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CSE DEPARTMENT DEVELOPMENT PROJECT TITLE LIST

S.No.	Project ID	Titles	Domain
1	TCMAPY2476	**Deep Learning-Based Automated Classification of Pathogenic Fungi from Microscopic Images using Enhanced EfficientNet-B4** **Objective:** The objective of this project is to develop an automated fungal classification system using Enhanced EfficientNet-B4 and Vision Transformer (ViT) with Learnable Spatial-Channel Attention (LSCA). The system classifies microscopic images into five fungal classes: Candida albicans, Aspergillus niger, Trichophyton rubrum, Trichophyton mentagrophytes, and Epidermophyton floccosum. It leverages federated learning and attention-based aggregation to improve accuracy, privacy, and robustness. **Algorithm:** Vision Transformer (ViT), Learnable Spatial-Channel Attention (LSCA), EfficientNet-B4, Transformer	DL (IEEE)
2	TCMAPY2478	**Advanced Multi-Scale Vision Transformer with Neural Architecture Search for Thyroid Cancer Diagnosis Using Ultrasound Images** **Objective:** This work introduces two innovative deep learning models, DBHNet and PyCAFNet, for thyroid cancer risk stratification from ultrasound images. DBHNet combines ResNet50 and a DeiT transformer for local-global feature fusion, while PyCAFNet uses an EfficientNet B4 backbone with cross-scale attention. Both address data imbalance through specialized augmentations and provide explainability via Grad-CAM, RISE, and Attention Rollout. Compared to the MSViTAFF baseline, these architectures promise improved classification across four risk levels. DBHNet's Flask deployment with relevance gating further enhances clinical utility by filtering non-thyroid inputs. **Algorithm:** DBHNet, PyCAFNet, CAM, RISE	DL (IEEE)
3	TCMAPY2479	**SDFFNet A Spatial-Frequency Domain Feature Fusion Network for Road Extraction From Very High-Resolution Satellite Images** **Objective:** This project addresses road extraction from very high-resolution satellite images, tackling occlusions, clutter, and thin road shapes. Two segmentation models—DeepAttnLab (with attention mechanisms) and PSPNet (with pyramid pooling)—share a ResNet50 backbone and stride modification to retain spatial detail. A combined BCE, Dice, and Focal loss handles class imbalance. Both models outperform the SDFFNet baseline. The best model is deployed in a Flask web application featuring user login, a relevance classifier to reject non-satellite inputs, and real-time road mask prediction, achieving accurate and continuous road extraction. **Algorithm:** PSPNet, BCE, SDFFNet, ResNet50	DL (IEEE)
4	TCMAPY2480	**Hybrid Wavelet-Swin Transformer and Dual-Path Attention Networks for Robust Skin Lesion Segmentation** **Objective:** Hybrid Wavelet-Swin Transformer and Dual-Path Attention Networks for Robust Skin Lesion Segmentation project presents an advanced deep learning framework for accurate skin lesion segmentation using dermoscopic images from the ISIC 2017	DL (IEEE)

S.No.	Project ID	Titles	Domain
		dataset. The proposed system aims to improve lesion boundary detection and feature extraction by combining convolutional and transformer-based architectures. Two segmentation models are developed and evaluated: WSB-Net, which integrates Wavelet Transform, Swin Transformer, and Boundary Refinement modules to capture fine-grained texture details and precise lesion boundaries, and DCT-Net, which combines a Dual-Path CNN, Transformer encoder, and Cross-Attention mechanism to learn both local and global image representations. A Flask-based web application is implemented to provide an interactive platform where users can register, log in, upload skin lesion images, and obtain segmented outputs. By leveraging complementary feature learning strategies, the framework enhances segmentation accuracy, boundary precision, and overall model robustness. The project demonstrates the effectiveness of hybrid deep learning techniques for skin lesion analysis and provides a practical solution for automated lesion segmentation. **Algorithm:** ISIC, WSB-Net, DCT-Net, CNN	
5	**TCMAPY2481**	**A Hybrid Multi-Scale CNN–Transformer Framework with Cross-Attention Fusion for Alzheimer's Disease Diagnosis** **Objective:** A Hybrid Multi-Scale CNN–Transformer Framework with Cross-Attention Fusion for Alzheimer's Disease Diagnosis project presents a hybrid deep learning framework for the automated classification of Alzheimer's disease using MRI brain images. The proposed system combines convolutional neural networks and transformer architectures to effectively capture both local structural details and global contextual information from medical images. Two advanced classification models are developed and evaluated: DCT-MRI Net, which utilizes dual CNN and Transformer encoders with a Cross-Attention Fusion mechanism to integrate complementary features, and MSF-S2T Net, which employs a multi-scale convolutional backbone followed by a Transformer encoder with Cross-Scale Attention to enhance feature representation across different image resolutions. Comprehensive preprocessing techniques are applied to improve data quality and consistency before model training. A classification head predicts the disease category based on the extracted features. The system is implemented through a Flask-based web application that enables users to upload MRI images and obtain classification results. By combining multi-scale learning, attention mechanisms, and feature fusion strategies, the framework aims to improve diagnostic accuracy, robustness, and efficiency for Alzheimer's disease classification. **Algorithm:** CNN, MRI, DCT-MRI, MSF-S2T	**DL (IEEE)**
6	**TCMAPY2483**	**Solder Joint Inspection Using Digital Model Priors for Industrial Applications** **Objective:** The objective of this project is to design and implement a solder joint inspection system using PSFNET and CDANET models trained on the vehicle-solder-joint-partly-dataset. The system includes a Flask web application with user	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		registration, login, image upload, real-time defect detection, inspection history, and logout, all stored in an SQLite database **Algorithm:** PSFNET, CDANET, SQLite, Web Application	
7	**TCMAPY2485**	**Contrastive Learning-Driven Representation and Feature Selection for Spinal Fracture Detection on CT Images** **Objective:** The objective of this project is to develop an automated system for detecting spinal fractures from CT images using deep learning techniques. By extracting local and global anatomical features, the system aims to accurately classify images as fractured or normal. It leverages advanced convolutional and residual neural network architectures to learn meaningful representations, reduce overfitting, and improve prediction reliability. The goal is to assist medical professionals in faster and more accurate diagnosis, enhancing patient care while minimizing manual inspection effort. **Algorithm:** CT, Deep Learning, Neural Network	**DL (IEEE)**
8	**TCMAPY2487**	**A Lightweight Factory Unsafe Behavior Recognition Method With Occlusion-Robust Adaptive Fusion** **Objective:** The objective of this project is to develop a real-time factory unsafe behavior recognition system based on deep learning techniques, specifically YOLOv8-CBAM and RT-DETR-Swin. The project aims to enhance safety monitoring by detecting factory smoking behavior using images captured through surveillance systems. By leveraging the capabilities of YOLOv8-CBAM for object detection, RT-DETR-Swin for improved multi-object tracking, and Adaptive Fusion for enhanced localization, the system aims to automatically identify smoking behavior as they occur. The integration of CBAM will provide visual interpretability by highlighting regions in the image that influence the model's decisions. The goal is to create an efficient, automated solution for factory unsafe behavior recognition, enabling rapid response to unsafe behaviors and enhancing safety management systems. **Algorithm:** YOLOv8-CBAM, RT-DETR-Swin, CBAM, Adaptive Fusion	**DL (IEEE)**
9	**TCMAPY2488**	**Enhancing Rotated Object Detection in Remote Sensing with a Parallel Hybrid Attention Mechanism** **Objective:** The primary objective of this project is to develop an enhanced rotated object detection system for accurately identifying ships and airplanes in aerial and satellite images. It implements YOLO26_PHAM with a hybrid CBAM-SE attention module and YOLO11_SDA with Spiral Depthwise Attention to capture multi-scale, orientation-aware features for precise detection. Both models are trained and evaluated on a merged dataset, with metrics for validation. The system includes a Flask-based web interface for image upload and prediction display and compares enhanced models against baseline YOLO models to demonstrate the benefits of parallel hybrid attention. It is optimized for accuracy and computational efficiency, supports future extensions, and provides comprehensive documentation of methodology and results.	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Algorithm: CBAM-SE, YOLO, Spiral Depthwise Attention, Object Detection	
10	**TCMAPY2489**	**Improving Traffic Object Detection with Vehicle-Borne Fisheye Imaging** **Objective:** The primary objective of this project is to develop a robust and accurate traffic object detection framework for fisheye camera images by designing and implementing YOLO26-SPAC and YOLO11-CFA architectures that incorporate attention mechanisms capturing spatial, frequency, and multi-scale contextual features. The models are trained on the FE8K dataset to classify five traffic object categories: Bike, Bus, Car, Pedestrian, and Truck, with feature enhancements including spatial pyramid attention, cross-frequency attention, wavelet feature extraction, and global context embedding to improve detection accuracy and robustness against geometric distortions. The system's performance is evaluated using metrics such as precision, recall, F1-score, and mAP, supported by visualization through confusion matrices, PR curves, and validation prediction grids. A modular framework integrating front-end and back-end components facilitates user interaction, image input, and prediction output. The framework is designed to handle variations in image resolution, object scale, and camera distortion efficiently, providing a scalable and reliable solution for accurate traffic object detection in fisheye imagery. **Algorithm:** YOLO26-SPAC, YOLO11-CFA, FE8K	**DL (IEEE)**
11	**TCMAPY2490**	**Automated Oil Spill Detection and Segmentation in Marine Ecosystems Using Drone-Captured Images and Attention-Enhanced Convolutional Architectures** **Objective:** The primary objective of this project is to develop and evaluate novel deep learning architectures for automatic oil spill segmentation from drone-captured RGB imagery. The system aims to classify each pixel into three classes: Oil, Water, and Other (ships, sky, quays). Specific goals include: (1) addressing challenges such as ambiguous oil-water boundaries, irregular slick shapes, domain shift between port and open-sea datasets, and severe class imbalance; (2) designing lightweight yet robust models (HFC-Net and SSM-FusionNet) that integrate feature calibration, contour supervision, and spatial-spectral fusion. **Algorithm:** RGB, HFC, SSM, FusionNet	**DL (IEEE)**
12	**TCMAPY2491**	**HeartGuard-AI A Fair, Explainable, and Multimodal Deep Learning Framework for Heart Disease Risk Prediction** **Objective:** The primary objective of this project is to develop a fair, explainable, and multimodal intelligent system for early heart disease prediction. The proposed framework, HeartGuard-AI, integrates three novel deep learning models — FairHeart-Former (Fairness-Aware Transformer), TrustHeart-XAI (Uncertainty-Aware Explainable AI), and MedFusion-HeartNet (Multimodal Clinical Fusion Network) — along with a robust ensemble model. The system classifies individuals into Low, Moderate, and High cardiac risk levels while ensuring fairness across demographic groups, providing model explanations through SHAP, and quantifying prediction uncertainty. A secure and user-	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		friendly web application built using the Flask framework with MySQL authentication has been developed to deliver real-time heart risk assessment. The project aims to create a trustworthy, transparent, and clinically reliable decision-support tool for cardiovascular healthcare. **Algorithm:** AI, XAI, SHAP	
13	**TCMAPY2492**	**Wheat Sunn Pest Detection and Species Classification Using Deep Ensemble Learning** **Objective:** The primary objective of this project is to develop an accurate, efficient, and user-friendly intelligent system for early detection of Sunn Pest damage and classification of wheat species. The proposed framework, SunnPest, integrates three high-performance deep learning models — ConvNeXt-Base, EfficientNetV2-M, and their soft-voting Ensemble — to achieve superior classification performance. The system performs binary damage detection (Healthy vs Damaged) and multi-class wheat species classification simultaneously. A secure and intuitive web application built using the Flask framework with MySQL authentication has been developed to enable real-time analysis of wheat leaf images. The project aims to create a reliable, practical, and high-accuracy decision-support tool for precision agriculture and crop protection. **Algorithm:** EfficientNetV2-M, SunnPest, ConvNeXt-Base	**DL (IEEE)**
14	**TCMAPY2493**	**Pleth-SleepNet: A Unified Network for Simultaneous Sleep Stages and Disorder Classification With PPG Signal** **Objective:** The objective of this project is to accurately detect and classify sleep stages and disorders using plethysmography-based signals, categorized as Healthy, Mild, Moderate, and Severe. By leveraging deep learning models—hybridCNN_GlobalPooling and LightweightAttentionCNN—the project aims to enhance the monitoring and diagnosis of sleep-related health conditions. The primary goal is to develop an automated system that can identify different levels of sleep quality and disorder severity with high precision using image-based signal representations. This system will provide valuable insights for clinical decision-making, enabling early detection and intervention for sleep disorders, thereby improving patient care and health outcomes. **Algorithm:** LightweightAttentionCNN, Deep Learning	**DL (IEEE)**
15	**TCMAPY2494**	**Design of a Multi-Object Wearable Recognition and Tracking Algorithm Based on PHSM-YOLO** **Objective:** The objective of this project is to design and develop a multi-object wearable recognition system using advanced deep learning-based object detection and classification models. The project mainly focuses on detecting important safety-related wearable objects and human presence, such as Helmet, Vest, Person, bare-arms, Gloves, Non-Helmet, and Shoes. The main aim is to identify whether a person is wearing the required protective equipment in workplace, construction, and industrial environments. To achieve this, two advanced models are implemented: YOLOv8+BiFPN+SimAM+DyHead and RT-	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		DETR+CST+CBAM. The YOLOv8-based model improves object detection through enhanced feature fusion, attention learning, and dynamic detection head mechanisms. The RT-DETR-based model improves detection accuracy by combining transformer-based object detection with attention modules. The project also includes both classification and object detection, allowing the system to classify wearable categories and locate them using bounding boxes. The final objective is to build an automated, accurate, and efficient system that can support safety monitoring and reduce manual checking. **Algorithm:** YOLOv8, BiFPN, SimAM, RT-DETR	
16	**TCMAPY2495**	**A Hybrid Deep Learning Approach With Explainable AI for Diabetic Retinopathy Classification** **Objective:** This project develops a hybrid deep learning framework for diabetic retinopathy (DR) classification from retinal fundus images, comparing four architectures: Swin Transformer, CoAtNet (Convolutional Transformer Network), a custom CNN-Transformer Hybrid combining EfficientNet-B0 with a two-layer transformer encoder (86%), and DeiT (Data-efficient Image Transformer). To ensure clinical interpretability, three complementary explainable AI techniques—Grad-CAM (Gradient-weighted Class Activation Mapping), LIME (Local Interpretable Model-agnostic Explanations), and Integrated Gradients—are applied to visualize and localize DR-related features such as exudates, hemorrhages, and microaneurysms. This approach enables transparent, trustworthy automated screening suitable for clinical decision support. **Algorithm:** CNN-Transformer, AI, CAM	**DL (IEEE)**
17	**TCMAPY2498**	**Adaptive Integration of Steady-State Change Features for Enhanced Multi-Label Energy Disaggregation** **Objective:** The primary objective of this project is to develop an efficient and accurate energy disaggregation framework titled “Adaptive Integration of Steady-State Change Features for Enhanced Multi-Label Energy Disaggregation.” The proposed system utilizes Adaptive Feature-Temporal NILM (AFT-NILM), Lightweight Hybrid Interpretable NILM (LHI-NILM), and Hybrid Ensemble NILM (HE-NILM) to identify and classify multiple appliance operating states from aggregate energy consumption data. The framework focuses on adaptively integrating steady-state change features to capture appliance behavior and improve multi-label disaggregation performance. AFT-NILM is employed to learn feature-temporal relationships, LHI-NILM provides efficient and interpretable appliance-level predictions, and HE-NILM combines prediction outcomes to enhance overall accuracy and robustness. The project aims to improve appliance identification, increase disaggregation accuracy, reduce classification errors, and support effective energy monitoring and management systems. **Algorithm:** Adaptive Feature-Temporal NILM (AFT-NILM), Lightweight Hybrid Interpretable NILM (LHI-NILM), Hybrid Ensemble NILM (HE-NILM), AFT-NILM	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
18	TCMAPY2499	**A DeepSHAP-Based Adversarial Attack on Machine Learning-Based Network Intrusion Detection** **Objective:** The primary objective of this project is to develop a robust Network Intrusion Detection System (NIDS) using machine learning techniques and evaluate its vulnerability to adversarial attacks through DeepSHAP analysis. The system utilizes Cascade Forest, Probabilistic Neural Network (PNN), and Echo State Network (ESN) models to accurately classify network traffic as normal or malicious. DeepSHAP is employed to identify the most influential features contributing to model predictions and to generate adversarial samples by manipulating these critical features. The project aims to analyze the impact of adversarial attacks on intrusion detection performance and compare the robustness of different machine learning models. Additionally, the system focuses on improving detection accuracy, reducing false alarms, and enhancing the security and reliability of machine learning-based intrusion detection systems **Algorithm:** Probabilistic Neural Network (PNN), Echo State Network (ESN), DeepSHAP	DL (IEEE)
19	TCMAPY2501	**Automated Detection and Recognition of Engraved Serial Numbers on Metallic Surfaces** **Objective:** The objective of this project is to develop an automated system for detecting and recognizing engraved serial numbers on metallic surfaces using deep learning techniques, specifically YOLOv8-CBAM and RT-DETR-Swin. The project aims to enhance industrial quality control by accurately identifying engraved Meter no and kWh-rating markings from metallic components captured through industrial inspection cameras. By leveraging YOLOv8-CBAM for attention-guided detection and RT-DETR-Swin for multi-scale feature extraction, the system automatically localizes and classifies engraved serial number regions. The integration of YOLOwill provide visual interpretability by highlighting regions in the image that influence the model's decisions. The goal is to create an efficient, automated solution for engraved serial number recognition on metallic surfaces, enabling rapid and accurate verification of Meter no and kWh-rating markings and enhancing industrial quality control management systems **Algorithm:** YOLOv8-CBAM, RT-DETR-Swin, YOLOwill, Deep Learning	DL (IEEE)
20	TCMAPY2502	**Deep Attention Fusion Framework for Automated Monkeypox Skin Image Classification** **Objective:** The main objective of this project is to develop a deep learning-based system for monkeypox skin image classification. The first objective is to use the Monkeypox Skin Image Dataset for training and evaluating the selected models. The second objective is to implement EfficientNetViTCBAM for advanced feature extraction and attention-based classification. This model helps the system focus on important regions in the skin image and reduce the effect of less useful background information. The third objective is to implement DenseNet121 as a comparative model to analyze classification performance. Another objective is to build a simple web application using Flask, HTML, CSS, and	DL (IEEE)

S.No.	Project ID	Titles	Domain
		JavaScript, where users can register, log in, upload an image, and view the classification result. The project also aims to maintain a clear workflow through separate modules such as Home, Register, Login, Classification, and Logout. In addition, the system aims to provide a user-friendly interface and organized backend processing. Overall, the objective is to create an accurate, understandable, and research-oriented monkeypox skin image classification system using modern deep learning methods. **Algorithm:** EfficientNetViTCBAM, DenseNet121	
21	**TCMAPY2503**	**Channeling Fairness: Class Imbalance-Aware Skin Disease Recognition via Fair Channel Enhancement Module** **Objective:** This project develops a fair skin disease classification system using ResNet50 and SE-EfficientNet-B3 with a Fair Channel Enhancement Module (FCEM) to dynamically reweight features for minority classes, addressing dataset imbalance on the Kaggle skin disease dataset. A Flask-based web interface with HTML, CSS, and JS allows user registration, login, and image submission for real-time predictions. Performance is evaluated per class using accuracy, precision, recall, and F1-score, comparing architectures to identify the most effective and fair backbone. The design emphasizes modularity, robustness, and reproducibility, enabling easy dataset expansion and future integration. Ultimately, it demonstrates fairness-aware AI for medical image classification, mitigating prediction bias across all disease categories. **Algorithm:** Fair Channel Enhancement Module (FCEM), SE-EfficientNet-B3	**DL (IEEE)**
22	**TCMAPY2504**	**A Multi-Task Attention-Driven SegNet for Lung Infection Segmentation and Classification From HRCT Images** **Objective:** This project builds a multi-task deep learning framework using MS-CSTA-Net and DualMask-SegNet v5.4 to jointly segment and classify lung infections from HRCT images via multi-scale attention and dual mask learning. A web interface allows image upload, segmentation map viewing, and classification results, with performance evaluated using accuracy, precision, recall, F1-score, and IoU. The scalable system adapts to diverse datasets, reduces manual effort, and offers interpretable infection visualizations to support medical imaging research. **Algorithm:** MS-CSTA-Net, HRCT, DualMask-SegNet	**DL (IEEE)**
23	**TCMAPY2506**	**ViT-ResNet Fusion: An Explainable Hybrid Framework for High-Accuracy Multiclass Lung Disease Classification in Chest X-Rays** **Objective:** The main objective of this study is to develop a hybrid deep learning framework, ViT-ResNet Fusion, for accurate multiclass classification of lung diseases from chest X-ray images, including pneumonia, tuberculosis, COVID-19, and other pulmonary disorders. The framework aims to integrate ResNet for effective local feature extraction with Vision Transformer (ViT) for global contextual modeling, thereby leveraging the complementary strengths of both architectures. Within this framework, specialized models—PulmoFusion X, BronchoViT R, and AeroNet S—are designed to	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		capture comprehensive pulmonary features, bronchial patterns, and subtle aeration abnormalities. Additionally, the study seeks to incorporate explainable AI techniques such as Grad-CAM to enhance interpretability, improve clinical trust, and support radiologists in timely and reliable diagnosis. **Algorithm:** Vision Transformer (ViT), AI, CAM	
24	**TCMAPY2507**	**CERVIA: A Hybrid Deep Learning Framework With Explainable AI for Automated Cervical Cancer Classification From Pap Smear Imagesys** **Objective:** The primary objective of the CERVIA framework is to develop an automated system capable of accurately classifying cervical cells from Pap smear images into normal, precancerous, and malignant categories. To achieve this, CERVIA integrates three complementary deep learning models—HybridDenseNetInception, KaryoFormer, and CytomeshModel—enabling the extraction of multi-scale, global, and structural cellular features for enhanced classification performance. The framework also incorporates explainable AI techniques to highlight the morphological and cytological factors influencing predictions, thereby improving clinical transparency and trust. Ultimately, CERVIA aims to reduce pathologists' workload, facilitate early detection, and ensure robust, reliable performance across diverse datasets. **Algorithm:** CERVIA, AI, HybridDenseNetInception, KaryoFormer	**DL (IEEE)**
25	**TCMAPY2508**	**An Explainable Multi-Level Framework for Cervical Cancer Detection Using Traditional Computer Vision and Deep Learning** **Objective:** The primary objective of this research is to develop an accurate and explainable automated cervical cancer detection framework using Pap smear images from the SIPAKMED dataset. The study aims to design and evaluate three novel deep learning architectures, namely PSMF Net, CAD Fusion, and KCPD Net, for effective multi-class cervical cell classification. It also focuses on extracting multi-scale morphological and cellular features through advanced attention and feature fusion mechanisms to improve diagnostic performance. Another objective is to enhance model interpretability by integrating Explainable AI techniques such as Grad-CAM and SHAP, enabling visualization of important regions influencing predictions. Furthermore, the research aims to provide a reliable, efficient, and clinically supportive screening system that facilitates early cervical cancer detection and assists healthcare professionals in decision-making. **Algorithm:** SIPAKMED, PSMF, , KCPDNet	**DL (IEEE)**
26	**TCMAPY2509**	**Applying Deep Learning for Detecting Gender Bias in Teaching Student Feedback** **Objective:** The primary objective is to develop and evaluate two novel deep learning architectures, MoE BERT-U and MM BERT-AD, for detecting gender bias in Spanish-Latam student feedback. The project aims to implement explainability through perturbation-based masking, incorporate uncertainty estimation for confidence quantification, ensure fairness through adversarial debiasing, and deploy an accessible web application with user authentication and prediction history for practical use.	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Algorithm: BERT-U, MM, BERT-AD, MoE	
27	**TCMAPY2510**	**AI Enhanced QoS Aware Content Delivery in Next Generation Networks** **Objective:** The main objective of this project is to develop a robust intrusion detection system for CAN networks capable of accurately classifying packets into Normal, DoS, Fuzzing, and Impersonation categories. This involves designing sequence-based BiGRU-IDS-Ensemble and fully connected Mamba-IDS-Ensemble models, trained with focal loss and enhanced through TRADES adversarial training to resist perturbations. The project further aims to integrate multiple IDS models into an ensemble to improve detection reliability and reduce misclassification. Adaptive adversarial attacks are simulated using Multi-DDQN agents, and co-evolutionary hardening strategies are applied to evaluate and strengthen system defenses. Feature squeezing and confidence gating are employed to manage input variability and flag uncertain predictions. Performance is assessed using metrics such as accuracy, F1-score, and Attacker Success Rate under both standard and adversarial scenarios. Visualizations, including confusion matrices, ASR plots, and training curves, support comprehensive analysis. Overall, the project seeks to establish a systematic and reproducible methodology for evaluating IDS robustness, comparing single-model and ensemble approaches, and guiding the development of resilient packet-based detection systems. **Algorithm:** BiGRU-IDS-Ensemble, IDS-Ensemble	**DL (IEEE)**
28	**TCMAPY2511**	**Secure Deep Learning-Based Framework for Facial Spoofing Detection Using Multi-Scale Object Detection** **Objective:** The main objective of this project is to develop a deep learning-based facial spoofing detection system using advanced YOLO models such as YOLOv12 and YOLO26. The system classifies facial inputs as real or spoofed by learning spatial and texture-based features from diverse spoofing data. It includes a Flask-based web application with image upload and live video processing. The project focuses on fast, accurate, and efficient prediction under different lighting and image conditions to improve secure authentication. **Algorithm:** YOLO, YOLOv12, YOLO26, Deep Learning	**DL (IEEE)**
29	**TCMAPY2513**	**Quantifying Adversarial Robustness of Hybrid CNN-Transformer Models for Brain Tumor Classification A Multi-Attack Evaluation** **Objective:** This project evaluates the adversarial robustness of three hybrid deep learning models for brain tumor classification: MobileNet with CBAM attention, ResNet18 with SE attention, and ConvNeXt-Tiny. The models classify brain MRI images into four categories: glioma, meningioma, pituitary tumor, and no tumor. To assess model vulnerability, four adversarial attack techniques are applied: Fast Gradient Sign Method (FGSM), Projected Gradient Descent (PGD), Basic Iterative Method (BIM), and a Hybrid Attack that combines all three methods sequentially. The study measures classification accuracy before and after attacks to quantify performance degradation and robustness. A	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Flask-based web application is developed with user registration, login, image upload, classification, attack selection, result visualization, and logout functionalities. The ResNet18-SE model is deployed within the web interface for interactive testing. Experimental results demonstrate varying levels of robustness across different model-attack combinations, providing valuable insights into the impact of attention mechanisms on adversarial resilience in medical image classification systems. **Algorithm:** Fast Gradient Sign Method (FGSM), Projected Gradient Descent (PGD), Basic Iterative Method (BIM), CBAM	
30	**TCMAPY2514**	**Monkeypox Detection and Classification Using Deep Learning With Ensemble Method and Attention Mechanisms** **Objective:** Monkeypox Detection and Classification Using Deep Learning with Ensemble Method and Attention Mechanisms project develops an automated Monkeypox Detection and Classification system using deep learning, attention mechanisms, and ensemble learning techniques. The system classifies skin disease images into six categories: Chicken_Pox, Measles, Monkey_Pox, Normal, Small_Pox, and Unknown. Four advanced hybrid models are used: EfficientNet-B7 with Vision Transformer and Cross-Attention, Inception-ResNet-V2 with Squeeze-and-Excitation Blocks and Feature Pyramid Network, MobileNetV3 with Bi-LSTM and Self-Attention, and ResNeXt101 with Squeeze-and-Excitation and Multi-Head Self-Attention. The workflow includes image preprocessing, feature extraction, classification, and prediction. Attention mechanisms enable the models to focus on important image regions, while ensemble learning improves overall classification performance and robustness. A Flask-based web application provides modules for registration, login, image upload, classification, and result display. The system supports fast and reliable image-based skin disease identification, assisting users in obtaining accurate classification results efficiently. **Algorithm:** LSTM, EfficientNet-B7, Inception-ResNet-V2, MobileNetV3	**DL (IEEE)**
31	**TCMAPY2515**	**Segment-Aware Contrastive Representation Learning With Vision Transformers TransCon-Skin** **Objective:** The primary objective is to develop a web-based skin cancer classification system using two novel architectures—DMAF-Net and FAGH-Net. Both models are trained on the Kaggle dataset and evaluated using accuracy, precision, recall, F1-score, and AUC-ROC. The secondary objective is to build a Flask web application with user authentication, image upload, Grad-CAM heatmap visualisation, and model performance comparison for educational and research purposes. **Algorithm:** DMAF, FAGH, CAM	**DL (IEEE)**
32	**TCMAPY2516**	**TriSense-AttentionNet A CNN-LSTM With Multi-Head Attention Fusion Model for Infant Cry Classification** **Objective:** The primary objective of this project is to design and develop a multimodal deep learning system for binary infant cry classification that accurately distinguishes	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		between infant cries and non-cry sounds. The system processes three complementary audio representations—spectrograms, cochleagrams, and chromagrams—through two novel architectures: CryMultiFormer, which employs CNN-GRU with dynamic gating for adaptive feature fusion, and GraphCryNet, which utilizes Graph Attention Networks for relational learning. The project aims to deploy the models as a Flask-based web application with user authentication and prediction history features, providing an accessible platform for academic demonstration and evaluation of deep learning approaches in audio classification tasks. **Algorithm:** CNN-GRU, CryMultiFormer, GraphCryNet, Graph Attention Networks	
33	**TCMAPY2518**	**IoT-Driven Food Management System for Freshness Tracking and Predictive Analytics** **Objective:** This project develops an IoT-enabled deep learning framework for food freshness monitoring and predictive quality assessment, using an image-based dataset consisting of food samples categorized into freshness levels (fresh and spoiled/rotten classes). The system applies standard image preprocessing techniques such as resizing, normalization, and data augmentation to improve model generalization and robustness. To enhance learning performance, the framework implements three advanced hybrid architectures. FreshTwin-ViTNet integrates EfficientNetV2 with Vision Transformer and a digital twin-inspired feature alignment module to capture both local and global visual patterns. IoT-SpoilFormerX combines Swin Transformer-based feature extraction with CNN attention mechanisms and gradient boosting (XGBoost) for improved classification accuracy. EdgeFresh-LSTMNet utilizes MobileNetV3 for lightweight feature extraction along with BiLSTM/TCN layers and LightGBM for temporal and contextual pattern learning. The system includes model training, evaluation using standard classification metrics (accuracy, precision, recall, F1-score), and a deployment-ready inference pipeline that provides real-time freshness classification for intelligent food monitoring and quality control applications. **Algorithm:** ViTNet, CNN, XGBoost, LSTMNet	**DL (IEEE)**
34	**TCMAPY2519**	**Traffic Density Analysis using CNN Models** **Objective:** The main objective of this project is to develop a deep learning-based system for automatic traffic density classification using CNN architectures. It aims to accurately categorize traffic into five levels, reduce manual monitoring, enable real-time analysis, improve traffic management efficiency, and support smart city transportation planning with an interactive web interface. **Algorithm:** CNN, Deep Learning, Classification	**DL**
35	**TCMAPY2521**	**ObstaNet-AWTNet Attention-Enhanced Visual Perception with Temporal-Spatial Feature Fusion for Traffic Scene Understanding** **Objective:** The main objective of this project is to develop an advanced deep learning-based object detection system for traffic scene understanding. It aims to enhance YOLO	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		architecture using spatial attention (ObstaNet) and temporal-spatial fusion (AWTNet) to improve detection accuracy of road obstacles, support real-time analysis, and enable efficient intelligent transportation systems. **Algorithm:** YOLO, AWTNet, ObstaNet, Deep Learning	
36	**TCMAPY2522**	**Improving Semiconductor Defect Classification in SEM Images via Domain Adaptation** **Objective:** The main objective of this project is to develop an advanced deep learning system for accurate semiconductor wafer defect classification using SEM images. It aims to improve performance over existing methods by integrating MicroWaferNet and Wafer-hybridNet with attention mechanisms and hybrid architectures, enabling robust, scalable, and high-accuracy multi-class defect detection. **Algorithm:** SEM, MicroWaferNet, Deep Learning, Classification	**DL (IEEE)**
37	**TCMAPY2524**	**Postearthquake Damage Mapping via Remote Sensing: Lessons From the 2023 Türkiye Disaster** **Objective:** The primary objective of this project is to develop an accurate, scalable, and intelligent post-earthquake damage mapping system using remote sensing data acquired from the 2023 Türkiye earthquake disaster. The proposed framework integrates four advanced deep learning models—NemotronNet, Deep Belief Network (DBN), Capsule Network (CapsNet), and an Ensemble Learning model—to achieve reliable damage classification and spatial damage assessment. The system aims to automatically detect, classify, and quantify earthquake-induced structural damage from multisource remote sensing imagery. Furthermore, the framework seeks to support rapid disaster response by providing accurate and interpretable damage information that can assist emergency management agencies, government authorities, and humanitarian organizations in decision-making and resource allocation. **Algorithm:** Deep Belief Network (DBN), Capsule Network (CapsNet), NemotronNet, Ensemble Learning	**DL (IEEE)**
38	**TCMAPY2525**	**ESS Battery Scheduling Using Deep Learning PED, PRT, TCA, Knowledge Distillation, and Adaptive Ensemble for Optimal Charge-Discharge Prediction** **Objective:** The primary objective of this project is to develop an accurate, efficient, and user-friendly intelligent system for real-time Energy Storage System (ESS) battery scheduling and optimization. The proposed framework integrates multiple advanced deep learning models — PED (Policy Evolution Deep-MLP), PRT (Probabilistic Reference Tracking), TCA (Temporal Context Attention Transformer), and a distilled Student network — combined through an adaptive ensemble to predict optimal battery charge/discharge actions. The system achieves superior performance with an Ensemble R^2 of 0.9611. A secure and intuitive web application built using the Flask framework has been developed to enable real-time inference using live sensor and market data. The	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		project aims to create a reliable, practical, and high-performance decision-support tool for smart energy management and battery optimization. **Algorithm:** Energy Storage System (ESS), PED, MLP, PRT	
39	**TCMAPY2526**	**Road Anomaly Classification Using Vibrational Signals with Transfer Learning-Enhanced Deep Architectures** **Objective:** The primary objective of this project is to develop an accurate, efficient, and user-friendly intelligent system for real-time road anomaly detection and classification using vibrational signals from accelerometer sensors. The proposed framework integrates three advanced deep learning models — TriFusion-AttnNet, HybriRoadNet, and MTL-RAA-Net — to achieve superior classification performance across five road condition classes (Pothole, Crack, SpeedBreaker, RoughRoad, and NormalRoad). The system also provides severity estimation through multi-task learning. A secure and intuitive web application built using the Flask framework has been developed to enable real-time analysis of sensor data. The project aims to create a reliable, practical, and high-accuracy decision-support tool for smart road maintenance and intelligent transportation systems. **Algorithm:** MTL-RAA-Net, TriFusion-AttnNet, HybriRoadNet, SpeedBreaker	**DL (IEEE)**
40	**TCMAPY2527**	**Transfer Learning-Enhanced Hybrid Deep Architectures for Accurate Underwater Seagrass Meadow Mapping** **Objective:** The primary objective of this project is to develop an accurate, efficient, and user-friendly intelligent system for underwater seagrass meadow mapping and health assessment using semantic segmentation of underwater imagery. The proposed framework integrates three advanced hybrid deep learning models — SeaFusion-AttnNet, HybriSeaNet, and MTL-SeaFormer Net — to achieve superior pixel-wise segmentation performance across five classes (Seagrass, Reef/Coral, Sand/Water, Rock/Wreck, and Biota/Fish). The system also provides seagrass health estimation through multi-task learning. A secure and intuitive web application built using the Flask framework has been developed to enable real-time analysis of underwater images. The project aims to create a reliable, practical, and high-accuracy decision-support tool for marine ecology monitoring, environmental conservation, and coastal ecosystem management. **Algorithm:** MTL-SeaFormer, SeaFusion-AttnNet, HybriSeaNet, Deep Learning	**DL (IEEE)**
41	**TCMAPY2528**	**A Hybrid-Based Deep Learning Framework for Pill Detection, Multi-Attribute Classification** **Objective:** The primary objective of this project is to develop a hybrid deep learning framework for pill image classification and provide a comparative evaluation of four distinct models: MTMedFormer, RadioDINO-b16, PIMA, and MobileNetV3-Large. The system aims to achieve accurate classification of 112 pill classes from the OGYEIv2 dataset while identifying the most effective model architecture for this task. Additionally, the project seeks to develop a user-friendly web application with FastAPI backend and HTML/CSS/JavaScript frontend, enabling users to upload pill images, select models,	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		receive predictions with confidence scores, and maintain prediction history. This integrated approach bridges the gap between deep learning research and practical deployment for medication safety. **Algorithm:** MTMedFormer, RadioDINO-b16, PIMA, OGYEIv2	
42	**TCMAPY2529**	**DeTrAck: UAV Detection and Tracking Using Neural Networks Ensemble on Surveillance Systems** **Objective:** The primary objective of the project "DeTrAck: UAV Detection and Tracking Using Neural Networks Ensemble on Surveillance Systems" is to develop an intelligent and efficient drone detection framework capable of accurately identifying UAVs in surveillance environments. The project aims to enhance aerial security by utilizing advanced deep learning-based object detection models, namely YOLOv12 with Lightweight Channel and Spatial Attention mechanisms and YOLOv12 with CBAM. These models are designed to improve feature extraction, increase detection accuracy, and minimize false detections under complex real-world conditions. The system seeks to provide real-time performance for surveillance applications where rapid drone identification is critical. Additionally, the project aims to improve robustness against environmental variations such as lighting changes, occlusions, and background clutter while maintaining computational efficiency suitable for practical deployment. **Algorithm:** UAV, UAVs, YOLOv12, CBAM	**DL (IEEE)**
43	**TCMAPY2530**	**A Multi-Branch Dual Residual Attention CNN Model for Pediatric Pneumonia Classification** **Objective:** The primary objective of this project is to develop a highly accurate and automated deep learning model for classifying pediatric chest X-ray images into NORMAL, PNEUMONIA_BACTERIAL, and PNEUMONIA_VIRAL categories. By leveraging a multi-branch dual residual attention CNN architecture, the project aims to extract rich spatial and channel-wise features from medical images, enhancing diagnostic precision. Additionally, the model seeks to provide interpretable predictions that can assist radiologists in early detection, ultimately contributing to timely treatment and improved healthcare outcomes for children. **Algorithm:** NORMAL, CNN, Deep Learning	**DL (IEEE)**
44	**TCMAPY2531**	**Lightweight YOLO Architectures for Real-Time Eggshell Defect Detection** **Objective:** The objective of this project is to develop a real-time eggshell defect detection system based on deep learning techniques, specifically YOLOv8-CBAM and RT-DETR-Swin. The project aims to enhance safety monitoring by detecting eggshell defects using images captured through poultry inspection systems. By leveraging the capabilities of YOLOv8-CBAM for defect detection, RT-DETR-Swin for improved multi-defect tracking, and AR Visualization for enhanced localization, the system aims to automatically identify defects as they occur. The integration of CBAM will provide visual interpretability by highlighting regions in the image that influence the model's decisions.	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		The goal is to create an efficient, automated solution for real-time eggshell defect detection, enabling rapid rejection to defects and enhancing quality **Algorithm:** YOLOv8-CBAM, RT-DETR-Swin, AR, CBAM	
45	**TCMAPY2532**	**Underwater Diver Detection Using YOLOv8-CBAM and RT-DETR-Swin** **Objective:** The objective of this project is to develop a real-time underwater diver detection system based on deep learning techniques, specifically YOLOv8-CBAM and RT-DETR-Swin. The project aims to enhance diver safety monitoring by detecting divers using images captured through underwater monitoring systems. By leveraging the capabilities of YOLOv8-CBAM for object detection, RT-DETR-Swin for improved multi-object tracking, and Swin Transformer for enhanced localization, the system aims to automatically identify divers as they occur. The integration of CBAM will provide visual interpretability by highlighting regions in the image that influence the model's decisions. The goal is to create an efficient, automated solution for real-time diver detection, enabling rapid marine safety response and enhancing diver safety management systems. **Algorithm:** YOLOv8-CBAM, RT-DETR-Swin, CBAM, Swin Transformer	**DL (IEEE)**
46	**TCMAPY2533**	**A Lightweight Explainable Sarcasm Detection System with Commonsense Reasoning Using Dual-Path CNN-BiLSTM and Gated Fusion** **Objective:** The objective of this project is to develop a real-time sarcasm detection system based on deep learning techniques, specifically Dual-Path CNN-BiLSTM and Multi-Head Self-Attention. The project aims to enhance safety monitoring by detecting text-based sarcasm using texts captured through text analysis systems. By leveraging the capabilities of Dual-Path CNN-BiLSTM for text classification, Multi-Head Self-Attention for improved multi-object tracking, and Gated Fusion for enhanced localization, the system aims to automatically identify sarcasm as they occur. The integration of LIME/SHAP will provide token-level explainability by highlighting key tokens in the text that influence the model's decisions. The goal is to create an efficient, automated solution for sarcasm detection, enabling rapid response to sarcastic expressions and enhancing content management systems. **Algorithm:** CNN-BiLSTM, LIME, SHAP, Multi-Head Self-Attention	**DL (IEEE)**
47	**TCMAPY2536**	**Advanced Assessment of Stroke in Retinal Fundus Imaging With Deep Multi-View Learning** **Objective:** This project builds a multi-task framework with a DualBranch-RetNet v3 classifier and ResUNet-CBAM segmenter to accurately detect stroke-related retinal conditions while highlighting key regions. It tackles class imbalance via weighted losses and mixup, then deploys the model through a simple Flask interface for easy image uploads and result viewing. The system delivers accurate, interpretable, and user-friendly retinal analysis for improved stroke risk assessment. **Algorithm:** ResUNet-CBAM, DualBranch-RetNet	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
48	TCMAPY2537	**ML-Mamba A Dual-Stream State Space Model With Atrous Scanning for Multilabel Remote Sensing Image Classification** **Objective:** This framework uses a dual-stream state-space model with atrous scanning and CSANet attention to extract multi-scale spectral-spatial features for multilabel classification of seven land cover classes (impervious, water, vegetation, buildings, trees, boats, cars). It handles co-occurring labels and class imbalance via multilabel cross-entropy loss, and includes a Flask web interface for uploads and real-time predictions with per-label precision, recall, and F1 evaluation. The system is scalable, adaptive to varying object scales, and provides a comprehensive solution for high-resolution remote sensing analysis. **Algorithm:** CSANet, Classification	DL (IEEE)
49	TCMAPY2538	**Recycle AId Training an Artificial Intelligence Model Based on Computer Vision for Solid Waste Classification** **Objective:** This project develops a dual-model computer vision system (E2CArc-Net with EfficientNetV2-S/CBAM/ArcFace and SAF-Net with Swin-T/Sub-center ArcFace/SE/Focal Loss) to accurately classify solid waste using advanced augmentations (AugMix, MixUp, CutMix), progressive resizing, layer-wise decay, and test-time augmentation for robust training. It provides a Flask-based web application for seamless image uploads and automated classification, reducing manual sorting effort and enhancing operational efficiency in waste management workflows. The framework is scalable and extendable to new waste types, serving as a foundation for research while delivering high accuracy across multiple categories **Algorithm:** E2CArc-Net, CBAM, SAF-Net, SE	DL (IEEE)
50	TCMAPY2539	**HybridFormer Data-Efficient Deep Learning for High-Dimensional Spatiotemporal Classification With Application to Neural Signal Processing** **Objective:** The main objective of the proposed EEG-based brain signal classification system is to develop an accurate and efficient framework for classifying motor imagery EEG signals into predefined categories such as Left Hand, Right Hand, Feet, and Rest using advanced deep learning architectures. The system integrates EEG-ConvMamba V2, MSFCNNet V2, and SATrans-Net V2 to effectively capture spatial and temporal features from high-gamma EEG data, improving classification performance and robustness. It aims to enhance feature extraction through multi-scale convolution, state-space sequence modeling, and self-attention mechanisms while reducing noise and inter-subject variability. Additionally, the system provides a user-friendly web interface that allows users to upload EEG signals and obtain real-time predictions with confidence scores. The overall goal is to support brain–computer interface applications by delivering a reliable, scalable, and computationally efficient solution for EEG signal analysis and intelligent decision-making. **Algorithm:** EEG-ConvMamba, MSFCNNet	DL (IEEE)

S.No.	Project ID	Titles	Domain
51	TCMAPY2541	**Geometry-Aware X-Ray Detection via Deformable Convolution, Squeeze-Excitation Recalibration, and Dynamic IoU Regression Loss** **Objective:** The primary objective of this work is to design and develop an efficient deep learning-based system for accurate detection of anatomical structures in X-ray images. The model aims to improve feature representation by integrating attention-based recalibration techniques that highlight important regions in the image. Another objective is to enhance spatial adaptability using deformable convolution, allowing the network to better capture irregular shapes and structural variations. The system also focuses on improving multi-scale feature extraction to ensure reliable detection of both small and large anatomical regions. A key objective is to optimize bounding box regression accuracy using advanced loss functions that improve overlap precision between predicted and actual regions. The framework is designed to reduce detection errors caused by overlapping bones, low contrast, and complex anatomical layouts. Additionally, the model aims to achieve better generalization across different dataset splits, ensuring consistent performance on unseen data. Another important goal is to maintain computational efficiency while improving accuracy, making the system suitable for practical deployment in medical imaging environments. **Algorithm:** Deep Learning, Feature Extraction, Regression	**DL (IEEE)**
52	TCMAPY2542	**Deep Learning-Based Retinal Disease Detection Using Optical Coherence Tomography Images** **Objective:** We introduce a deep-learning framework for automated OCT classification across eight retinal conditions using 24,000 balanced images. After benchmarking three architectures—Triple-Branch (CNN+Transformer+LSTM with SVM), Pyramid Vision Transformer, and HybridSENet—we selected HybridSENet for its superior performance, combining ConvNeXt and ViT embeddings with Squeeze-Excitation gating. Deployed as a Flask web app with MySQL authentication and a MobileNetV2 relevance filter, the system enhances clinical trust via an explainability dashboard featuring Grad-CAM, Grad-CAM++, EigenCAM, attention maps, and LIME, bridging advanced AI with transparent ophthalmic decision support. **Algorithm:** CNN, LSTM, SVM	**DL (IEEE)**
53	TCMAPY2543	**From CNN to Attention Benchmarking YOLO Variants for Automated Bridge Inspection** **Objective:** We evaluated four YOLO variants—WD-YOLO, YOLO-World, YOLO12, and YOLO26—on a Kaggle bridge damage dataset covering corrosion, crack, free lime, leakage, and spalling, using mAP, Precision, and Recall metrics. The best-performing model was deployed in a Flask web application with MobileNetV2 pre-filtering, MySQL for user management and prediction history, and Grad-CAM for interpretability. This integrated system enables accurate, explainable damage detection, demonstrating the	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		practical deployment potential of advanced YOLO architectures for real-world infrastructure monitoring and automated safety assessment applications. **Algorithm:** YOLO, WD-YOLO, YOLO-World, YOLO12	
54	**TCMAPY2544**	**YOLO-WCAF: An Enhanced YOLO Framework for Wildlife Detection in Camera Trap Images** **Objective:** The objective of this project is to develop an efficient wildlife detection system using the proposed YOLO-WCAF architecture with YOLOv12n and YOLO26n backbones. The system aims to detect animals from camera trap images by generating bounding boxes, class labels, and confidence scores. It improves detection performance by integrating Wavelet Feature Extractor, Cross-Attention Block, and Adaptive Fusion Module to capture texture, spatial, and fused feature information. The project also aims to build a Flask-based web application with user login, image upload, prediction, result visualization, history, and logout modules for academic demonstration. **Algorithm:** YOLO-WCAF, YOLOv12n, YOLO26n, Wavelet Feature Extractor	**DL (IEEE)**
55	**TCMAPY2545**	**SlimTom-DETR: A Lightweight and Real-Time Tomato Detection Model for Plant Factories With Complex Lighting Conditions** **Objective:** The main objective is to design a lightweight tomato detection system using improved YOLO models (LiteTomato-YOLO26-ADM and LiteTomato-YOLO12-ADM) for plant factory environments with complex lighting. The system integrates three custom modules—Adaptive Dynamic Mixing Block, Edge-Lighting Attention Fusion, and Plant-Light Distribution Head—to enhance multi-scale feature extraction, lighting-aware fusion, and prediction stability. A complete web-based interface supports image upload, live webcam detection, and separate counting of green and red tomatoes. The project also compares model performance using precision, recall, and mAP, balancing detection accuracy with computational efficiency for practical agricultural monitoring. **Algorithm:** YOLO, YOLO26-ADM, YOLO12-ADM, mAP	**DL (IEEE)**
56	**TCMAPY2546**	**A Transformer-Based Computational Framework for Automated Burn Injury Segmentation** **Objective:** The primary objective is to develop a Transformer-based framework using CrossAttn-DeepLab and SwinFuse-Lab for automated burn segmentation. The system aims to accurately delineate wound regions from clinical backgrounds, addressing challenges like irregular shapes, varying illumination, and diverse skin tones. It implements DeepLab decoders with ASPP, cross-attention, CBAM, and BCE + Dice loss for robust performance. The project evaluates both models on the Wound Segmentation dataset to identify the optimal architecture for clinical deployment, providing a reliable foundation for automated severity assessment, treatment planning, and healing monitoring. **Algorithm:** ASPP, CBAM, BCE, CrossAttn-DeepLab	**DL (IEEE)**
57	**TCMAPY2548**	**Pixel-Wise Modulated Dice Loss for Medical Image Segmentation**	**DL**

S.No.	Project ID	Titles	Domain
		Objective: The primary objective of this project is to develop an accurate and robust medical image segmentation framework using Pixel-Wise Modulated Dice Loss (PM Dice Loss). The proposed system aims to improve pixel-level segmentation performance by effectively handling class imbalance and difficulty imbalance in medical imaging data. The framework integrates three advanced deep learning models—Hypercomplex Residual Network (HCRN), Sparse Vision Mamba (SVM), and EfficientNet-B4 combined with CBAM attention mechanism—to achieve precise and reliable segmentation results. The system focuses on enhancing boundary detection, improving small structure segmentation, and increasing overall prediction accuracy in complex medical images. **Algorithm:** Hypercomplex Residual Network (HCRN), Sparse Vision Mamba (SVM), PM, CBAM	**(IEEE)**
58	**TCMAPY2550**	**Low-Cost FPGA-Enhanced CNN Accelerator for Real-Time YOLO Object Detection and Classification** **Objective:** The objective of this project is to develop a real-time FPGA-accelerated object detection system based on deep learning techniques, specifically YOLOv12 with FastAttentionBlock and YOLOv8-CBAM. The project aims to enhance safety monitoring by detecting traffic object detections using images captured through intelligent transportation systems. By leveraging the capabilities of YOLOv12 with FastAttentionBlock for speed-optimized detection, YOLOv8-CBAM for high-accuracy inference, and the FPGA accelerator for real-time hardware execution, the system accurately detects and classifies urban traffic objects—bus, car, person, traffic signal, truck, and background—in real time. The integration of CBAM will provide visual interpretability by highlighting regions in the image that influence the model's decisions. The goal is to create an efficient, automated solution for real-time YOLO object detection, enabling rapid and accurate multi-class traffic object classification to support intelligent transportation systems, road safety monitoring, and autonomous driving applications. **Algorithm:** FPGA-accelerated, YOLOv12, YOLOv8-CBAM, FPGA	**DL (IEEE)**
59	**TCMAPY2551**	**Adaptive Frequency Global-Local Feature Fusion Model on YOLO for Remote Sensing Object Detection** **Objective:** The objective of this project is to develop a remote sensing object detection system based on deep learning techniques, specifically YOLOv12-CNN and YOLOv8-CBAM. The project aims to enhance remote sensing monitoring by detecting remote sensing objects using images captured through remote sensing platforms. By leveraging YOLOv12-CNN for primary object detection, YOLOv8-CBAM with attention mechanisms for improved multi-class detection, and Global-Local Feature Fusion (GLFF) for enhanced localization, the system aims to automatically identify remote sensing objects as they occur. The integration of Adaptive Frequency Module (AFM) will provide visual interpretability by highlighting regions in the image that influence the model's decisions. The goal is to create an efficient, automated solution for remote sensing object	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		detection, enabling rapid and accurate object classification and enhancing detection performance management systems. **Algorithm:** Global-Local Feature Fusion (GLFF), Adaptive Frequency Module (AFM), YOLOv12-CNN, YOLOv8-CBAM	
60	**TCMAPY2553**	**LECY-Net: Joint Low-Light Image Enhancement and Classification Y-Net** **Objective:** The project develops LECY-Net, a deep learning framework that jointly performs low-light image enhancement and classification within a unified encoder-decoder architecture. To improve training robustness, it generates synthetic degraded images via controlled transformations and integrates a classification branch to extract both visual and semantic features. The model's performance is validated using standard metrics and a Flask-based web application, with the ultimate goal of bridging enhancement and recognition tasks for practical deployment. **Algorithm:** LECY-Net, Deep Learning, Web Application, Classification	**DL (IEEE)**
61	**TCMAPY2554**	**When and How to Focus A Task-Dependent Analysis of Efficient Attentive Architectures for Biosignal Classification** **Objective:** The primary objective is to develop efficient attentive architectures for refining fixed Scattering Transformer embeddings for ECG anomaly detection. Specific objectives include designing MPDANet with multiple learnable prototypes and dynamic gating, developing CCATNet with adaptive temperature contrastive learning, training and validating both models on the PTB-XL dataset, evaluating performance using patient-level AUROC, and establishing task-dependent architectural selection principles through systematic comparison. **Algorithm:** ECG, MPDANet, CCATNet, PTB	**DL (IEEE)**
62	**TCMAPY2555**	**Dilated YOLOv8 for Blur-Robust Image Classification on the MosquitoLarvae-7400 Dataset** **Objective:** The primary objective of this project is to develop a high-performance deep learning framework for the robust classification of mosquito larvae species using the MosquitoLarvae-7400 dataset. Specifically, we aim to implement and evaluate two novel architectures: DBA-YOLO26-Cls (Dilated Blur-Aware Attention YOLO26 Classifier) with a ResNet50 backbone, which leverages dilated convolutions and attention mechanisms to mitigate the effects of image degradation, and FAT-YOLO12-Cls (Frequency-Aware Transformer YOLO12 Classifier) with a ResNet34 backbone, which integrates transformer-based frequency analysis to capture both local textures and global morphological patterns. The project seeks to accurately classify four species—Aedes albopictus (AB), Aedes aegypti (AG), Anopheles cracens (AN), and Culex quinquefasciatus (CQ)—while providing a comprehensive comparative analysis of their performance using metrics such as accuracy, precision, recall, and F1-score. **Algorithm:** DBA-YOLO26-Cls, YOLO26, FAT-YOLO12-Cls, YOLO12	**DL (IEEE)**
63	**TCMAPY2556**	**SUA-YOLO: A Novel YOLO-Based Algorithm for Detecting Dense Small Objects From a Low-Altitude UAV Perspective**	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Objective: The objective of this project is to design and develop a dual-dataset aerial object detection system using advanced deep learning-based detection and classification models. The project focuses on two independent datasets and two dedicated models. The RSOD dataset covers 4 aerial infrastructure classes: aircraft, oiltank, overpass, and playground. The Pedestrian-and-Vehicle UAV dataset covers 6 urban traffic classes: bicycle, bus, car, motorbike, person, and truck. Two novel model architectures are implemented: YOLOv8-CBAM for the RSOD dataset and YOLOv8n-SA (Shuffle Attention) for the Pedestrian-and-Vehicle dataset. YOLOv8-CBAM integrates CBAM into the YOLOv8n neck for channel and spatial attention-enhanced feature recalibration, improving localization of geometrically diverse small targets. YOLOv8n-SA injects Shuffle Attention (SA-Net, ICASSP 2021) into the YOLOv8n neck, enabling group-wise joint channel and spatial attention with cross-group channel shuffling for efficient small object detection at low computational cost. Both models perform object detection, locating objects with bounding boxes and assigning class labels with confidence scores. The final objective is to build an automated, accurate, and intelligent system for aerial and UAV-based multi-class object detection. **Algorithm:** RSOD, UAV, YOLOv8-CBAM, YOLOv8n-SA	
64	**TCMAPY2557**	**Research on Improved Model for PCB Image Defect Detection Based on YOLO** **Objective:** The objective of this project is to detect and classify defects in printed circuit board images accurately using improved deep learning object detection models. The project focuses on six common defect categories: missing_hole, mouse_bite, open_circuit, short, spur, and spurious_copper. By using YOLOv12-DualAttn and RT-DETR-SwinDConv, the system aims to improve detection of small, irregular, and visually similar PCB defects. The goal is to develop an automated inspection system that can take a PCB image as input, identify defect locations with bounding boxes, classify the defect type, and display confidence scores and evaluation metrics for practical manufacturing quality control. **Algorithm:** YOLOv12-DualAttn, RT-DETR-SwinDConv, PCB, Deep Learning	**DL (IEEE)**
65	**TCMAPY2558**	**A Comprehensive Study of Attention Mechanisms in Deep Neural Networks for Wood Defect Classification** **Objective:** This project presents a comprehensive study of attention mechanisms in deep neural networks for wood defect classification using the VNWoodKnot dataset. The dataset consists of three classes: live_knot, dead_knot, and knot_free. The main objective is to compare the performance of different attention-based deep learning models for accurate wood defect classification.Four models are implemented and evaluated: ResNet with Convolutional Block Attention Module (CBAM), EfficientNetB2 with Squeeze-and-Excitation (SE), DenseNet121 with Self-Attention, and MobileNetV3 with Large Kernel Attention (LKA). Before training, the dataset undergoes preprocessing, including image resizing, normalization, and dataset splitting. Each model is trained and evaluated using	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		performance metrics such as accuracy, precision, recall, and F1-score.A Flask-based web application is developed with modules including Home, Register, Login, Classification, and Logout. Users can upload a wood image, and the trained model predicts whether it belongs to the live_knot, dead_knot, or knot_free class. The comparative analysis highlights the effectiveness of different attention mechanisms in improving feature extraction and classification performance. The project provides a structured framework for evaluating attention-based deep learning models and contributes to further research in image classification and automated wood defect analysis. **Algorithm:** Convolutional Block Attention Module (CBAM), Squeeze-and-Excitation (SE), Large Kernel Attention (LKA), VNWoodKnot	
66	**TCMAPY2559**	**Attention-based Hybrid Stacked Network for Jackfruit Leaf Disease Diagnosis** **Objective:** The project, titled "Attention-based Hybrid Stacked Network for Jackfruit Leaf Disease Diagnosis," focuses on the automated classification of jackfruit leaf conditions using deep learning techniques. The dataset consists of five classes: Dried, Healthy, Leaf_Miner, Senescence, and Young. The objective is to accurately identify different leaf conditions from images and provide an efficient classification system.Three attention-enhanced deep learning models were implemented and evaluated: EfficientNetV2-S with Squeeze-and-Excitation (SE), EfficientNetV2-S with Spatial Attention-Guided Multi-Scale Fusion, and ResNet with Squeeze-and-Excitation (SE). These models improve feature extraction by emphasizing important disease-related information and reducing the influence of irrelevant features. The dataset was preprocessed through resizing and normalization before training and testing.Performance evaluation was conducted using accuracy, precision, recall, F1-score, and confusion matrix analysis. Among the three models, EfficientNetV2-S + SE achieved the highest accuracy of 99.60%, followed by EfficientNetV2-S + Spatial Attention-Guided Multi-Scale Fusion with 99.20%, while ResNet + SE achieved 95.20%.A Flask-based web application was developed with Home, Register, Login, Classification, and Logout modules. The system enables users to upload leaf images and receive classification results through a simple and user-friendly interface. **Algorithm:** Squeeze-and-Excitation (SE), SE, EfficientNetV2-S	**DL (IEEE)**
67	**TCMAPY2560**	**TrafficSense AI Deep Learning Ensemble Approach to Traffic Signal Recognition** **Objective:** The primary objective of this project is to develop a highly accurate, efficient, and real-time intelligent system for traffic light detection and recognition using the S2TLD (S2TLD_1080x1920) dataset. The proposed framework integrates three novel high-performance deep learning models — ApexVision-X (YOLOv8x), GenesisEye-E (YOLOv9e), and NexusDetect-L (YOLOv10l) — to achieve superior detection performance across five traffic light classes (red, yellow, green, off, wait_on). The system incorporates advanced augmentation techniques (ChromaFlux-Aug v2) and a sophisticated temporal fusion module (SignalFusion-Net v2) for flicker reduction and	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		stable predictions. A secure and intuitive Flask-based web application has been developed to enable real-time image upload, ensemble inference, and visualized results, aiming to create a reliable decision-support tool for Intelligent Transportation Systems (ITS). **Algorithm:** YOLOv8x, YOLOv9e	
68	**TCMAPY2561**	**HyperFusion Generative Transfer Learning-Enhanced Hybrid Deep Architectures with Adaptive Ensemble for Robust Hyperspectral Image Classification on Indian Pines** **Objective:** The primary objective of this project is to develop an accurate, efficient, and user-friendly intelligent system for hyperspectral image (HSI) classification and analysis using the Indian Pines dataset. The proposed framework integrates three advanced hybrid deep learning models — HyperFusion-AttnNet, HybriSpecFormer, and MTL-HyperMambaNet — to achieve superior pixel-wise classification performance across 16 classes. The system employs an adaptive attention-based ensemble fusion strategy along with uncertainty estimation for reliable predictions. A secure and intuitive web application built using the Flask framework has been developed to enable real-time analysis of hyperspectral data cubes. The project aims to create a reliable, practical, and high-accuracy decision-support tool for remote sensing, precision agriculture, and environmental monitoring. **Algorithm:** HSI, MTL-HyperMambaNet, HyperFusion-AttnNet, HybriSpecFormer	**DL (IEEE)**
69	**TCMAPY2563**	**Short-term wind power probabilistic forecasting via data-driven ensemble weather modeling** **Objective:** The main objective of this project is to develop an accurate short-term wind power forecasting system that predicts the next-hour Wp1 wind power value using historical wind power data from the GEFC2012 dataset. The system aims to capture previous power generation patterns using a 48-hour sequence window and seven input features, Wp1 to Wp7. To improve forecasting accuracy and reliability, the project applies advanced deep learning models such as PatchTST, LTW-Transformer, and D²-SMoE, and combines their outputs using a weighted ensemble approach. The project also aims to evaluate model performance using R^2, MAE, and RMSE metrics and provide a user-friendly web application using Flask, HTML, CSS, and JavaScript for practical wind power prediction. **Algorithm:** GEFC2012, PatchTST, LTW-Transformer, SMoE	**DL (IEEE)**
70	**TCMAPY2564**	**EggVision AI Deep Learning-Based Cracked Egg Quality Detection System** **Objective:** The objective of this project is to develop an automated egg crack classification system using three hybrid deep learning models. The project aims to implement and evaluate CrackSynth-ViT (Vision Transformer with YOLOv12, DCNv4, and small-object detection layer), SCOD (RT-DETRv2 with MambaFPN and diffusion pipeline), and a YOLOv12 baseline detector. A complete web application with FastAPI backend, user authentication, MySQL database, and responsive frontend is developed for	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		image upload, model selection, prediction display, and history tracking. The models are compared based on classification accuracy and confidence scores for four egg categories. The project demonstrates the practical application of hybrid deep learning architectures for agricultural quality assessment. **Algorithm:** YOLOv12, DCNv4, SCOD, RT-DETRv2	
71	**TCMAPY2565**	**SOIL CRACK DETECTION AREAS Using RCA U-Net and WECSM-UNet for Pixel-Level Crack Segmentation** **Objective:** The main objective of this project is to develop a deep learning-based web application for detecting soil crack areas from images. The system aims to identify crack regions at pixel level using semantic segmentation models such as RCA U-Net and WECSM-UNet. It focuses on preprocessing soil images, converting polygon labels into binary masks, training models, and evaluating results using Dice score and IoU. The project also aims to provide a simple user interface for image upload, model selection, prediction display, and logout. MySQL is used to store user details and prediction history for future reference. **Algorithm:** RCA, WECSM-UNet, MySQL, IoU	**DL (IEEE)**
72	**TCMAPY2569**	**Speech Emotion Recognition Using Hybrid Spectral-Prosodic Deep Learning and Explainable Fusion Models** **Objective:** The primary objective of this project is to develop an accurate, efficient, and user-friendly Speech Emotion Recognition (SER) system using hybrid spectral-prosodic deep learning and explainable fusion models. The proposed framework integrates three advanced models — PS-AttBiLSTM, SpecTransNet, and XAI-Stacked SER — for multi-class emotion classification (7 emotions). The system performs robust audio preprocessing, rich feature extraction, model training, and evaluation. A secure and intuitive web application built using the Flask framework with user authentication has been developed to enable real-time emotion prediction from audio files. The project aims to create a reliable, high-accuracy decision-support tool for applications in mental health monitoring, human-computer interaction, customer service analysis, and intelligent virtual assistants. **Algorithm:** Speech Emotion Recognition (SER), PS-AttBiLSTM, XAI-Stacked, SER	**DL (IEEE)**
73	**TCMAPY2572**	**OsteoVision AI_Based Osteoporosis Detection Using PyCAFNet and MSViTAFF with Explainable AI** **Objective:** This project develops an advanced deep learning-based osteoporosis detection framework using X-ray image analysis. The project is titled OsteoVision: AI-Based Osteoporosis Detection Using PyCAFNet and MSViTAFF with Explainable AI. The dataset used in this project is an osteoporosis X-ray image dataset containing two classes: Normal and osto, where the objective is to classify whether a given bone X-ray image belongs to the normal category or shows osteoporosis-related patterns. The main objective is to support automated osteoporosis screening by accurately identifying bone-density-	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		related abnormalities from medical images. The workflow includes dataset loading, class-wise image scanning, missing or mismatched class checking, exploratory data analysis, class distribution visualization, sample image visualization, train-validation-test splitting, image resizing, normalization, and clinically suitable data augmentation. The framework implements two proposed models: PyCAFNet and MSViTAFF. PyCAFNet is a Pyramid Cross-Scale Attention Fusion Network that uses an EfficientNet-B4 backbone, multi-level feature pyramid extraction, cross-scale attention, NAS-based fusion, focal loss, and Grad-CAM-based explainability. MSViTAFF is a Multi-Scale Vision Transformer with Adaptive Feature Fusion that uses four patch embedding scales, transformer layers, bidirectional cross-scale attention, sigmoid-gated NAS fusion, focal loss, and attention-based explainable AI. These models are trained and evaluated using accuracy, balanced accuracy, precision, recall, F1-score, AUC-ROC, confusion matrix, classification report, ROC curve, and sample prediction visualization. Based on the notebook results, PyCAFNet performs best with 95.01% test accuracy, 94.92% balanced accuracy, 0.9503 weighted F1-score, 0.9466 macro F1-score, and 0.9876 AUC-ROC. Finally, the best trained model, class labels, configuration details, decision threshold, training curves, confusion matrix, ROC plots, prediction outputs, and explainable AI visualizations are saved for deployment-ready osteoporosis image classification. **Algorithm:** AI-Based, PyCAFNet, MSViTAFF, AI	
74	**TCMAPY2573**	**Enhancing Thyroid Dysfunction Prediction with Ensemble Learning and Hierarchical Classification A Complete Machine Learning Pipeline with Two Novel Models** **Objective:** The main objective of this project is to develop an accurate and reliable machine learning framework for predicting thyroid dysfunction using a comprehensive public dataset. The study introduces two novel models: a Calibrated Stacking Ensemble Model, which integrates Random Forest, XGBoost, and Support Vector Machine (SVM) with Logistic Regression as the meta-learner, and a Two-Stage Hierarchical Cascade Classifier that performs binary screening before multi-class diagnosis. The project also applies leakage-aware preprocessing, clinically inspired feature engineering, and SMOTE-based class balancing to improve prediction accuracy, minority-class detection, and overall clinical decision support for early thyroid disease diagnosis. **Algorithm:** Support Vector Machine (SVM), XGBoost, SMOTE-based, Calibrated Stacking Ensemble Model	**DL (IEEE)**
75	**TCMAPY2574**	**Hybrid Deep Learning and TransformerBased Detection Framework for Autonomous Vehicles in Challenging Weather Conditions** **Objective:** The main objective of this project is to develop an accurate and robust weather scene classification framework for autonomous vehicles operating under challenging environmental conditions. The study compares three existing deep learning models—MobileNetV2, DenseNet121, and VGG16—with three advanced proposed models—Swin	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Transformer, EfficientNetV2, and ConvNeXt. By leveraging transfer learning and a stratified evaluation strategy, the project aims to improve classification performance across seven weather categories. The trained models are evaluated using consistent data splits, with the best-performing model deployed as a browser-based application to support reliable weather-aware perception for intelligent driving systems. **Algorithm:** VGG16, MobileNetV2, DenseNet121, EfficientNetV2	
76	**TCMAPY2575**	**A Multiscale Attention Transformer for Martian Dust Devil Detection in Remote Sensing Imagery** **Objective:** The main objective of this project is to develop an efficient object detection system for identifying Martian dust devils in remote sensing imagery using custom YOLO-based models. The project focuses on preparing and analyzing a single-class YOLO dataset containing the class dust_devil, where the train, validation, and test folders are checked along with image-label matching and object statistics such as bounding box size and object count. Another objective is to design AMFT-Net, an Attention Multiscale Fusion Transformer Network, by using CBAM, Triplet Attention, AMFT fusion blocks, and a lightweight transformer module to improve spatial and channel-based feature learning. The project also aims to design HAFD-YOLO, a Hybrid Attention Feature-fusion YOLO model, which applies squeeze-and-excitation attention and spatial attention to highlight important dust devil regions. Finally, the project aims to develop a Flask-based web application with Home, Register, Login, Prediction, and Logout modules, allowing users to upload Martian imagery and view dust devil detection results clearly. **Algorithm:** YOLO-based, YOLO, AMFT-Net, CBAM	**DL (IEEE)**
77	**TCMAPY2576**	**GraniTR A Novel Dataset and Transfer Learning Approach for Multi-Class Granite Tile Classification** **Objective:** GraniTR is a deep learning framework for automated classification of granite tile textures across 25 varieties. Using an augmented Kaggle image dataset, three models—CoAtGran (convolution-transformer hybrid), GranResNeSt (split-attention CNN), and a Hybrid Quantum-Classical CNN—were trained with AdamW, label smoothing, and learning-rate scheduling. Explainable AI techniques (attention rollout, occlusion sensitivity) highlighted key texture regions. CoAtGran was deployed via a Flask web app for accurate granite prediction and explanation. **Algorithm:** GraniTR, CNN, AI, CoAtGran	**DL (IEEE)**
78	**TCMAPY2577**	**WiT_Wood_Species_Identification_via_a_Hybrid_CNNTransformer_With_Query-Guided_Cross-Attention** **Objective:** This project presents an automated wood species identification system combining CNNs and transformer-based attention mechanisms, addressing the subjectivity of traditional expert-based visual analysis. Using a 12-class dataset of 7,852 RGB macroscopic wood images with augmentation and class-balancing, three models—WiT, WoodNet-DHJT, and WoodNet-MSQCA—were developed. WoodNet-MSQCA	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		performed best, fusing fine texture, pore-level, and global structural features via multi-scale query cross-attention. The final model was deployed as a Flask web app with user login, image upload, prediction, and explainability outputs like heatmaps and probability charts. **Algorithm:** CNNs, RGB, DHJT, MSQCA	
79	**TCMAPY2578**	**A machine Learning Approach for privacy Risk Detection in BNPL Application** **Objective:** The objective of this project is to develop a machine learning-based privacy risk detection system for Buy Now Pay Later applications by analyzing privacy-related factors such as app permissions, data collection, third-party sharing, advertising preferences, encryption, multi-factor authentication, secure server usage, and data deletion options. The system predicts the Privacy Score, Risk Level, and Privacy Category to help users identify whether a BNPL application is highly secure, moderately secure, or privacy risky. Random Forest, XGBoost, and Naive Bayes models are used for privacy risk prediction, while Explainable AI helps identify the major factors affecting user privacy and improves transparency in decision-making. **Algorithm:** BNPL, XGBoost, AI,	**DL (IEEE)**
80	**TCMAPY2579**	**AFR-STFA-YOLOv12 An Enhanced Object Detection Framework for Road Sign Detection** **Objective:** The main objective of this project is to develop an enhanced object detection framework named AFR-STFA-YOLOv12 for road sign detection. The project aims to improve detection accuracy by combining feature refinement and attention-based learning with the YOLOv12 architecture. The first objective is to collect and prepare the road sign dataset from Roboflow Universe. The dataset is used for training, validation, and testing of the proposed detection model. Proper preprocessing and annotation handling are performed to make the data suitable for model training. The second objective is to implement YOLOv12 as the base object detection model. YOLOv12 is selected because it can detect objects with bounding boxes and class labels in an efficient manner. The third objective is to integrate Adaptive Feature Refinement with the model to improve the quality of extracted features. This helps the model focus on useful road sign details. **Algorithm:** AFR-STFA-YOLOv12, YOLOv12, Roboflow Universe, Adaptive Feature Refinement	**DL (IEEE)**
81	**TCMAPY2580**	**Hybrid Ensemble Learning for Malicious URL 1Detection With BERT and Boosting Models** **Objective:** The objective of this project is to accurately detect and classify URLs as Benign or Malicious using hybrid ensemble learning techniques. By leveraging DistilBERT embeddings, handcrafted URL features, LightGBM, CNN-BiLSTM attention features, and XGBoost, the project aims to enhance the identification of phishing, malware, and suspicious web links. The primary goal is to develop an automated system that can analyze both the semantic meaning and structural characteristics of URLs with	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		high precision. This system will provide valuable insights for cybersecurity monitoring, enabling early detection and prevention of malicious web access, thereby improving user safety and network protection. **Algorithm:** DistilBERT, LightGBM	
82	**TCMAPY2581**	**Vision-Based Traffic Signal Light Detection for Intelligent Signal Timing Systems** **Objective:** The objective of this project is to accurately detect and classify traffic signal light states using vision-based road-camera images, categorized as Red, Green, and Yellow. By leveraging deep learning models—HFTD-YOLO and LMSC-YOLO—the project aims to enhance intelligent signal timing systems through reliable real-time signal state recognition. The primary goal is to develop an automated system that can identify traffic lights with high precision from image inputs and support adaptive traffic control decisions. This system will provide valuable insights for traffic management, enabling faster response to road conditions, reducing signal timing errors, and improving urban mobility. **Algorithm:** HFTD-YOLO, LMSC-YOLO, Deep Learning	**DL (IEEE)**
83	**TCMAPY2583**	**BERT-OTA: Enhancing Hate Speech Detection With Ontology-Guided Transformer Attention** **Objective:** The objective of this project is to accurately detect and classify online text as Non-Hateful or Hateful using ontology-guided transformer attention models. By leveraging DeBERTa-OGA-Net and RoBERTa-LACFNet, the project aims to enhance the monitoring and detection of abusive, toxic, and discriminatory language in digital platforms. The primary goal is to develop an automated system that can identify harmful textual content with high precision using contextual embeddings, gated attention, local convolutional patterns, and cross-fusion mechanisms. This system will provide valuable insights for content moderation and online safety teams, enabling early detection and intervention against hate speech, thereby improving digital communication safety and reducing harmful user interactions. **Algorithm:** DeBERTa-OGA-Net, RoBERTa-LACFNet, Transformer	**DL (IEEE)**
84	**TCMAPY2584**	**HCA-YOLO A Pedestrian Detection Model That Integrates Multi-Source Context-Aware Mechanisms** **Objective:** The objective of this project is to accurately detect pedestrians in traffic-scene images using a vision-based deep learning framework for intelligent signal timing systems. The project clearly uses two models: YOLOv8-CBAM-PedNet and YOLOv8-BiFPN-PedNet. YOLOv8-CBAM-PedNet focuses on attention-based pedestrian feature selection using CBAM, while YOLOv8-BiFPN-PedNet focuses on weighted multi-scale feature fusion using BiFPN modules. The primary goal is to develop an automated system that identifies pedestrian locations, confidence scores, and pedestrian counts from road and crossing images. These outputs can support adaptive signal decisions, safer pedestrian crossings, and improved traffic monitoring	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Algorithm: YOLOv8-CBAM-PedNet, YOLOv8-BiFPN-PedNet, CBAM, BiFPN	
85	**TCMAPY2585**	**Computer Vision System for Post-Larval Shrimp Detection and Counting in Aquaculture** **Objective:** The objective of this project is to develop an AIoT-based computer vision framework titled "An AIoT-Based Computer Vision System for Post-Larval Shrimp Detection and Counting in Aquaculture". The project aims to detect and count post-larval shrimp from aquaculture images by combining connected image acquisition, small-object oriented preprocessing, and advanced shrimp detection models. Based on the attached trained notebooks, the implemented models are YOLOv12-DualAttn and RT-DETR-SwinDConv. The objective is to identify post-larval shrimp, estimate the total count from detections, evaluate the trained models using precision, recall, F1-score, mAP, prediction outputs, and confusion matrix results, and explain the detection behavior using EigenCAM visualizations. **Algorithm:** AIoT-based, YOLOv12-DualAttn, RT-DETR-SwinDConv, mAP	**DL (IEEE)**
86	**TCMAPY2586**	**Super-Resolution and Granularity-Optimized Detection of Extremely Small Beach-Litter Objects in UAV Imagery** **Objective:** The objective of this project is to develop a UAV-based beach-litter detection framework titled "SRGO-YOLO: Super-Resolution and Granularity-Optimized Detection of Extremely Small Beach-Litter Objects in UAV Imagery". The project aims to detect extremely small litter objects from aerial images by combining super-resolution oriented preprocessing, granularity-aware augmentation, and advanced object detection models. Based on the attached trained notebooks, the implemented models are YOLOv12-DualAttn and RT-DETR-SwinDConv. The objective is to identify objects such as plastic-bottle, takeaway-cup, and trash, evaluate the trained models using precision, recall, F1-score, mAP, prediction outputs, and confusion matrix results, and explain the detection behavior using EigenCAM visualizations. **Algorithm:** UAV-based, SRGO-YOLO, UAV, YOLOv12-DualAttn	**DL (IEEE)**
87	**TCMAPY2587**	**A Decision Support System for Ovarian Cancer Classification Using Clinical Features From Ultrasound Imaging** **Objective:** This project classifies eight ovarian tumor subtypes from ultrasound images using CIAFNet with image, handcrafted, and clinical feature fusion.It uses U-Net with EfficientNet-B0 for lesion segmentation, mask generation, overlay visualization, and radiomic feature extraction.The Flask web system provides login, image upload, prediction probabilities, uncertainty scores, segmentation output, and performance evaluation. **Algorithm:** CIAFNet, EfficientNet-B0, Feature Extraction, Feature Fusion	**DL (IEEE)**
88	**TCMAPY2588**	**Data-Efficient Pomegranate Disease Classification Using MulTaSiCl-MulTeSiSt Framework**	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Objective: This research develops a data-efficient deep learning framework for pomegranate disease classification with high accuracy using limited labeled data.It uses multi-task learning, contrastive learning, rotation prediction, teacher ensemble, MobileNetV3 student model, knowledge distillation, and CNN-Transformer comparison.A web application with login, disease prediction, result visualization, and performance evaluation is implemented to demonstrate the proposed system. **Algorithm:** CNN-Transformer, MobileNetV3, Deep Learning, Transformer	
89	**TCMAPY2589**	**A Federated Learning and Explainable AI Framework for Privacy-Preserving Brain Tumor Diagnosis Using Multi-Institutional MRI Data** **Objective:** The main objective of this project is to develop a privacy-preserving brain tumor MRI classification framework using federated learning, deep learning, and Explainable AI.The proposed system integrates DCGF-Net and FSDA-Net with FedAvg aggregation to improve tumor feature extraction, classification accuracy, and model interpretability through attention-based explanations.A Flask-based web application is developed to provide secure user access, MRI image prediction, and explainable diagnostic results. **Algorithm:** MRI, AI, DCGF-Net, FSDA-Net	**DL (IEEE)**
90	**TCMAPY2590**	**Mitigating Location Bias for Cross-Location Generalization in Camera Trap Wildlife Detection** **Objective:** The main objective of this project is to develop a deep learning-based wildlife detection framework that reduces location bias and improves cross-location generalization in camera trap images. The project aims to prepare and process the CCT20-Wild dataset by converting annotations into a suitable YOLO format for effective model training and evaluation. It focuses on developing the CamoWild-YOLOv12 model with texture enhancement, camouflage separation, boundary-aware feature fusion, and low-contrast recovery mechanisms to improve the detection of difficult animal regions. Additionally, the project aims to design the EcoShift-YOLOv12 model with scene-context decoupling, habitat-invariant feature learning, cross-location contrastive learning, and uncertainty-aware detection to minimize dependency on location-specific patterns. The developed models are evaluated using performance measures such as precision, recall, mAP50, mAP50-95, and class-wise detection analysis. The project also aims to integrate Grad-CAM visualization for providing interpretable prediction results by highlighting important image regions influencing model decisions. Finally, a Flask-based web application is developed with user authentication and image prediction modules to provide an accessible platform for wildlife image detection and analysis. **Algorithm:** CCT20-Wild, YOLO, YOLOv12, mAP50	**DL (IEEE)**
91	**TCMAPY2591**	**Comparative Attention-Based YOLOv12 Architectures for Engagement Detection** **Objective:** The main objective of this project is to develop a comparative framework using attention-based YOLOv12 architectures for engagement detection. The project aims to	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		design FCCA-YOLO12 by integrating Frequency-Channel Coordinate Attention to improve feature selection and representation. Another objective is to develop ECA-YOLO by incorporating MDCA and GCFF modules for better contextual understanding and cross-scale feature fusion. The study also aims to evaluate and compare both architectures based on their detection performance and feature learning capabilities. A Flask-based application is developed to provide user authentication and detection functionalities through an interactive interface. The project focuses on understanding how different attention mechanisms improve YOLOv12-based detection systems and provides a foundation for developing efficient engagement analysis solutions. **Algorithm:** YOLOv12, FCCA-YOLO12, ECA-YOLO, MDCA	
92	**TCMAPY2592**	**WEFA-YOLO Wavelet-Enhanced Feature Attention for Small Crater Detection in Lunar Surface Imagery** **Objective:** The main objective of this project is to design and implement WEFA-YOLO for accurate small crater detection in lunar surface imagery. The project aims to improve crater feature extraction by applying wavelet-based enhancement, which helps retain fine texture and boundary information. Another objective is to use feature attention to guide the model toward important crater regions and reduce background confusion. The system also focuses on building a simple Flask-based web application where users can register, log in, upload lunar images, and view detection results. The project aims to support both image upload detection and live feed detection through an easy interface. It also intends to reduce manual effort in crater identification by providing automated prediction output. Overall, the objective is to create a clear, efficient, and research-oriented crater detection framework that combines deep learning, feature enhancement, and web-based deployment. **Algorithm:** WEFA-YOLO, Deep Learning, Feature Extraction, Web Application	**DL (IEEE)**
93	**TCMAPY2593**	**A Comprehensive Study on the Evolution of Different Motivations and Architectures of YOLO** **Objective:** The objective of this project is to develop a study framework titled “A Comprehensive Study on the Evolution of Different Motivations and Architectures of YOLO”. The project aims to analyze the motivation and architectural development of YOLO-based object detection systems by implementing and comparing the trained notebook models YOLOv8-DualAttn and RT-DETR-SwinDConv. The objective is to understand how real-time detection models improve speed, accuracy, feature extraction, attention refinement, multi-scale fusion, and prediction interpretability. The trained models are evaluated using precision, recall, F1-score, mAP, prediction outputs, and visualization results, while EigenCAM is used to explain the image regions that influence the detection process. **Algorithm:** YOLO, YOLO-based, YOLOv8-DualAttn, RT-DETR-SwinDConv	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
94	TCMAPY2594	**A Robust Framework for Infrared Ship Detection With Graph Reasoning and Enhanced Multi-Scale Fusion** **Objective:** The objective of this project is to develop an infrared ship detection framework titled "A Robust Framework for Infrared Ship Detection With Graph Reasoning and Enhanced Multi-Scale Fusion". The project aims to detect the single class ship from infrared maritime images by applying infrared image preprocessing, multi-scale feature-aware augmentation, graph reasoning for contextual relationship understanding, and advanced object detection models. Based on the attached trained notebooks, the implemented models are YOLOv12-DualAttn and RT-DETR-SwinDConv. The objective is to identify ship targets accurately, evaluate the trained models using precision, recall, F1-score, mAP, prediction outputs, and confusion matrix results, and explain the detection behavior using EigenCAM visualizations **Algorithm:** YOLOv12-DualAttn, RT-DETR-SwinDConv, mAP, EigenCAM	DL (IEEE)
95	TCMAPY2595	**Dense Residual Dense Block Super-Resolution for Enhancing Vehicle Detection in Remote Sensing** **Objective:** The objective of this project is to develop a remote-sensing vehicle detection framework titled “Dense Residual Dense Block Super-Resolution for Enhancing Vehicle Detection in Remote Sensing”. The project aims to detect small and scale-varied vehicle targets from remote sensing images by applying Dense Residual Dense Block Super-Resolution preprocessing, multi-scale feature-aware augmentation, and advanced object detection models. Based on the attached trained notebooks, the implemented models are YOLOv12-DualAttn and RT-DETR-SwinDConv. The objective is to identify vehicle targets such as cars, trucks, buses, and small/distant vehicles, evaluate the trained models using precision, recall, F1-score, mAP, prediction outputs, and confusion matrix results, and explain the detection behavior using EigenCAM visualizations. **Algorithm:** YOLOv12-DualAttn, RT-DETR-SwinDConv, mAP, EigenCAM	DL (IEEE)
96	TCMAPY2596	**Adaptive QKS Integration via Late-Fusion Ensemble for Traffic Classification** **Objective:** The primary objective of this project is to develop and evaluate quantum-inspired feature engineering techniques for encrypted network traffic classification using the ISCXVPN2016 dataset containing 14 traffic classes: BROWSING, CHAT, FT, MAIL, P2P, STREAMING, VOIP, VPN-BROWSING, VPN-CHAT, VPN-FT, VPN-MAIL, VPN-P2P, VPN-STREAMING, and VPN-VOIP. **Algorithm:** ISCXVPN2016, BROWSING, CHAT, FT	DL (IEEE)
97	TCMAPY2597	**LEAD-YOLO: Context-Aware Multi-Scale Object Detection for Autonomous Driving on KITTI Road Scenes** **Objective:** The objective of this project is to develop and compare two enhanced YOLO-based object detection models, LEAD-YOLO and MDAT-YOLO, for accurate multi-target detection in autonomous driving road scenes. The system aims to improve small-object detection, multi-scale feature learning, and computational efficiency using	DL (IEEE)

S.No.	Project ID	Titles	Domain
		advanced feature extraction and fusion techniques on the KITTI dataset. It also provides a Flask-based application for image-based detection and result visualization. **Algorithm:** YOLO-based, LEAD-YOLO, MDAT-YOLO, KITTI	
98	**TCMAPY2598**	**Decoder-Based Anomaly Detection with Concentration Filtering for Distinguishing Wildfire Smoke from Clouds** **Objective:** The objective of this project is to develop an intelligent wildfire smoke detection system using YOLOv12n-based deep learning models. The system aims to improve smoke localization by incorporating spatial context and spectral texture analysis through HorizonAware-YOLO and SpectroTex-YOLO, reducing cloud-related false detections and providing accurate smoke prediction with visualized results. **Algorithm:** YOLOv12n-based, YOLO, Deep Learning	**DL (IEEE)**
99	**TCMAPY2602**	**AOAF-ThermalNet Altitude and Occlusion-Aware Adaptive Fusion Network for Thermal Aerial Person Detection in Search and Rescue** **Objective:** The primary objective of this project is to develop an accurate and usable intelligent system for detecting persons in high-altitude infrared thermal UAV imagery. The implementation trains and deploys three deep learning models - ADF-ResNet50, OAM-EfficientNetV2, and AOAF-ThermalNet - for binary Person / No-Person classification. The system uses 96x96 thermal image patches, altitude and occlusion condition inputs, CLAHE enhancement, adaptive denoising, attention-based feature learning, and CNN-Transformer fusion. A Flask web application with MySQL-based registration and login enables users to upload thermal images, select altitude and occlusion conditions, and receive annotated detection results with confidence values and model-wise probability comparison. **Algorithm:** UAV, ADF-ResNet50, OAM-EfficientNetV2, AOAF-ThermalNet	**DL (IEEE)**
100	**TCMAPY2603**	**Large Industrial Pump Flow-Rate Classification Using Koopman-Inspired Deep Learning and Explainable AI** **Objective:** The main objective of this project is to develop an intelligent pump flow-rate classification system using sensor and operational data. The system aims to classify pump flow behavior into Low Flow Rate, Medium Flow Rate, High Flow Rate, and Very High Flow Rate classes. It applies data preprocessing, feature scaling, Koopman-inspired feature engineering, feature selection, class balancing, and dimensionality reduction before model training. The project implements three models: DKG-Net, KFC-Net, and NSKB-Ensemble. A Flask-based web application is also created to make the model usable through a simple interface where users can enter pump readings and view prediction results. **Algorithm:** DKG-Net, KFC-Net, NSKB-Ensemble	**DL (IEEE)**
101	**TCMAPY2604**	**HCA-Net Hierarchical Confusion-Aware Attention Network for Histopathology Image Classification**	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		Objective: Accurate histopathology image classification is essential for reliable cancer diagnosis. This project proposes CCAR-Net and HCA-Net deep learning models to improve discrimination between visually similar tissue classes. CCAR-Net uses ResNet50 features, learnable class prototypes, and cross-attention, while HCA-Net introduces confusion-aware learning to enhance class separation. The best-performing model is deployed using Flask, providing a user-friendly web application for uploading histopathology images and generating good predictions with confidence scores. **Algorithm:** CCAR-Net, HCA-Net, ResNet50, Deep Learning	
102	**TCMAPY2609**	**A Hybrid Chaotic Bat Algorithm With Deep Learning Optimization for Multi-Level Image Segmentation** **Objective:** The primary objective of this project is to develop an efficient and intelligent semantic image segmentation framework using deep learning models optimized by the Tent-Map Chaotic Bat Algorithm. The proposed framework utilizes the PASCAL VOC 2012 dataset containing 21 pixel-level classes and follows a systematic pipeline consisting of data validation, image preprocessing, augmentation, chaotic hyperparameter optimization, model training, and comparative evaluation. Three architecture-specific segmentation models—XLITE-UNet, A2PNet, and PUNet—are designed and evaluated to perform accurate pixel-wise image segmentation. The Tent-Map Chaotic Bat Algorithm is employed to automatically optimize the learning rate and batch size for each architecture, reducing manual hyperparameter tuning while improving training efficiency. The framework further aims to enhance segmentation performance through class-weighted loss functions, transfer learning, test-time augmentation, and comprehensive evaluation using mean Intersection over Union (mIoU) and Pixel Accuracy. **Algorithm:** Union (mIoU), PASCAL, VOC, XLITE-UNet	**DL (IEEE)**
103	**TCMAPY2610**	**MTGA-Net: A Multi-Tier Global-Attention DeepLearning Framework for Enhanced Breast Mass Classification in Mammographic Images** **Objective:** The primary objective of this project is to develop an efficient deep learning-based breast mass classification framework named MTGA-Net (Multi-Tier Global-Attention Deep Learning Framework for Enhanced Breast Mass Classification in Mammographic Images). The proposed framework aims to improve the classification of breast masses from mammographic images by learning discriminative local and global image features using multiple advanced deep learning architectures. The system follows a structured pipeline consisting of mammographic image preprocessing, data augmentation, deep feature extraction, attention-based representation learning, model training, ensemble-based prediction, and performance evaluation. The framework integrates multiple models including CNN_ACAEB with ResNet34 backbone and adaptive channel-spatial attention, Diffusion_UNet with residual U-Net architecture, ODIN_Fusion using EfficientNet-B0 and ResNet18 gated feature fusion, TRISKELION1 with multi-scale convolution branches, and ConvNeXt_TL based on transfer learning. The extracted model predictions	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		are further combined using an EnsembleStack mechanism with logistic regression to improve classification reliability. The project also focuses on model interpretability using Grad-CAM visualization to highlight important regions influencing prediction decisions. The framework aims to provide an accurate, scalable, and interpretable solution for automated breast mass classification. **Algorithm:** MTGA-Net, TRISKELION1, CAM, ResNet34	
104	**TCMAPY2611**	**CLoE: Curriculum Learning on Endoscopic Images for Robust MES Classification** **Objective:** The primary objective of this project is to develop EndoCLoE-AI, a quality-aware multi-model deep learning framework for robust gastrointestinal endoscopic image classification. The proposed framework extends the two-phase curriculum-learning logic of the CLoE base paper from ordinal Mayo Endoscopic Score classification to the broader 23-class HyperKvasir labeled-image dataset containing 10,662 images. The project aims to organize endoscopic images into clean, mixed/full, and noisy-focus stages through a CLoE-inspired quality curriculum. It also aims to investigate three architecture-specific novelty models: a Multi-Modal Adversarial Autoencoder, Dense+UNet, and SAformer. The framework incorporates image preprocessing, ImageNet normalization, class-imbalance handling, data augmentation, model training, checkpoint saving, and comparative evaluation. Its overall objective is to examine reconstruction-based representation learning, dense spatial refinement, self-attention, ordinal consistency, and quality-aware curriculum learning within a unified endoscopic image classification pipeline. **Algorithm:** EndoCLoE-AI, CLoE, CLoE-inspired, UNet	**DL (IEEE)**
105	**TCMAPY2612**	**Remaining Useful Life Prediction of Aircraft Engines Using Hybrid Deep Learning and Explainable AI** **Objective:** The main objective of this project is to develop an intelligent Remaining Useful Life prediction system for aircraft engines using advanced deep learning models. The system analyzes operational settings and sensor measurements from turbofan engine data to estimate the number of useful cycles remaining before maintenance is required. The project implements three models: CGA-TCN RULNet, SGC-Former, and Hybrid XAI-CBiLSTM. It also includes preprocessing steps such as sensor selection, operating condition clustering, contextual normalization, MinMax scaling, and sequence preparation. A Flask-based web application is developed with user registration, login, manual prediction input, model comparison, and maintenance status display. **Algorithm:** CGA-TCN, RULNet, SGC-Former, XAI-CBiLSTM	**DL (IEEE)**
106	**TCMAPY2613**	**Adversarial Robustness of Deep Learning Models for Inland Water Body Segmentation From SAR Images** **Objective:** The project aims to develop a robust deep learning system using DAR-Net and SGF-Net to accurately segment inland water bodies from SAR images.It includes dataset preparation, denoising and spectral feature extraction, suitable segmentation loss	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		functions, and PGD-based adversarial training for improved stability.A Flask web application will enable users to register, log in, upload SAR images, view segmentation masks, and log out. **Algorithm:** DAR-Net, SGF-Net, SAR	
107	**TCMAPY2614**	**FoMoSkinNet: A Dual-Stream Deep Learning Model for Early Detection and Classification of Non-Dermoscopic Skin Lesions via Focal Modulation and Local Feature Integration** **Objective:** The project aims to develop FoMoSkinNet, a dual-stream deep learning framework using EfficientNet-B0 and local feature extraction for accurate skin lesion classification and segmentation from non-dermoscopic images.It focuses on improving feature fusion and lesion boundary detection using gated fusion, BAFM-Net, boundary-weighted loss, and multi-scale supervision techniques.A Flask-based web application will be developed for user registration, image upload, lesion prediction, segmentation visualization, and system access management. **Algorithm:** BAFM-Net, EfficientNet-B0, FoMoSkinNet	**DL (IEEE)**
108	**TCMAPY2615**	**RSO-YOLO Traffic Sign Detection Method Based on Reparameterization and Shallow Feature Enhancement** **Objective:** The primary objective of this project is to improve traffic sign detection accuracy, particularly for small objects, while maintaining computational efficiency. To achieve this, HSN-YOLO and DRN-YOLO are developed with enhanced feature extraction, hierarchical suppression, and dynamic routing techniques. Their performance is evaluated against conventional YOLO models using mAP, F1-score, and inference speed. The best-performing model is then deployed in a web application with user authentication, an intuitive detection interface, and a searchable detection history. **Algorithm:** HSN-YOLO, DRN-YOLO, YOLO	**DL (IEEE)**
109	**TCMAPY2616**	**A Novel Deep Learning Analysis in Detecting Urban Flood Objects for Faster Rescue Operations** **Objective:** The primary objective of this project is to develop and implement two independent deep learning models, HydroCue-YOLO and ReflectGuard-YOLO, for detecting urban flood objects and classifying them into eight risk-level categories. The system aims to improve contextual understanding, glare robustness, and low-contrast feature recovery through domain-specific architectural modules, while providing a user-friendly web application for model selection, prediction, and result visualization to support faster visual assessment in rescue-oriented scenarios. **Algorithm:** YOLO, Deep Learning	**DL (IEEE)**
110	**TCMAPY2617**	**SegS-YOLO A YOLO-Based Instance Segmentation Approach for Small-Scale Ship Targets in SAR Images** **Objective:** The primary objective of this project is to design and implement a dual-model deep learning framework for detecting small-scale ship targets in SAR imagery using two	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		enhanced architectures: SOE-YOLO with Asymmetric Padding Down-Sampling, High-Frequency Contrast Enhancement, and Contextual Attention Fusion, and ST-YOLOA with Swin Transformer and Coordinate Attention mechanisms. The models are trained on the SAR-Ship dataset and evaluated using precision, recall, and mAP metrics. A web-based application integrates these models, enabling users to upload images, perform single or batch detection, and visualize results with bounding boxes and confidence scores. **Algorithm:** SAR, SOE-YOLO, ST-YOLOA, SAR-Ship	
111	**TCMAPY2618**	**AeroTassel-Detect: A UAV-Based Deep Learning Framework for Detecting and Geolocating Missed Tassels in Hybrid Maize Seed Production** **Objective:** The primary objective is to design and develop two specialized YOLOv12n-based models: LeafPierce-YOLO for detecting occluded tassels and DenseGeo-YOLO for dense clusters with geolocation. It aims to convert detection into GPS coordinates and build a web application with modules for image upload, model comparison, and field mapping, while evaluating performance using precision, recall, mAP. **Algorithm:** YOLOv12n-based, YOLO	**DL (IEEE)**
112	**TCMAPY2619**	**Deep Learning-Based Glaucoma Screening System Using Smartphone-Captured Fundus Images with Multi-Scale Transformer and Dual-Stream Multi-Task Learning Architectures** **Objective:** The objective of this project is to develop two deep learning models, GlaucomaViT and GlaucomaDualNet, for automated glaucoma screening from smartphone-captured fundus images. The models perform binary classification to classify images as Normal or Glaucoma. GlaucomaViT uses a Vision Transformer with anatomical attention, while GlaucomaDualNet uses a dual-stream multi-task learning framework. Both models extract anatomical features including cup-to-disc ratio and rim width. An ensemble prediction combines both models for improved accuracy. The system is deployed as a Flask web application with Grad-CAM visualizations for explainability. **Algorithm:** CAM, GlaucomaViT, GlaucomaDualNet, Vision Transformer	**DL (IEEE)**
113	**TCMAPY2620**	**EASA-YOLO Edge-Aware Spatial Attention Enhanced YOLO for Automated Glass Insulator Defect Detection and Deployment** **Objective:** The primary objective of this project is to develop an automated defect detection system for glass insulators that accurately classifies images as Broken or Normal. The system utilizes two models: YOLOv8n as the baseline and the enhanced EASA-YOLO (Edge-Aware Spatial Attention YOLO) as the proposed model. EASA-YOLO integrates a novel Edge-Aware Spatial Attention module with a fixed Sobel edge prior to emphasize crack-like patterns, improving detection sensitivity. Both models are trained and evaluated on a custom dataset of glass insulator images with bounding box annotations. A Flask-based web application is implemented to provide user authentication, image upload functionality, and real-time predictions. The system also generates annotated images with bounding boxes and confidence scores, enabling interpretable	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		results. The final EASA-YOLO model achieves higher classification accuracy and efficiency compared to the baseline, making it suitable for practical deployment in power grid inspection tasks. **Algorithm:** YOLOv8n, EASA-YOLO, YOLO, Edge-Aware Spatial Attention	
114	**TCMAPY2621**	**SAR Target Classification Enhancement via Synthetic Defocused Image Augmentation Using Kinematic Motion Modeling** **Objective:** The primary objective of this project is to develop a physics-guided augmentation framework that enhances SAR target classification robustness by synthetically generating defocused images through kinematic motion modeling. The study aims to augment the MSTAR dataset with realistic defocused samples, train three deep learning architectures—ResNet101, Swin-T, and SAR-HiFATNet—on the augmented data, and evaluate classification performance under clean and motion-degraded conditions. Ultimately, this research seeks to bridge the domain gap between clean laboratory data and real-world operational SAR scenarios. **Algorithm:** SAR, MSTAR, SAR-HiFATNet, ResNet101	**DL (IEEE)**
115	**TCMAPY2622**	**Enhanced Camouflaged Object Segmentation Using EdgeCamoNet and CamoMamba-FPN with Dual Attention Feature Fusion** **Objective:** The main objective of this project is to develop an enhanced camouflaged object segmentation framework using CamoMamba-FPN and EdgeCamoNet models for improving object identification and mask generation accuracy. The project aims to design CamoMamba-FPN by integrating PVTv2 feature extraction, a lightweight Mamba-inspired context block, Feature Pyramid Network fusion, and boundary refinement techniques to capture both detailed and contextual information. It also aims to develop EdgeCamoNet using a hybrid CNN–PVTv2 encoder that combines local texture features with transformer-based representations through feature fusion, edge extraction, texture difference attention, and edge-guided decoding. The framework focuses on improving segmentation quality using deep supervision, BCE-IoU loss, and boundary-aware optimization methods. The proposed models are evaluated using segmentation metrics such as IoU, Dice score, MAE, S-measure, and E-measure. The project also aims to integrate Grad-CAM visualization for interpreting important feature regions and develop a Flask-based application that provides user authentication, image segmentation, and visualization of prediction results. The overall objective is to create an effective and explainable segmentation system by combining context learning, attention mechanisms, and boundary enhancement strategies. **Algorithm:** FPN, PVTv2, CNN, BCE-IoU	**DL (IEEE)**
116	**TCMAPY2624**	**FSCA and GCSA Dual Attention Architectures for Brain Tumor MRI Classification with EfficientNetV2** **Objective:** The main objective of this project is to develop an attention-based deep learning framework for brain tumor MRI image classification using EfficientNetV2. The	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		project aims to design FSCA-EfficientNetV2 and GCSA-EfficientNetV2 architectures by integrating attention mechanisms for improved feature extraction. Another objective is to analyze the effectiveness of spatial, channel, and contextual feature learning in MRI image classification. The project also aims to apply Grad-CAM visualization to identify important regions contributing to classification decisions. A Flask-based application is developed to provide a simple interface for user access and image classification. The overall objective is to create a reliable classification system that combines deep learning, attention mechanisms, and visualization techniques. **Algorithm:** MRI, FSCA-EfficientNetV2, GCSA-EfficientNetV2, CAM	
117	**TCMAPY2625**	**An Integrated Situational Awareness Framework for Inland Waterway Shipping** **Objective:** The objective of this project is to develop an inland-waterway shipping situational-awareness framework titled "EC-YOLOv8 and Qwen: An Integrated Situational Awareness Framework for Inland Waterway Shipping". The project aims to detect vessel targets from waterway and port-scene images using YOLO-format dataset preparation, augmentation, enhanced YOLO-based detection, transformer-based comparative detection, and Qwen-assisted interpretation. Based on the attached trained notebooks, the implemented detection models are YOLOv12-DualAttn and RT-DETR-SwinDConv, trained on the seashipDataset-1 dataset with six vessel classes. The objective is to identify bulk cargo carrier, container ship, fishing boat, general cargo ship, ore carrier, and passenger ship targets, evaluate the models using precision, recall, mAP, prediction outputs, and confusion matrix results, and convert detections into useful situational-awareness information. **Algorithm:** EC-YOLOv8, YOLO-format, YOLO-based, YOLOv12-DualAttn	**DL (IEEE)**
118	**TCMAPY2626**	**FACA-YOLOv12 Frequency-Aware Coordinate Attention for Robust Small-Object Drone Detection in Aerial Imagery** **Objective:** The main objective of this project is to develop a deep learning-based framework called FACA-YOLOv12 for detecting small objects in aerial images. The model uses frequency-aware learning to capture detailed object features and coordinate attention to focus on important information. Its performance is compared with the YOLO26 detection model. The project also includes a Flask-based web application with user login, object detection, and live detection modules. Finally, the proposed model is evaluated using suitable performance metrics to measure its effectiveness in aerial image object detection. **Algorithm:** FACA-YOLOv12, YOLO26, Deep Learning, Object Detection	**DL (IEEE)**
119	**TCMAPY2627**	**GFARN A Gated Feature-Attention Residual Network for Failure Risk Prediction in Hyperscale Green Data Centers** **Objective:** The main objective of this project is to design and develop a Gated Feature-Attention Residual Network (GFARN) for predicting failure risks in hyperscale green data centers. The project focuses on preprocessing and preparing the data center dataset for	**DL (IEEE)**

S.No.	Project ID	Titles	Domain
		deep learning-based classification. The proposed GFARN model combines feature gating, attention mechanisms, and residual connections to improve failure risk prediction. It also aims to identify important input features and learn complex relationships among data attributes for better classification performance. The effectiveness of the proposed model is evaluated using suitable classification metrics. Additionally, a Flask-based application is developed with user authentication and prediction functionalities to provide a practical implementation of the proposed system. **Algorithm:** Gated Feature-Attention Residual Network (GFARN), GFARN	
120	**TCMAPY2631**	**Lung Cancer Detection Using Attention-Based Feature Fusion** **Objective:** This project presents an attention-based feature fusion approach for lung cancer classification using CT scan images from the IQ-OTHNCCD Lung Cancer Dataset. The main objective is to develop an accurate and efficient deep learning system capable of classifying CT scan images into Benign, Malignant, and Normal categories. Three advanced hybrid deep learning models were developed and evaluated. The first model combines EfficientNet-B7 with a Vision Transformer using Cross-Attention to integrate local and global image features. The second model integrates Inception-ResNet-V2 with Squeeze-and-Excitation (SE) Blocks and a Feature Pyramid Network (FPN) to improve channel attention and multi-scale feature extraction. The third model combines MobileNetV3 with a Bi-Directional LSTM and Self-Attention mechanism to learn relationships between image patches. The system was implemented using Python and Flask, with HTML, CSS, and JavaScript used to develop a user-friendly web interface. The application includes modules such as Home, Register, Login, Classification, and Logout, allowing users to upload CT scan images and obtain classification results. **Algorithm:** Squeeze-and-Excitation (SE), Feature Pyramid Network (FPN), CT, IQ-OTHNCCD	**DL (IEEE)**
121	**TCMAPY2477**	**Cybersecurity of Sensor Systems for State Sequence Estimation A Machine Learning Approch** **Objective:** The objective of this project is to develop a machine learning–based cybersecurity framework for securing sensor systems and state sequence estimation. The system uses Random Forest, XGBoost, Extra Trees, LightGBM, and K-Nearest Neighbors (KNN) algorithms, along with a Hybrid Model, to classify network traffic into Benign and Attack classes. It aims to improve intrusion detection accuracy, enhance threat mitigation, and provide real-time security recommendations. **Algorithm:** K-Nearest Neighbors (KNN), XGBoost, LightGBM, Random Forest	**ML (IEEE)**
122	**TCMAPY2484**	**A multi-faceted approach to electricity theft detection: Using community engagement, audit analytics, and machine learning algorithms** **Objective:** The objective of this project is to develop an intelligent system that can accurately detect electricity theft by analyzing consumption patterns and other relevant customer data. It combines traditional anomaly detection techniques with advanced	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		machine learning algorithms to identify unusual behavior. The system aims to enhance efficiency in monitoring electricity usage, reduce losses due to theft, and provide utility companies with a reliable tool for proactive detection and decision-making. **Algorithm:** Machine Learning, Anomaly Detection	
123	**TCMAPY2496**	**A Hybrid Machine Learning Framework for Water Quality Index Prediction Using Feature-Based Neural Network Initialization** **Objective:** This project develops a hybrid machine learning framework for water quality index prediction, utilizing a dataset of 3,276 samples with nine physicochemical parameters to classify water as potable or non-potable. After addressing class imbalance with SMOTE (Synthetic Minority Over-sampling Technique) and standardizing features, the framework implements two innovative architectures: the Adaptive Attention-Guided Hybrid Ensemble (AAGHE) , which combines an autoencoder with CatBoost (Categorical Boosting), ExtraTrees (Extremely Randomized Trees), and HistGradientBoosting (Histogram-based Gradient Boosting) classifiers alongside an attention-based meta-learner to achieve 99.33% accuracy; and the Dual-Transformer Cross-Fusion Network (DTCF-Net) , which uses parallel transformer blocks with cross-attention fusion to capture complex feature interactions, achieving 68.81% accuracy. The system includes a deployment-ready inference pipeline that generates actionable treatment suggestions based on parameter threshold violations, supporting water safety management, public health monitoring, and timely intervention through rigorous evaluation metrics. **Algorithm:** Adaptive Attention-Guided Hybrid Ensemble (AAGHE), Dual-Transformer Cross-Fusion Network (DTCF-Net), SMOTE, CatBoost	**ML (IEEE)**
124	**TCMAPY2497**	**AI-Powered Career Guidance A Scalable Model for Personalized Recommendations** **Objective:** AI Career Guidance Framework predicts student employment post-graduation (1,000 records, 20 features). Three architectures: ACFE-Net (Autoencoder-Convolutional Feature Extraction Network) , combining autoencoder with ensemble classifiers and attention mechanism; DTFE-Net (Dual-Transformer Feature Extraction Network), utilizing dual transformer towers; and HRAF-Net (Hybrid Residual-Attention-BiGRU Fusion Network), fusing residual blocks, attention mechanisms, and bidirectional GRU layers. The framework delivers: correlation analysis, balanced classification, and deployment-ready inference with actionable career suggestions (academic improvement, internships, mentoring, upskilling). Impact includes personalized recommendations, at-risk student identification, and data-driven career counseling. **Algorithm:** AI, ACFE-Net, DTFE-Net, HRAF-Net	**ML (IEEE)**
125	**TCMAPY2505**	**Psychological Profiling of Digital Dependency Using Machine Learning and Behavioral Clustering Techniques** **Objective:** This project developed a machine learning pipeline to predict Digital Dependency Score using a dataset of 4,000 individuals with 15 behavioral, cognitive, and demographic features. After preprocessing, including label encoding and feature scaling,	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		eight regression models were trained and evaluated: Linear Regression, Ridge, Lasso, Random Forest, XGBoost, LightGBM, DeepGBM, and DCN-V2. Performance was measured using RMSE, MAE, R^2, and MAPE. LightGBM achieved the best results (RMSE = 2.5738, R^2 = 0.9268), closely followed by XGBoost. The project demonstrates that gradient-boosted trees outperform both simple linear models and more complex deep architectures on this tabular dataset, providing a reliable tool for identifying digital dependency risk factors. **Algorithm:** XGBoost, LightGBM, DeepGBM, DCN	
126	**TCMAPY2517**	**Distributed Enhanced Security for Energy Harvesting IoT Networks in Smart Cities** **Objective:** This project develops a distributed, AI-driven intrusion detection framework for energy-harvesting IoT networks in smart city environments, using an IoT Security Dataset containing network traffic records with multiple attack categories and normal behavior labels. The dataset includes structured network features and an imbalanced class distribution, which is handled using SMOTE (Synthetic Minority Over-sampling Technique) along with preprocessing steps such as label encoding, feature cleaning, and SelectKBest-based feature selection to retain the most relevant attributes. The framework implements multiple advanced hybrid architectures to improve detection performance. DESK-Net (Dynamic Ensemble Security Knowledge Network) combines traditional machine learning models such as Random Forest, XGBoost, and Gradient Boosting classifiers with ensemble learning and meta-level decision fusion. CABEN-Net (Confidence-Aware Bayesian Ensemble Network) integrates probabilistic reasoning using CatBoost, AdaBoost, and Gaussian Naive Bayes with weighted confidence scoring for robust classification. QHAFN (Quantum-inspired Hybrid Attention Fusion Network) enhances feature learning using attention-based fusion mechanisms and deep neural components to capture complex attack patterns in IoT traffic. The system performs exploratory data analysis, correlation study, class balancing, and comparative model evaluation to ensure robustness. Finally, it includes a deployment-ready inference pipeline that classifies incoming network traffic into attack types or normal behavior and provides real-time security alerts and mitigation recommendations, supporting intelligent IoT security management and proactive threat prevention in smart city infrastructures. **Algorithm:** SMOTE, SelectKBest-based, DESK-Net	**ML (IEEE)**
127	**TCMAPY2520**	**Beyond Opacity: Interpretable Machine Learning for Hospital Efficiency Assessment** **Objective:** The main objective of this project is to develop an interpretable machine learning system for predicting hospital efficiency levels using operational and clinical parameters. It aims to classify hospitals into Low, Medium, and High efficiency categories using hybrid models such as HETA-Net and E-XGB, while improving accuracy, transparency, and decision-making through a web-based interface. **Algorithm:** HETA-Net, XGB	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
128	TCMAPY2523	**Battery Health Monitoring under Multi-dynamic Operating Conditions Based on Fused-model** **Objective:** The primary objective of this project is to develop a robust and accurate battery state-of-health (SOH) monitoring system using advanced machine learning techniques that can operate reliably under multi-dynamic conditions encountered in electric vehicles. Accurate SOH estimation is critical not only for predicting the remaining useful life of the battery but also for ensuring safe and efficient operation under varying load currents, temperatures, and charging/discharging profiles. This system integrates three complementary machine learning models—Double-Exponential Gradient Boosting, Gradient-Free Meta-Learning with Symbolic Regressors, and Deep Stacked Histogram Gradient Boosting Ensemble—to learn complex relationships between electrochemical behavior and operational parameters. By combining features derived from voltage deviations, state-of-charge errors, and dynamic operating factors, the project aims to produce highly precise SOH predictions that remain stable across different battery aging stages and operational scenarios. Moreover, the framework is designed to achieve these results with minimal computational overhead, making it suitable for real-time onboard implementation in electric vehicles. **Algorithm:** SOH, Double-Exponential Gradient Boosting, Gradient-Free Meta-Learning, Symbolic Regressors	**ML (IEEE)**
129	TCMAPY2547	**Digital Twin Synthetic Dataset for Bearing Fault Diagnosis in Industrial Spindles** **Objective:** The primary objective of this project is to develop a robust and accurate bearing fault diagnosis framework for industrial spindle systems using advanced machine learning techniques integrated with a digital twin environment. Accurate fault detection and classification are critical for ensuring reliable operation, preventing unexpected machine downtime, and optimizing maintenance schedules under varying rotational speeds, load conditions, and operational vibrations. This framework combines State Space Models, a Mixture of Experts architecture, and an RF + XGBoost ensemble to learn complex relationships among vibration signals, rotational parameters, and load features. By integrating multi-domain features extracted from time–frequency analysis, statistical descriptors, and fault-sensitive indicators, the system aims to deliver highly precise fault predictions that remain robust across different spindle speeds, fault severities, and operational scenarios. Additionally, the framework is designed for computational efficiency, enabling practical real-time deployment in industrial monitoring systems. **Algorithm:** RF, XGBoost, State Space Models	**ML (IEEE)**
130	TCMAPY2549	**Detection of Cisplatin Resistance in Bladder Cancer Using Machine Learning** **Objective:** The objective of this project is to develop a machine learning-based system for detecting cisplatin resistance in bladder cancer using genomic and epigenetic data. It aims to analyze important biological features such as CpG island methylation patterns, genome region details, and cellular accessibility to classify cancer cases as cisplatin-	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		resistant or non-resistant. By applying models such as Broad Learning System, Quadratic Discriminant Analysis, and Random Forest, the project focuses on improving prediction accuracy, identifying hidden resistance patterns, supporting early detection, and assisting personalized treatment decision-making for bladder cancer patients. **Algorithm:** CpG, Broad Learning System, Quadratic Discriminant Analysis, Random Forest	
131	**TCMAPY2552**	**Heterodyne-Based Detection Approach for Future Generation Fiber-Wireless Communication Links With the Aid of Machine Learning** **Objective:** This project develops a deep learning-based signal equalization framework for 16QAM SSBI heterodyne fiber-wireless communication systems. The dataset contains received in-phase and quadrature signal values, I_rx and Q_rx, as input features, and transmitted signal values, I_tx and Q_tx, as target outputs. The main objective is to recover the original transmitted symbols from distorted received signals and improve communication reliability. The workflow includes data loading, exploratory analysis, null-value checking, statistical study, constellation visualization, train-validation-test splitting, and feature scaling using StandardScaler. The framework implements four models: BaselineFC / M1-64 Fully Connected Equalizer, TempFormer Transformer Equalizer, PhasorNet Complex-Valued Equalizer, and SpecMatch-Net CNN Equalizer with Spectral Loss. These models are trained and evaluated using metrics such as MSE, RMSE, MAE, Symbol Error Rate, and EVM percentage. Finally, the best model and scaler are saved for deployment-ready signal prediction and restoration. **Algorithm:** 16QAM, SSBI, BaselineFC, CNN	**ML (IEEE)**
132	**TCMAPY2566**	**Psychological Profiling of Digital Dependency Using Machine Learning and Behavioral Clustering Techniques** **Objective:** The primary objective is to develop a hybrid machine learning framework for forecasting water and energy demand driven by population dynamics, supporting smarter urban growth strategies. The system integrates Random Forest, Stacking Regressor, and Voting Regressor models to predict future resource needs based on historical demographic, socioeconomic, and climate data. The project focuses on optimizing these ensemble models to enhance forecast accuracy and minimize error. Feature-based model initialization and SHAP-based interpretability are incorporated to provide transparent insights into key predictive drivers. The framework aims to deliver a scalable, efficient solution enabling data-informed decision-making for sustainable urban planning and climate resilience. **Algorithm:** SHAP-based, Random Forest, Stacking Regressor, Voting Regressor	**ML (IEEE)**
133	**TCMAPY2567**	**A Ray Tracing Assisted Machine Learning and Deep Learning Approach for Received Power Prediction in Open and Collapsed Tunnels** **Objective:** The main objective of this project is to develop a ray-tracing assisted machine learning and deep learning system for received power prediction in open and collapsed	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		tunnel environments. The project focuses on generating and using ray-tracing based propagation data by considering important tunnel features such as surface roughness, conductivity, permittivity, tunnel geometry, transmitter and receiver positions, operating frequency, antenna gain, transmit power, and polarization. The collected data is preprocessed, normalized, and prepared for model training so that the prediction system can learn the relationship between tunnel conditions and received power.The project also aims to develop advanced prediction models such as PIML-XGBoost, Inc-GAN, and CNNSE for accurate received power estimation. These models are used to capture non-linear signal propagation behavior and improve prediction performance under different tunnel conditions. The system evaluates model performance using regression metrics such as R^2 score, RMSE, MAE, and MAPE. The final objective is to build a reliable predictive framework that can estimate received power for new tunnel input parameters and assist in designing strong wireless communication systems for mining, transportation tunnel, and emergency rescue applications. **Algorithm:** PIML-XGBoost, GAN, CNNSE, RMSE	
134	**TCMAPY2570**	**Applying Deep Learning and Machine Learning Algorithms to Estimate PM2.5 Concentration Using Satellite Data and Meteorological Data** **Objective:** This project develops an advanced hybrid deep learning framework for PM2.5 concentration prediction using global air quality, pollutant, meteorological, temporal, and spatial features. The dataset used in this project is global_air_quality_dataset.csv, which contains air quality records such as City, Country, AQI, PM2.5, PM10, NO2, SO2, CO, O3, Temperature, Humidity, and Wind Speed. The main objective is to predict PM2.5 concentration accurately and estimate the corresponding AQI category to support air quality monitoring and pollution analysis. The workflow includes data loading, missing-value checking, statistical analysis, exploratory data visualization, correlation heatmap generation, city-wise analysis, and preprocessing. Feature engineering is performed using temporal features, chemical interaction features, pollutant load features, lag features, rolling average features, and spatial latitude-longitude values. The dataset is split into train, validation, and test sets using a time-based split, and feature scaling is applied using StandardScaler. The framework implements three proposed models: WD-STGTNet, Chem-PINN-AQNet, and SS-MAE-MoE. WD-STGTNet uses wavelet decomposition, graph-based station relationships, and transformer learning for spatio-temporal prediction. Chem-PINN-AQNet uses chemistry-guided pollutant interaction learning with a physics-informed constraint. SS-MAE-MoE uses masked autoencoder pretraining and a mixture-of-experts regression head for robust PM2.5 prediction. These models are trained and evaluated using R^2 score, RMSE, and MAE. Based on the notebook results, Chem-PINN-AQNet is selected as the best model with the highest R^2 value and lowest prediction error. Finally, the trained models, scalers, city encoder, comparison results, training curves,	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		prediction plots, and AQI category outputs are saved for deployment-ready air quality prediction. **Algorithm:** WD-STGTNet, Chem-PINN-AQNet, and SS-MAE-MoE. WD-STGTNet	
135	**TCMAPY2599**	**Credit Card Fraud Detection Using Deep Learning Techniques and Handling Unbalanced** **Objective:** The primary objective of this project is to develop an efficient and reliable Credit Card Fraud Detection system using machine learning and deep learning techniques. The system utilizes the fraud_dataset.csv dataset containing transaction attributes such as transaction amount, transaction type, account balance, device type, location, merchant category, card type, authentication method, risk score, transaction distance, weekend flag, and previous fraudulent activity.The project aims to perform data preprocessing, feature encoding, feature scaling, exploratory data analysis, and model training using OCSVM/SVDD, Hybrid OCSVM + LDA, and an AutoSciDACT-inspired contrastive autoencoder. The developed models are evaluated using Accuracy, Precision, Recall, F1-score, ROC-AUC, and Average Precision to identify the most effective fraud detection model. Another objective is to deploy the trained models through a Flask-based web application named Perimeter, enabling users to upload transaction data, perform fraud prediction, visualize results, and receive confidence-based classification. **Algorithm:** OCSVM, SVDD, LDA, AutoSciDACT-inspired	**ML (IEEE)**
136	**TCMAPY2600**	**Explainable Machine Learning for Suicide Risk Assessment Using Social Media Data** **Objective:** The primary objective of this project is to develop an explainable machine learning framework for suicide risk assessment using social media text. The proposed framework extends the multi-level explainability approach for binary risk classification with global, local, and counterfactual explanations. The project aims to process a Reddit-based dataset containing 12,615 usable posts and evaluate three proposed models: SADED, Support Vector Data Description, and Self-Navigated Residual Mamba. SADED combines synthetic sample generation, teacher–student knowledge transfer, discrepancy-based weighting, and an interpretable Logistic Regression student. SVDD learns a one-class boundary from lower-risk posts to identify possible high-risk deviations. SNARM applies residual selective-scan blocks and self-navigation gates to dense TF-IDF representations. The overall objective is to achieve reliable suicide-risk classification while providing understandable explanations through SHAP, LIME, and Counterfactual Explanations with Optimised Contextual Flow. The framework is intended as an explainable research prototype for supporting human review and not as a clinical diagnostic system. **Algorithm:** SADED, SVDD, SNARM	**ML (IEEE)**
137	**TCMAPY2601**	**Memory-Efficient Multi-Island Jaya Feature Selection for Large-Scale DDoS Attack Detection**	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		Objective: The primary objective of this project is to develop an efficient and scalable DDoS attack detection framework using a Memory-Efficient Multi-Island Jaya Feature Selection approach. The proposed framework aims to identify important network traffic features by reducing redundant and unnecessary attributes while maintaining high detection performance. The system follows a structured pipeline consisting of network traffic preprocessing, feature analysis, memory-aware feature optimization, machine learning-based classification, and performance evaluation. The Multi-Island Jaya optimization algorithm is designed to improve feature selection efficiency by dividing the search population into multiple islands and performing independent optimization with periodic migration. The selected optimal features are evaluated using advanced classification models, including Adversarial Autoencoder, Sparse Robust Least-Squares One-Class Support Vector Machine, Random Forest, and Linear Support Vector Machine. The framework further aims to achieve accurate multi class DDoS attack detection while reducing computational complexity, memory requirements, and training overhead for large-scale network environments. **Algorithm:** DDoS, Memory-Efficient Multi-Island Jaya Feature, Adversarial Autoencoder, Sparse Robust Least-Squares One-Class	
138	**TCMAPY2605**	**GA- and SHAP-Guided Feature Selection with Dynamic Weighted Voting Ensembles for Human Activity Recognition** **Objective:** Human Activity Recognition (HAR) identifies human movements using smartphone sensor data such as accelerometer and gyroscope signals. This project proposes a framework combining Genetic Algorithm-based feature selection, SHAP analysis, and Dynamic Weighted Voting Ensemble learning. Sensor features are optimized and classified using multiple models, including Stacking Ensemble, CapsNet, and adaptive voting classifiers. Explainable AI methods provide transparent predictions, while the best model is deployed using Flask for activity prediction with explanation visualizations. **Algorithm:** Human Activity Recognition (HAR), SHAP, AI, CapsNet	**ML (IEEE)**
139	**TCMAPY2628**	**Early and Accurate Diagnosis of Ectopic Pregnancy: A SHAP-Based Explainable Machine Learning Approach** **Objective:** The main objective of this project is to develop an accurate and explainable machine learning system for the early diagnosis of ectopic pregnancy using clinical, biochemical, and ultrasound parameters. The proposed CS-RTAN and CSF-FTT models aim to improve prediction performance while handling class imbalance through cost-sensitive learning. SHAP is used to explain each prediction, helping healthcare professionals understand the important risk factors influencing the diagnostic result. **Algorithm:** CS-RTAN, CSF-FTT, SHAP	**ML (IEEE)**
140	**TCMAPY2629**	**PROTEAN An eXplainable AI pipeline for protein classification in support of precision**	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		Objective: The main objective of this project is to develop an explainable machine learning framework for accurate classification of proteins into SNARE and NON-SNARE categories using biological sequence and structural descriptors. The proposed BFW-SVM and EPFS-XGB models aim to improve classification performance by selecting important biological features and learning complex protein patterns. SHAP and LIME-based explainable AI techniques are integrated to identify the contribution of individual protein features, providing transparent and interpretable predictions for precision protein analysis. **Algorithm:** SNARE, NON-SNARE, BFW-SVM, EPFS-XGB	
141	**TCMAPY2632**	**Trip Detection Algorithms for Healthy and Amputee Individuals** **Objective:** This project develops a hybrid machine learning and deep learning framework for wearable-sensor-based trip detection using the TripGuard Synthetic Alternate Dataset containing 15,000 records with 28 sensor and demographic features. The objective is to classify trip events into three classes using sensor patterns from accelerometer, gyroscope, gait, and impact-related features. The workflow includes data preprocessing, missing-value handling, outlier removal, feature encoding, feature selection, class balancing, and StandardScaler-based normalization. Three proposed models, CL-STG-DA, MSF-ATA-ELF, and ESD-RTO, are developed using temporal feature learning, attention mechanisms, sensor fusion, and ensemble-based classification. The models are evaluated using accuracy, precision, recall, F1-score, ROC-AUC, MCC, and confusion matrices. All three models achieved 100% test accuracy, with trained models, preprocessing components, evaluation results, and deployment files saved for real-time trip detection. **Algorithm:** CL-STG-DA, MSF-ATA-ELF, ESD-RTO	**ML (IEEE)**
142	**TCMAPY2633**	**Transformer-Enhanced Machine Learning Framework for Advanced Palm Biometric Recognition** **Objective:** This project presents an advanced deep learning-based multimodal palm biometric recognition framework using palmprint and palm-vein images. It proposes three models: QACMF-PalmNet, OpenPalm-ProtoFormer, and PalmLite-FreqFormer using cross-modal fusion, transformer-based recognition, and lightweight frequency-aware learning. The dataset contains 13,718 paired samples from 98 identities with preprocessing, augmentation, and biometric verification workflows.QACMF-PalmNet achieves high-accuracy multimodal recognition using quality-aware attention fusion, while OpenPalm-ProtoFormer supports open-set identity verification with unknown-user rejection. PalmLite-FreqFormer provides lightweight edge deployment using spatial-frequency feature fusion.The models are evaluated using accuracy, F1-score, ROC analysis, verification metrics, and recognition performance. QACMF-PalmNet achieves the best performance with 98.79% accuracy, OpenPalm-ProtoFormer achieves 78.10% Rank-1 and 100% Rank-5 accuracy, and PalmLite-FreqFormer enables efficient real-time deployment with 70.85% accuracy and 8.27 ms inference latency. The framework provides accurate, secure, and deployment-ready palm biometric solutions.	**ML (IEEE)**

S.No.	Project ID	Titles	Domain
		Algorithm: QACMF-PalmNet	
143	**TCMAPY2482**	**A Blockchain and Cryptography-Based Framework for Secure Log Integrity Verification** **Objective:** The primary objective is to design and implement a secure blockchain-based system that ensures the integrity, confidentiality, and verification of digital files. The system aims to provide secure file upload, encryption, hash generation, and blockchain registration. It will enable authorized users to verify the authenticity of files, detect any tampering, and receive notifications. The project seeks to integrate encryption, blockchain, and secure storage to deliver a comprehensive, user-friendly solution for document integrity management. The system will enhance trust, transparency, and accountability in file management. **Algorithm:** Blockchain, Encryption	**PYTHON (IEEE)**
144	**TCMAPY2486**	**Design and Optimization of Hybrid End-to-end Encryption Architecture for a Secure Web Application System** **Objective:** The primary objective of this project is to design and develop a secure cloud-based web application that ensures the confidentiality, integrity, and controlled sharing of sensitive data. The system aims to provide end-to-end protection for user files by encrypting data using the AES-GCM algorithm before storing it in the cloud. Another objective is to implement a secure access control mechanism that allows users to share files while ensuring that only authorized individuals can access the requested resources. **Algorithm:** AES-GCM, Web Application	**PYTHON (IEEE)**
145	**TCMAPY2500**	**Efficient Cloud Resource Sharing Using Smart Contracts and Blockchain Automation** **Objective:** The primary objective is to design and implement a secure blockchain-based system that ensures the integrity, confidentiality, and verification of digital files. The system aims to provide secure file upload, encryption, hash generation, and blockchain registration. It will enable authorized users to verify the authenticity of files, detect any tampering, and receive notifications. The project seeks to integrate encryption, blockchain, and secure storage to deliver a comprehensive, user-friendly solution for document integrity management. The system will enhance trust, transparency, and accountability in file management. **Algorithm:** Blockchain, Encryption	**PYTHON (IEEE)**
146	**TCMAPY2512**	**Personalized Fitness and Nutrition Guidance System Using Gemini AI and Blockchain Technology** **Objective:** The objective of this project is to design and develop a Human–AI Interaction–based Fitness and Nutrition Web Application that provides personalized health guidance through an intelligent chatbot. The system aims to collect user-specific information such as age, gender, height, weight, fitness goals, activity level, dietary preferences, and	**PYTHON (IEEE)**

S.No.	Project ID	Titles	Domain
		medical conditions to generate customized workout plans, meal recommendations, calorie calculations, and overall health advice. **Algorithm:** AI, Nutrition Web Application	
147	**TCMAPY2534**	**Hospital Information system** **Objective:** The primary objective of the proposed Health Management Information System (HMIS) is to develop a comprehensive web-based platform that efficiently manages and automates various hospital operations. The system aims to centralize patient information, streamline appointment scheduling, facilitate medical consultations, manage laboratory and radiology services, handle prescriptions and pharmacy operations, support inpatient admissions, and generate billing and administrative reports. Another key objective is to improve communication and coordination among different hospital departments through a unified information system. **Algorithm:** Health Management Information System (HMIS)	**PYTHON (IEEE)**
148	**TCMAPY2535**	**An End-to-End Privacy-Preserving Tax Management System for Government Services** **Objective:** The objective of this project is to design and implement a secure, privacy-preserving Tax Filing System that ensures the confidentiality of sensitive user data throughout the entire process, from submission to processing. The project aims to integrate Homomorphic Encryption (HE) to enable computations on encrypted data, ensuring that sensitive tax information remains private and secure during processing, without the need for decryption. By implementing HE, the system enhances data privacy by protecting personal tax details such as income, deductions, and payments from unauthorized access during computation. **Algorithm:** Homomorphic Encryption (HE), HE, Tax Filing System, Encryption	**PYTHON (IEEE)**
149	**TCMAPY2540**	**Fully Dynamic Advanced Encryption Standard** **Objective:** The primary objective of this project is to design and implement a secure, blockchain-backed file management system that enables users to upload, share, request, and access files with high integrity and accountability. It aims to eliminate centralized control, protect against unauthorized access, and ensure tamper-proof storage. Additional goals include integrating authentication mechanisms, transparent tracking of activities, and efficient handling of file requests and responses. The system also seeks to provide user-friendly interfaces for smooth interactions. Ultimately, the project strives to demonstrate how blockchain can enhance traditional file systems by offering traceability, security, and decentralized custodianship of critical file interactions. **Algorithm:** Blockchain	**PYTHON (IEEE)**
150	**TCMAPY2562**	**Blockchain Analytics for Tracing and Identifying Crypto Transaction Recipients** **Objective:** The main objective of this project is to design and implement a blockchain analytics-based application for secure identification and verification of cryptocurrency transaction recipients. The system includes separate login access for Admin and User. The	**PYTHON (IEEE)**

S.No.	Project ID	Titles	Domain
		Admin is responsible for managing user information, viewing transaction activities, monitoring records, and maintaining the overall system. Users can securely send and receive cryptocurrency through the platform.By applying blockchain transaction analysis, the system can examine transaction details, trace the movement of digital currency, and verify recipient information before or after a transaction. This helps reduce transaction risks and improves trust among users. The proposed project mainly focuses on enhancing security, transparency, traceability, and reliability in cryptocurrency-based financial transactions. **Algorithm:** Blockchain	
151	**TCMAPY2568**	**An Efficient Blockchain Based Approach to Educational Credential Verification** **Objective:** The project aims to develop a blockchain-based certificate verification system for secure certificate issuing and validation. It helps reduce certificate forgery by generating a unique hash for each certificate and storing it on blockchain. Admin issues certificates, students view records, and verifiers check certificate authenticity through a valid hash. **Algorithm:** Blockchain	**PYTHON (IEEE)**
152	**TCMAPY2582**	**A Blockchain-Enabled Chat Application System for Secure Communication Design and Implementation** **Objective:** The main objective of the system is to provide users with a simple and secure online platform where they can register, log in, create a profile, and manage their chat account. The application allows users to search for other registered users and exchange messages within a controlled environment. It also stores chat history so that users can view their previous conversations whenever required. To improve security and trust, the system verifies message integrity by comparing the stored message hashes with the corresponding blockchain records. Additionally, the Admin can manage the overall application by viewing registered users, blocking or unblocking accounts, monitoring system logs, checking blockchain records, managing security activities, and generating necessary reports. **Algorithm:** Blockchain	**PYTHON (IEEE)**
153	**TCMAPY2606**	**Blockchain-Powered Platform for Transparent Civic Issue Reporting and Resolution** **Objective:** The system provides citizens with an easy portal to register, submit complaints with proof, and track progress. Officers can manage assigned cases, add remarks, and upload resolution evidence. Administrators oversee users, departments, and assignments. Feedback, ratings, and downloadable PDF reports support transparency, satisfaction monitoring, institutional record-keeping, and public accountability. **Algorithm:** Blockchain	**PYTHON (IEEE)**
154	**TCMAPY2607**	**From Traditional SLA Management to Blockchain-Enabled Smart Contracts A Survey**	**PYTHON (IEEE)**

S.No.	Project ID	Titles	Domain
		Objective: The system provides a secure web-based platform for creating, managing, monitoring, and verifying Service Level Agreements (SLAs). It enables clients and service providers to maintain transparent workflows by defining SLA terms, deadlines, response times, quality conditions, and penalties. Blockchain-based cryptographic hashing ensures data integrity and verification. The system tracks SLA statuses and provides administrators with controls for user management, monitoring, security, blockchain records, and report generation. **Algorithm:** Service Level Agreements (SLAs), SLA, Blockchain	
155	**TCMAPY2608**	**Secure Blockchain Digital Asset Management System** **Objective:** The proposed system aims to provide a secure web-based platform for uploading, managing, verifying, and transferring ownership of digital assets. It generates a unique SHA-256 hash for every uploaded asset and records important activities in a blockchain-style ledger to ensure data integrity and traceability. Users can view asset details, download their assets, verify ownership, and examine the complete transaction history. The system also provides administrative controls for approving or blocking users, verifying or rejecting assets, monitoring blockchain records, and generating reports. Unauthorized modifications are detected by recalculating and comparing both file hashes and blockchain ledger hashes. Overall, the platform improves digital asset transparency, integrity, ownership proof, auditability, and security without using machine learning or deep learning techniques. **Algorithm:** SHA-256, Deep Learning, Machine Learning, Blockchain	**PYTHON (IEEE)**
156	**TCMAPY2630**	**Smart Loan & Interest Management System for Digital Lending, Agreement, Repayment and Analytics** **Objective:** The main objective of the system is to provide borrowers with a simple and secure platform to register, log in, manage their profiles, and view verified dealers and available loan plans. It allows borrowers to submit loan requests by specifying the required amount, purpose, repayment duration, and supporting documents, as well as track the status of their applications. The system enables dealers or money lenders to create loan plans, review applications, approve or reject requests, activate loans, and manage borrower details. It also automatically calculates interest, total payable amount, EMI, due dates, and remaining balance while maintaining a complete repayment history. In addition, the system provides administrators with full control over users and dealers, transaction monitoring, report generation, and the identification of suspicious or high-risk activities. **Algorithm:** Deep Learning	**PYTHON (IEEE)**
157	**TCMAJA1353**	**OnboardTogether: A Gamified Approach to Enhancing Employee Motivation and Connection,During On-boarding** **Objective:** The primary objective of this work is to enhance employee motivation and engagement during the on-boarding process by incorporating gamified elements. It seeks to foster stronger interpersonal connections among new hires through interactive and	**JAVA**

S.No.	Project ID	Titles	Domain
		collaborative activities. The approach aims to make on-boarding more enjoyable and rewarding, thereby improving knowledge retention and understanding of organizational processes. Another goal is to provide real-time feedback and personalized experiences that adapt to individual learning and engagement patterns. The system is designed to reduce early-stage employee attrition by promoting a sense of achievement and belonging. It also intends to offer actionable insights for HR teams to refine and optimize on-boarding strategies. Additionally, the framework focuses on encouraging consistent participation and completion of on-boarding tasks. Overall, the objective is to create a structured, motivating, and socially engaging on-boarding environment that benefits both employees and the organization. **Algorithm:** Clooud	
158	**TCMAJA1357**	**A Generalization of Iterative Closest Point Registration Algorithms Using a Local Reference Frame-Based SE3** **Objective:** The main objective of this project is to design and develop a web-based SE3-ICP Point Cloud Registration System that enables users to perform accurate and robust 3D point cloud alignment using both standard ICP and SE(3)-augmented ICP variants. The system aims to convert a research-level algorithmic concept into an accessible software platform with a clear user interface, backend services, database storage, and visualization support. It provides facilities for user registration, secure login, point cloud generation, PLY upload, point cloud downsampling, algorithm selection, registration execution, and result analysis. **Algorithm:** SE3-ICP, ICP, SE, PLY	**JAVA (IEEE)**
159	**TCMAJA1358**	**A User-Friendly Google Earth Engine Web Application for Vegetation Trait Mapping and Time Series Analysis From Sentinel-2 and Sentinel-3 Imagery** **Objective:** The main objective of this project is to develop a web-based application for vegetation trait mapping and time series analysis using Sentinel-2 and Sentinel-3 imagery. To allow users to register and log in securely. To enable users to select satellite sensors and study areas. To support vegetation traits such as LAI, FVC, fAPAR, CCC, CCM, CCW, CNC, LCC, LCM, LCW, and GPP. To generate vegetation trait maps using the system interface. To provide interactive map visualization using Google Maps. To support time series analysis with graphical representation. To allow result export in CSV and PNG format. To provide admin control for user and project management. **Algorithm:** LAI, FVC, fAPAR, CCC	**JAVA (IEEE)**
160	**TCMAJA1359**	**Revenue-Aware Vehicular Edge-Cloud Offloading via Two-Stage DRL and Dynamic Server Clustering** **Objective:** To implement a revenue-aware platform that clusters servers, performs two-stage offloading, and allocates CPU resources using task urgency, server condition, subscription tier, and credit. It aims to reduce deadline violations, improve task completion and provider revenue, preserve fairness, and present real-time analytics.	**JAVA (IEEE)**

S.No.	Project ID	Titles	Domain
		Algorithm: Cloud	
161	**TCMAJA1360**	**Multi-Cloud Security Monitoring and Risk Management System Using Multi-Layer Threat Assessment and Dynamic Risk Scoring** **Objective:** The main objective of this project is to develop a web-based multi-cloud security monitoring and risk management system using ReactJS, Java Spring Boot, and MySQL. The system aims to provide secure user registration and login, allowing users to add and manage multi-cloud environment details. It collects cloud configuration data, access logs, network logs, and vulnerability information to identify misconfigurations, policy violations, and suspicious cloud activities. **Algorithm:** Cloud, Java Spring Boot	**JAVA (IEEE)**
162	**TCMAJA1354**	**SHARED APARTMENT EXPENSE & TASK MANAGER** **Objective:** The objective of Roomie Rent is to develop a comprehensive web-based shared apartment management platform that automates expense splitting, chore management, payment processing, and dispute resolution. The system leverages the MERN stack to provide real-time balance updates, intelligent chore rotation, secure payment workflows, digital rent receipt generation, and a structured dispute resolution mechanism. By supporting three user roles—Tenants, Owners, and Administrators—Roomie Rent aims to eliminate manual tracking inefficiencies, promote financial transparency, and foster harmonious roommate relationships through a secure, scalable, and user-friendly solution. **Algorithm:** MERN, Roomie Rent	**MERN (IEEE)**
163	**TCMAJA1355**	**Smart _Farming_Assistant_for_Crop_Advice_and_Disease_Detection** **Objective:** The main objective of Agri Advisor is to develop an intelligent agricultural advisory platform that helps farmers make accurate and timely farming decisions. The system aims to provide AI-based crop disease detection using uploaded plant images, weather-based farming suggestions, crop recommendation, fertilizer guidance, pest control advice, and market price information. It also allows farmers to communicate with agricultural experts for verified solutions and practical guidance. The platform provides separate modules for Admin, Agricultural Expert, and Farmer to ensure proper role-based access and system management. By using Gemini AI and the MERN stack, Agri Advisor improves farming efficiency, reduces crop damage, supports digital agriculture, and provides farmers with a simple and reliable smart farming solution. **Algorithm:** AI	**MERN (IEEE)**
164	**TCMAJA1356**	**MediNear-Location-Based-Medicine-Availability-and-Ordering-Platform** **Objective:** To develop a comprehensive location-based medical shop discovery and medicine ordering platform for Tirupati that connects patients, pharmacies, and administrators. The platform aims to enable users to find nearby medical shops, compare medicine prices, place orders with real-time tracking, and provide feedback, while	**MERN (IEEE)**

S.No.	Project ID	Titles	Domain
		empowering distributors with inventory and order management tools, and administrators with complete system oversight, analytics, and approval workflows. **Algorithm:** Data Preprocessing, Feature Extraction, Model Training, Evaluation	

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The team explained the project well. They delivered project on time. Overall the good experience.

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