, topics that should have been known)	Ability to innovate and work with interdisciplinary field. Mechanical : CAD/CAM/CAE Electronics : Microcontroller based system design. C / Python Programming CS/IT/MCA : Software / Mobile App design
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	

Prof. Pravin Dwaramwar — Dr. A.A.Khurshid

Name and Signature of PI & Co-PI — Name & Signature of Head of Department

112. Title of the Project	Al and Computer vision in X-ray Analysis
Name of the Principal Investigator (PI), Department	Pravin Dwaramwar Electronics Engineering
Place of Work/Department	Electronics Engineering
Brief description of the project	X-ray is the most common form of medical imaging. It is estimated that 3.6 Billion X-ray images are taken each year. Around 45% of Radiologists report burnout due to reasons such as time pressure and the rising volume of scans. A I in analysing and reporting X-ray results can have an impactful effect on radiology, improving access and diagnosis in developing countries.
Expected outcomes of the project	Real life problem definition, modelling, simulation & implementation. A research paper / Foundation for further research A Technology Based product/ start-up in health care in association with Alumni and Radiologist
Possible learning outcomes for the interns	Data gathering, standardization, data labelling, Synthetic data generation, ML Model development and Comparing synthetic and real data performance & Validation

Requirements from the interns	
UG / PG Program (Branch)	UG/PG
Discipline	Electronics/ECE: 02 IT/CS: 02
Technical background (eg. Courses that should have been done, topics that should have been known)	Machine Learning, Deep learning, Image Processing Ability to innovate and work with interdisciplinary field
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Python Programming

Prof. Pravin Dwaramwar — Dr. A.A.Khurshid

Name and Signature of PI & Co-PI — Name & Signature of Head of Department

113. Title of the Project	Design and Fabrication of an Environmentally Sustainable Incinerator for Sanitary Napkin Disposal and Women Health Management
Name of the Principal Investigator (PI), Department	Dr. Tripti B. Gupta (PI) Civil Engineering Department, RCOEM
Place of Work/Department	Civil Engineering Department
Brief description of the project	The improper disposal of sanitary napkins poses significant environmental and health risks. This research aims to design and fabricate an efficient incinerator specifically tailored for the safe disposal of sanitary napkins. Objectives of research : 1. Develop a comprehensive understanding of existing sanitary napkin disposal methods and their environmental impact. 2. Design an incinerator system capable of efficiently and safely disposing of sanitary napkins. 3. Fabricate a prototype incinerator based on the design, considering cost-effectiveness and practicality. 4. Evaluate the environmental and health benefits of the proposed incinerator compared to traditional disposal methods. Methodology: 1. Literature Review: - Investigate current sanitary napkin disposal practices. - Examine environmental and health implications of improper disposal. 2. Design Phase: - Collaborate with engineers and environmental experts to develop an efficient incinerator design. - Consider factors such as temperature control, emissions, and user safety. 3. Fabrication: - Utilize sustainable and cost-effective materials for constructing the prototype. - Incorporate safety features and user-friendly controls. 4. Testing and Optimization: - Conduct controlled tests to evaluate the incinerator's performance. - Optimize design based on test results for efficiency and

	emissions control.
Expected outcomes of the project	1. A functional prototype of an incinerator designed for sanitary napkin disposal. 2. Comparative analysis highlighting the environmental and health advantages over traditional disposal methods. 3. Recommendations for potential implementation and future improvements.
Possible learning outcomes for the interns	This research addresses a critical issue of improper sanitary napkin disposal, contributing to environmental sustainability and public health. The proposed incinerator aims to provide a viable and eco-friendly solution for safe disposal practices.. The learning outcomes for the interns are expected to have: 1. Positive implications for both the environment and public health. 2. Publications in reputed Journals / Conferences / Copyright / Patents.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	Civil, Electrical, Mechanical/ Industrial
Technical background (eg. Courses that should have been done, topics that should have been known)	Environmental Engg I / Environmental Engg II / Solid Waste Manegement / Environmental Impact Assessment / Environmental Pollution
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	-

Dr. Tripti B. Gupta, Civil, RCOEM — **Dr. M.S.Kadu**

Name and Signature of PI & Co-PI — Name & Signature of Head of Department

114. Title of the Project	Experimental investigations on the performance of Laser cutting machining parameters for different materials.
Name of the Principal Investigator (PI), Department	Dr. Ashish Urade Mechanical Engineering Department
Place of Work/Department	CIIIT Center & Department of Mechanical Engineering
Brief description of the project	Laser cutting machine allow users to make extremely precise cuts in a flat sheet of material (such as wood, glass and acrylic) and engrave an image onto an object by burning or melting away very fine layers. The proposed project work is based on the optimisation of the laser machining parameter, useful for the shop floor, in terms of: a. Cutting Precision and Positional Accuracy b. Improved Edge Quality and Surface Finish c. Drilling and Engraving in Addition to Cutting d. Minimal Thermal Stress Zone e. Strong Repeatability with Cost-Effectiveness
Expected outcomes of the project	The proposed project work may lead to the publication of a good research paper in the reputed Journal. Also, the results and outcomes can be used to carry out future projects.
Possible learning outcomes for the interns	● Hands-on experience Laser cutting machine ● Ability to plan an experimental research in terms of Design of Experiment (DOE) ● Understanding of the selection of independent, dependent and controlled variables, experimental procedures, data collection, data analysis and interpretation. ● First-hand experience of writing a research paper for reputed journals.

Requirements from the interns	
UG / PG Program (Branch)	2 UG Students
Discipline	Students from Mechanical Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	The students should have the basic understanding of Manufacturing processes and unconventional machining phenomenon.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** ● The students should be ready to carry out the rigorous experimental work for a period of minimum 3 months. ● Good written and communication skills. **Desirable** ● Familiar with the data visualization and plotting tools such as MITAB etc. ● Familiar with Laser cutting machine software.

Dr. Ashish Urade — Name and Signature of PI

Dr. V.V. Shukla — Name & Signature of Head of Department

115. Title of the Project	DESIGN & FABRICATION OF MICRO UATV FOR STEALTH SURVEILLANCE AND DEFENCE APPLICATION
Name of the Principal Investigator (PI), Department	Dr. Vishal Shukla, Mechanical Engg
Place of Work/Department	RCOEM-TATA-CIIIT
Brief description of the project	No high-power drones are developed yet, with the high load carrying capacity. The drone should be generating enough lifting power, so that it can carry the rescue materials for the stranded or missing person. to develop a rescue drone that is capable of conducting a search and rescue operation with onboard carbo capacity. The project aims to design and develop the actual airframe and cargo handling device, set up the firmware SW of flight control computer, and run a flight stability test to validate the safe flying characteristics
Expected outcomes of the project	Design and Fabrication of Central Propulsion System (PS), Dual Mirrored Hexapod and integration with PS, Fabrication & assembly of carbon fibre. Implementation of autonomous flight plan using GPS satellite and way point mapping
Possible learning outcomes for the interns	Major learnings would be thrust vectoring, bioinspired Robotics, thrust for flight, propulsion system, various mechanical, electronics and computer programming skills for design, manufacture, and assembly & testing of arial vehicle. In this project use of raspberry pi zero and satellite-based waypoint control will be done and also use of AI for advance autonomous control is desired

Requirements from the interns	
UG / PG Program (Branch)	Mechanical + ENCS/EC/AI&ML
Discipline	Multidisciplinary
Technical background (eg. Courses that should have been done, topics that should have been known)	Design, 3-D printing, Electronics system, system integration, IoT Control system, stability & testing etc
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Mechanical or electronic system design & control, Passion for participatory and experiential learning

Name and Signature of PI & Co-PI Name & Signature of Head of Department

116. Title of the Project	Development of automatic tyre condition monitoring system for Indian expressways
Name of the Principal Investigator (PI), Department	Dr. Sandeep Joshi Mechanical Engineering
Place of Work/Department	Solar Energy Laboratory- Department of Mechanical Engineering
Brief description of the project	The proposed project work is aimed to develop an automated system for tyre condition monitoring . It has been divided in the following major phases I. A comprehensive literature review, field visits to identify the causes of road accidents on expressways and factors leading to tyre bursts. II. In-depth survey of existing automated tyre condition monitoring systems, sensors and software tools. III. Design and development of the automation system. IV. Performance Analysis V. Data analysis and reporting, preparation of project report and research paper.
Expected outcomes of the project	A state-of-the-art new product can be developed. A quality research article can be prepared based on the literature review and the experimental work. Students can exhibit the product at National Level events.
Possible learning outcomes for the interns	● First-hand experience of literature study and design of new product. ● Ability to understand the real time challenges in new product development. ● Opportunity to connect with industry and Society.

Requirements from the interns

UG / PG Program (Branch)	2 UG Students
Discipline	1 Student from Mechanical Engineering 1 Student from Electronics Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	The students should have the interest in Automation and New Product development.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** ● Knowledge of CAD tools, Basic Electronics ● Good written communication skills

Dr. Sandeep Joshi

Name and Signature of PI

Dr. V.V. Shukla

Name & Signature of Head of Department

117. Title of the Project	A system of IoT Devices to prevent under-loading / overloading of Railway wagons
Name of the Principal Investigator (PI), Department	Dr. Vishal Shukla, Mechanical Engg
Place of Work/Department	Mechanical Engineering
Brief description of the project	The project aims to develop weight limit systems for miniaturized moving trolley prototype with real-time dynamic data.
Expected outcomes of the project	Technology development & dissemination to road and rail transport systems
Possible learning outcomes for the interns	CAD & FEA, Mechanical strength of material, 3-D Printing, Prototyping , IoT IDE

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	Mechanical/ENCS/EC/AI&ML
Technical background (eg. Courses that should have been done, topics that should have been known)	Basic understanding of IoT, Python, System Integration,
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipment such as CRO, Electron Microscope etc.)	Basic understanding of Design & 3-D Printing Passion to acquire multi-disciplinary knowledge

Name and Signature of PI & Co-PI Name & Signature of Head of Department

118. Title of the Project	Development of coordinate measuring machine using Pick & Place BRABO Robot
Name of the Principal Investigator (PI), Department	Dr. Vishal Shukla, Mechanical Engg (PI) Dr. Alok Jha, Mechanical Engg (CO-PI)
Place of Work/Department	RCOEM-TATA-CIIIT
Brief description of the project	The project aims to develop additional extended utility of measuring point-cloud data (coordinates) form complex shaped objects, by incorporating additional external electromechanical accessories (Probe, arm, software etc) to the existing Pick & Place Robot (BRABO)
Expected outcomes of the project	Feature-based Functionality improvement of existing facility to enhance the utility of Robot. The integration of electromechanical system developed through research can work as coordinate data acquisition system for a point with respect to some reference point. This is, in particular very much useful to trace and designate spatial positions of multiple points over the surface of highly non-linear and complex shaped objects, where use of dimension measuring instrument is either difficult or most of the time impossible.
Possible learning outcomes for the interns	Functioning of pick & place Robot and its mechanism and controls. Extensive review of sensors and integration with microcomputers. Programming for acquiring the spatial data and its processing, storage etc.

Requirements from the interns	
UG / PG Program (Branch)	UG
Discipline	Mechanical/EC/EN/CS
Technical background (eg. Courses that should have been done, topics that should have been known)	Knowledge of Robotics, control & mechanism. CAD & features of computational graphics. Data acquisition through sensor and integration with IDEs. HMI (Teaching pendant) Data Storage and processing.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	Knowledge thirsty, readiness to plan & execute various experimentation, record keeping, Handling of sensors, IDEs, report writing skills etc. will accelerate the completion of project work.

Name and Signature of PI & Co-PI Name & Signature of Head of Department

119. Title of the Project	Impact of Environmental Temperature Variation, Ranging from Room Temperature to Sub-Zero Liquid Nitrogen Conditions, on the Microstructure and Mechanical Properties of High-Strength Low-Alloy (HSLA) Steel Weldment.
Name of the Principal Investigator (PI), Department	Nitin Gudadhe Mechanical Engineering Department
Place of Work/Department	CIIIT Center & Department of Mechanical Engineering
Brief description of the project	The proposed project work is based on the investigation of microstructure and mechanical properties of high speed low alloy steel weldments using Robo-MIG welding process. It has been divided in the following three major phases. I. To carry out experimental work for single and multi-pass weldments for HSLA steel using Robotic -MIG welding . II. To study the impact of welding parameters on mechanical properties and its corresponding microstructure of weldment regions. III. To study the impact of environment temperature on impact toughness and its microstructure of HSLA steel.
Expected outcomes of the project	The proposed project work may lead to the publication of a good research paper in the reputed Journal. Also, the results and outcomes can be used to carry out future projects.
Possible learning outcomes for the interns	• Hands-on experience in robot programming and path planing. • Ability to plan an experimental research study • Deep understanding of the selection of welding parameters, experimental procedures, data collection, data analysis and interpretation. • Understanding of Microstructure and mechanical testing of welded joints.. • First-hand experience of writing a research paper for reputed journals.

Requirements from the interns	
UG / PG Program (Branch)	2 UG Students
Discipline	Students from Mechanical Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	The students should have the basic understanding of metallurgy and welding operations.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** The students should be ready to carry out the rigorous experimental work for a period of minimum 3 months. Good written communication skills **Desirable** Expertise in mechanical testing, thermal analysis, and data interpretation. Requiring a strong background in materials engineering and experimental design.

Nitin Gudadhe

Name and Signature of PI

Dr. V.V. Shukla

Head of Department, Mechanical Engineering

120. Title of the Project	Experimental Investigations on the Performance of Manufacturing Exeution System (MES)
Name of the Principal Investigators (PI), Department	(1) Dr. P. B. Shiwalkar, Industrial Engineering, RCOEM (2) Dr. Y. M. Sonkhaskar, Prof. In-charge CIIIT, Mechanical Engineering, RCOEM
Place of Work/Department	Center for Invention, Innovation, Incubation and Training (CIIIT) RCOEM, Nagpur-13
Brief description of the project	The proposed project work is based on the development of an efficient and optimized SoP for assembling multipart Assembled products on MES. It will be executed in following three major phases VI. Development of detailed Operation Manual for the installed MES. (Note: such a manual is not provided with the system). VII. To carry out the exhaustive experimental work using the installed set up for assembly of a bicycle. Followed by iterations to improve the takt time. VIII. Experimental comparison of Assembly line techniques for enhanced productivity and safety. Reporting, preparation of project report and research paper.
Expected outcomes of the project	The proposed project work may lead to the publication of a good research paper in the reputed Journal. Also, the developed experimental set up can be used to carry out future projects and can be used as a laboratory experimental set up.
Possible learning outcomes for the interns	● Hands-on experience in designing and developing the experimental set up ● Ability to plan an experimental research study ● Deep understanding of the selection of independent, dependent and controlled variables, experimental procedures, data collection, data analysis and interpretation.

	• First-hand experience of writing a research paper for reputed journals.
Requirements from the interns	
UG / PG Program (Branch)	2 UG Students
Discipline	1 student from Mechanical Engineering 1 student from Industrial Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	The students should have the basic understanding of Catalog detailing alongwith awareness of productivity concepts OR Awareness of Ergonomics, Time and Motion study (MOST) and basic Mechatronic concepts.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** • The students should be ready to carry out the rigorous experimental work for a period of minimum 4 months on the MES at CIIIT with other floating team members. • Good understanding of safety practices and written communication skills and **Desirable** • Familiar with the Solid modelling concepts • Inclination for working with team on factory shop floor

Dr. P. B. Shiwalkar Dr. Y. M. Sonkhaskar Dr. V.V. Shukla

Name and Signature of PIs Head of Department

121. Title of the Project	Development PV solar cooking system for domestic applications
Name of the Principal Investigator (PI), Department	Dr. Sandeep Joshi Mechanical Engineering
Place of Work/Department	Solar Energy Laboratory- Department of Mechanical Engineering
Brief description of the project	The proposed project work is aimed at the development of PV solar cooking system for domestic applications. It has been divided in the following major phases IX. To carry out the exhaustive literature review of existing PV solar cooking techniques. X. To design and develop the affordable and efficient PV solar cooking system suitable for domestic applications XI. To investigate the system performance by conducting experimental studies. XII. Data analysis and reporting, preparation of project report and research paper.
Expected outcomes of the project	The proposed project work may lead to the development of an innovative solar PV cooking system. A quality research article can be prepared based on the literature review and the experimental work.
Possible learning outcomes for the interns	● First-hand experience of literature study and product design. ● Ability to plan and conduct the experimental investigations. ● Students can exhibit the product at National Level events ● Ability to prepare state of the art research articles.

Requirements from the interns	
UG / PG Program (Branch)	2 UG Students

Discipline	1 Student from Mechanical Engineering 1 Student from Electrical Engineering
Technical background (eg. Courses that should have been done, topics that should have been known)	The students should have the interest in new product development.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** ● The students should be ready to carry out the rigorous experimental work for a period of minimum 3 months in the sunlight. ● Good written communication skills **Desirable** ● Familiar with design of data acquisition system ● Familiar with the data visualization and plotting tools such as Tableau, Origin, Sigma Plot etc.

Dr. Sandeep Joshi

Name and Signature of PI

Dr. V.V. Shukla

Name & Signature of Head of Department

122. Title of the Project	Design and Development of Solar Powered Adsorption Cooling System for Horticultural Products
Name of the Principal Investigator (PI), Department	Prof. S. A. Patil (PI) Dr. S. S. Joshi (Co-PI) Mechanical Engineering
Place of Work/Department	Solar Energy Laboratory- Department of Mechanical Engineering
Brief description of the project	The objectives of the proposed research work are as below, • To design a solar powered adsorption cooling system for the given Horticultural produce. • To develop an experimental facility to investigate the performance of the designed cooling system • To carry out the performance evaluation of the developed cooling system.
Expected outcomes of the project	The proposed project work may lead to the development of an innovative solar cooling system. A quality research article can be prepared based on the literature review, design and the experimental work.
Possible learning outcomes for the interns	• First-hand experience of literature study and cooling system design. • Ability to plan and conduct the experimental investigations. • Ability to prepare state of the art research articles.

Requirements from the interns	
UG / PG Program (Branch)	2 UG Students
Discipline	2 students from Mechanical Engineering
Technical background (eg. Courses that should have been done, topics	The students should have interest in Thermal Engineering and Solar Thermal systems.

that should have been known)	
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** ● The students should be ready to carry out the rigorous experimental work for a period of minimum 3 months in the sunlight. ● Good written communication skills **Desirable** ● Familiar with design of data acquisition system ● Familiar with the data visualization and plotting tools such as Tableau, Origin, Sigma Plot etc.

Prof. S. A.Patil, Dr. Sandeep Joshi,

Name and Signature of PI & Co-PI

Dr. V.V. Shukla

Name & Signature of Head of Department

123. Title of the Project	Exploratory Research on Agri-voltaic Systems
Name of the Principal Investigator (PI), Department	Dr. Sandeep Joshi Mechanical Engineering
Place of Work/Department	Solar Energy Laboratory- Department of Mechanical Engineering
Brief description of the project	The proposed project work is aimed to investigate the various aspects of the Agri voltaic System . It has been divided in the following major phases XIII. To carry out the exhaustive literature review of the current status of Agri voltaic systems (APV) XIV. To design and develop experimental facilities of APV system on campus XV. To investigate the system performance by conducting experimental studies. XVI. Data analysis and reporting, preparation of project report and research paper.
Expected outcomes of the project	A quality research article can be prepared based on the literature review and the experimental work.
Possible learning outcomes for the interns	● First-hand experience of literature study and design of experimental set up. ● Ability to plan and conduct the experimental investigations. ● Ability to prepare state of the art research articles.

Requirements from the interns	
UG / PG Program (Branch)	2 UG Students
Discipline	1 Student from Mechanical Engineering 1 Student from Electrical Engineering
Technical background (eg. Courses that should	The students should have the interest in Agriculture and

have been done, topics that should have been known)	Solar Energy.
Specific skill set (eg. Programming, theoretical reasoning, constructing mathematical proofs, handling specific laboratory equipments such as CRO, Electron Microscope etc.)	**Mandatory** ● The students should be ready to carry out the rigorous experimental work for a period of minimum 3 months in the sunlight. ● Good written communication skills **Desirable** ● Familiar with design of data acquisition system ● Familiar with the data visualization and plotting tools such as Tableau, Origin, Sigma Plot etc.

Dr. Sandeep Joshi

Name and Signature of PI

Dr. V.V. Shukla

Name & Signature of Head of Department