Information Technology

Engineering Design Project syllabus

An Engineering Design Project is a comprehensive, hands-on initiative where students apply scientific and engineering principles to develop innovative solutions to real-world problems.The project emphasizes the entire design process, including problem identification, research, conceptualization, modeling, prototyping, testing, and iteration. It develops technical skills, creativity, teamwork, and project management capabilities, enabling students to design and develop functional products or systems that address societal, industrial, or environmental needs.

1). AI-Powered Student Performance Predictor

a). Objective:

Predict student academic outcomes based on attendance, past marks, and behavioral data. The AI-Powered Student Performance Predictor is a machine learning-based system designed to predict the academic performance of students using historical academic data, behavioral patterns, attendance, and engagement metrics. The goal is to assist educators, administrators, and students in identifying early warning signs of poor performance and suggesting actionable interventions to improve outcomes.

b). Problem Statement:

In large academic institutions, it is often challenging to monitor every student's progress manually. Late identification of struggling students can lead to lower grades, dropouts, and mental health issues. Traditional systems rely heavily on final exam scores, ignoring other key predictors such as participation, internal assessments, and behavioral indicators. This project aims to solve this problem using AI by building a predictive model that analyzes various parameters and provides proactive insights into student performance.

c). Scope:

- Predict whether a student will pass/fail or their likely grade.
- Visualize performance trends using dashboards.
- Provide early intervention alerts for at-risk students.
- Enable filtering and analysis by subject, semester, or demographic group.
- Can be deployed in schools, colleges, or online learning platforms.

d). Features:

- Data Inputs: Marks from previous semesters, attendance %, assignment scores, lab performance, participation (e.g., LMS logins), demographic data.
- Predictive Models: Random Forest, Logistic Regression, or Neural Networks to estimate the likelihood of success/failure.
- User Interface: Admin dashboard for instructors with performance prediction, charts, and risk flags.
- Recommendations: Personalized tips for students to improve performance (e.g., increase attendance, focus on specific subjects).

e). Tools and Technologies:

- Language: Python
- Libraries: Scikit-learn, Pandas, NumPy, Matplotlib/Seaborn
- Framework: Flask or Streamlit for the front end
- Database: SQLite or Firebase
- Optional Enhancements: TensorFlow (for deep learning models), Power BI/Tableau for visualization

f). Workflow:

- Data Collection: Collect student data from academic records and LMS platforms.
- Preprocessing: Clean and normalize data (handle missing values, encode categorical data).
- Model Training: Train a model on past student data to predict performance.
- Evaluation: Use metrics like accuracy, precision, recall, and F1-score to validate.
- Deployment: Integrate the model with a web-based UI for users to upload data and get predictions.

g). Expected Outcomes:

- Accurate prediction of student academic risk.
- Insightful analytics for personalized learning strategies.
- Reduced dropout rates and improved overall academic success.
- A scalable and generalizable solution for educational institutions.

h). Future Enhancements:

- Integrate with real-time classroom tools (Google Classroom, Moodle).
- Use NLP to analyze written assignments for deeper insight.
- Implement adaptive learning paths based on predictions.
- Expand to mental health and engagement prediction using multimodal data.

i). SDG Alignment:

- SDG 4: Quality Education

2). AI-Based Traffic Congestion Predictor

a). Objective:

The aim is to build an intelligent traffic prediction system using AI to reduce congestion and commute times in urban cities. By using live traffic data, weather conditions, and historical congestion records, the system enables traffic authorities to implement smart traffic flow controls and suggest alternate routes to commuters.

b). Problem Statement:

Urban areas are experiencing high levels of traffic congestion due to rapid urbanization, poor route planning, and lack of real-time data utilization. Traditional traffic management systems are reactive rather than proactive, which results in inefficiencies, time loss, and increased pollution. This project addresses these issues using AI to proactively predict congestion and optimize traffic flow.

c). Scope:

- Predict traffic congestion levels on specific routes.
- Suggest alternative paths to users in real time.
- Aid government planning through congestion heatmaps.
- Integrate with GPS and smart city infrastructure.

d). Features:

- Real-Time Data: Integrates with traffic sensors, GPS, and weather APIs.
- Prediction Algorithms: LSTM, Time Series Models.
- User Interface: Dashboard for real-time visualization of traffic flow and predictions.
- Alerts: SMS/Push notifications for congestion and alternate routes.

e). Tools and Technologies:

- Language: Python
- Libraries: TensorFlow/Keras, Pandas, OpenCV
- Visualization: Streamlit, Plotly
- APIs: Google Maps, OpenWeatherMap
- Database: PostgreSQL

f). Workflow:

- Data Collection: Capture live and historical traffic data.
- Preprocessing: Normalize and structure time-series data.
- Model Training: Train LSTM models on traffic data.
- Evaluation: Measure prediction accuracy using RMSE, MAE.
- Deployment: Dashboard integration with real-time feeds.

g). Expected Outcomes:

- Reduced travel time for commuters.
- Improved urban traffic management.
- Lower vehicle emissions due to reduced idle time.

h). Future Enhancements:

- Integration with autonomous vehicle routing.
- Use drones to monitor traffic and enhance prediction.
- Include construction/detour feeds.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

3). Project Title: Machine Learning-Based Disease Diagnosis System

a). Objective:

To develop a machine learning-based disease prediction system that aids early diagnosis by analyzing patient symptoms, medical history, and lab results. The system supports doctors in identifying potential diseases and prioritizing care based on predictive insights, improving healthcare outcomes through technology.

b). Problem Statement:

Delayed or incorrect diagnosis often leads to worsening patient conditions, especially in resource-limited areas. Current diagnostic procedures may overlook critical patterns hidden in patient history or symptoms. This project applies ML algorithms to build an intelligent diagnostic assistant to support medical decision-making.

c). Scope:

- Predict diseases based on symptoms and health parameters.
- Enable diagnosis support for primary healthcare centers.
- Visualize diagnostic probabilities and suggestions.
- Integrate with EHR systems.

d). Features:

- Input: Patient symptoms, lab test results, age, medical history.
- Models: Decision Trees, SVM, or XGBoost.
- Output: Likely diseases with probability score.
- Interface: Doctor dashboard with diagnostic suggestions.

e). Tools and Technologies:

- Python, Scikit-learn, Pandas, Flask
- Streamlit for UI
- SQLite/PostgreSQL for medical records
- Optional: TensorFlow for deeper models

f). Workflow:

- Data Collection: Medical records and symptom data.
- Preprocessing: Encode symptoms, normalize values.
- Model Training: Train and validate models on diagnosis datasets.
- Evaluation: Accuracy, Precision, ROC-AUC metrics.
- Deployment: Web UI for doctors.

g). Expected Outcomes:

- Quicker, more accurate disease identification.
- Reduced diagnostic errors.
- Improved rural healthcare.

h). Future Enhancements:

- Integration with wearable devices.
- NLP-based symptom extraction.
- Real-time clinical support.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

4). Project Title: Cyber Threat Detection Using Machine Learning

a). Objective:

Build a cybersecurity tool that uses ML to detect anomalies in network traffic and identify potential threats such as malware, phishing, and brute-force attacks. The system provides security analysts with real-time alerts to enable a quick response.

b). Problem Statement:

Traditional security systems rely heavily on rule-based detection and often fail to detect evolving threats. With increasing cyberattacks and sophisticated methods, there's a need for adaptive systems capable of identifying unknown or zero-day attacks using behavioral patterns.

c). Scope:

- Monitor and analyze network traffic.
- Detect and classify cyber threats.
- Provide real-time threat alerts and logs.

d). Features:

- Anomaly Detection using Isolation Forest.
- Packet-level inspection.
- Alert system via email/SMS.
- Dashboard for security status.

e). Tools and Technologies:

- Python, Scikit-learn, Wireshark
- Flask, Kibana/ELK Stack
- Database: MongoDB

f). Workflow:

- Data Ingestion: Network logs and packet data.
- Feature Extraction: Convert raw logs to structured input.
- Model Training: Supervised and unsupervised ML models.
- Alerting & Visualization: Real-time threat dashboard.

g). Expected Outcomes:

- Reduced breach risk.
- Faster incident response.
- AI-based continuous learning system.

h). Future Enhancements:

- Threat intelligence feed integration.
- Deep packet inspection.
- AI-driven automated mitigation.

i). SDG Alignment:

- SDG 9: Industry, Innovation and Infrastructure

5). Project Title: Cloud-Based Smart Inventory Management

a). Objective:

Design a cloud-integrated inventory management system that leverages real-time data and predictive analytics to help businesses manage stock levels efficiently. It aims to reduce wastage, improve fulfillment rates, and automate restocking.

b). Problem Statement:

Manual inventory systems result in overstocking, understocking, and inaccuracies that hurt business operations. Many SMEs lack advanced inventory solutions. This project addresses the issue using cloud and data intelligence to streamline inventory workflows.

c). Scope:

- Track inventory in real-time across locations.
- Predict demand and recommend restocking.
- Integrate with billing systems.

d). Features:

- Barcode-based tracking.
- Demand forecasting using regression.
- Stock level alerts.
- Cloud-based dashboard.

e). Tools and Technologies:

- Python, Google Cloud Platform
- Firebase, Streamlit
- SQL, Scikit-learn

f). Workflow:

- Input: Product flow logs.
- Processing: Stock and sales prediction.
- Output: Alerts and reports.
- Deployment: Hosted on GCP/AWS.

g). Expected Outcomes:

- Reduced stock-outs and wastage.
- Data-driven decision making.

h). Future Enhancements:

- IoT-based shelf monitoring.
- Mobile app for on-site updates.
- Integration with ERP.

i). SDG Alignment:

- SDG 12: Responsible Consumption and Production

6). Project Title: Sentiment Analysis for Public Policy Feedback

a). Objective:

To develop a sentiment analysis system using NLP that processes public feedback on government schemes or social issues to provide policymakers with insights into citizen sentiments and opinions.

b). Problem Statement:

Governments often rely on surveys and reports that may not reflect real-time public sentiment. With increasing digital engagement, social media offers valuable insights, but processing unstructured text at scale requires automation. This system addresses that gap.

c). Scope:

- Analyze sentiment on specific policies.
- Classify data into positive/negative/neutral.
- Dashboard for ministry/agency use.

d). Features:

- Real-time sentiment extraction.
- Word cloud and topic analysis.
- Integration with Twitter API.
- Text classifier with LSTM.

e). Tools and Technologies:

- Python, NLTK, TextBlob, TensorFlow
- Streamlit/Flask
- Twitter API
- MongoDB or Firebase

f). Workflow:

- Data Collection: Social media feeds.
- Text Preprocessing: Tokenization, stopword removal.
- Sentiment Analysis: Classify sentiment.
- Visualization: Dashboard with sentiment trends.

g). Expected Outcomes:

- Real-time feedback for policymakers.
- Transparent communication loop.

h). Future Enhancements:

- Multilingual sentiment support.
- Emotion detection.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

7). Project Title: AI Tutor Chatbot for Personalized Learning

a). Objective:

To build an AI-powered tutor chatbot that delivers personalized learning support to students by answering questions, explaining concepts, and recommending resources based on individual learning pace and interests.

b). Problem Statement:

Students often lack immediate support when studying outside classrooms. Human tutors are costly and unavailable at scale. This chatbot addresses these challenges by using NLP and recommendation systems to simulate a tutor experience.

c). Scope:

- Respond to student academic queries.
- Recommend videos/articles.
- Adjust tone and difficulty.

d). Features:

- Conversational NLP.
- Student profile and progress tracking.
- Resource linking.
- Reinforcement learning.

e). Tools and Technologies:

- Python, Rasa, Hugging Face Transformers
- Flask, Firebase

f). Workflow:

- Input: Student questions.
- NLP: Understand and respond.
- Recommendation: Learning content.
- Feedback loop for personalization.

g). Expected Outcomes:

- 24/7 academic support.
- Improved self-paced learning.

h). Future Enhancements:

- Voice-based chatbot.
- Gamified quizzes.

i). SDG Alignment:

- SDG 4: Quality Education

8). Project Title: Predictive Maintenance in Manufacturing

a). Objective:

Create a predictive maintenance system that uses IoT sensor data and ML models to anticipate machine failures and optimize maintenance schedules in manufacturing units.

b). Problem Statement:

Unplanned machinery breakdowns cause significant downtime and loss. Reactive maintenance is inefficient. This project focuses on predictive techniques to optimize equipment uptime and resource allocation.

c). Scope:

- Collect sensor data from machinery.
- Predict failures.
- Optimize maintenance tasks.

d). Features:

- Real-time sensor monitoring.
- Failure classification.
- Alert system.
- Maintenance history logs.

e). Tools and Technologies:

- Python, MQTT, Keras
- Raspberry Pi for IoT
- SQLite

f). Workflow:

- Input: Vibration, temp, RPM sensors.
- Preprocessing: Smoothing, anomaly detection.
- Prediction: Classification model.
- Dashboard: Alerts and logs.

g). Expected Outcomes:

- Reduced unplanned downtime.
- Cost-efficient repairs.

h). Future Enhancements:

- Digital twin modeling.
- Augmented reality support for field engineers.

i). SDG Alignment:

- SDG 9: Industry, Innovation and Infrastructure

9). Project Title: Fraud Detection in Online Transactions

a). Objective:

To design an AI-driven system that detects and prevents fraudulent transactions in real time using behavioral and transactional data from users.

b). Problem Statement:

As online transactions grow, so do fraud attempts. Rule-based detection systems lack adaptability to new fraud methods. This system addresses the need for dynamic fraud detection using real-time ML models.

c). Scope:

- Detect suspicious financial transactions.
- Block and alert fraudulent patterns.

d). Features:

- Real-time data stream monitoring.
- Behavioral profiling.
- ML classification algorithms.

e). Tools and Technologies:

- Python, Kafka, Scikit-learn
- XGBoost, Flask
- PostgreSQL

f). Workflow:

- Data Stream: User transaction logs.
- Feature Engineering: Time-based features.
- Model: Classification and outlier detection.
- Deployment: API integration with payment gateway.

g). Expected Outcomes:

- Reduced financial fraud.
- Increased customer trust.

h). Future Enhancements:

- Blockchain for audit trails.
- Visual behavior mapping.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

10). Project Title: Smart Water Quality Monitoring System

a). Objective:

Develop a system using IoT and ML to continuously monitor water quality in rivers, reservoirs, or pipelines and provide alerts in case of contamination.

b). Problem Statement:

Contaminated water leads to serious health and environmental issues. Manual testing is infrequent and lacks real-time feedback. This system uses sensors and analytics to ensure water safety continuously.

c). Scope:

- Monitor pH, turbidity, temperature.
- Alert during anomaly detection.
- Integrate with smart grids.

d). Features:

- IoT sensors for real-time monitoring.
- ML for contamination pattern detection.
- Mobile/web dashboard.

e). Tools and Technologies:

- Arduino, NodeMCU, Python
- Keras, Streamlit
- Firebase

f). Workflow:

- Data Acquisition: IoT sensor feed.
- Processing: Clean and normalize.
- Prediction: Contamination alert.
- Visualization: Real-time dashboard.

g). Expected Outcomes:

- Improved public health.
- Safer water supply.

h). Future Enhancements:

- GIS integration.
- Predict seasonal risks.

i). SDG Alignment:

- SDG 6: Clean Water and Sanitation

11). Project Title: AI-Powered Crop Disease Detection System

a). Objective:

Develop an AI system using image processing and machine learning to identify crop diseases from leaf images and suggest remedies to farmers, enabling early detection and reducing yield loss.

b). Problem Statement:

Crop diseases are often identified late due to lack of expert access in rural areas. Manual inspections are error-prone and time-consuming. An AI-based image recognition tool can automate disease detection and improve agricultural productivity.

c). Scope:

- Detect diseases from leaf images.
- Recommend treatments.
- Mobile-compatible interface for farmers.

d). Features:

- Image input via smartphone camera.
- CNN model for disease classification.
- Treatment guide based on disease.
- Multilingual support.

e). Tools and Technologies:

- Python, TensorFlow, OpenCV
- Streamlit/Flask
- Firebase for data storage

f). Workflow:

- Image Collection: Crop image dataset.
- Preprocessing: Resize, normalize.
- Model Training: CNN-based classifier.
- Deployment: Mobile/web interface.

g). Expected Outcomes:

- Early disease diagnosis.
- Reduced crop damage.
- Empowerment of farmers.

h). Future Enhancements:

- Real-time drone image analysis.
- Weather-based prediction.

i). SDG Alignment:

- SDG 2: Zero Hunger

12). Project Title: Smart Waste Segregation System using AI

a). Objective:

Design a smart waste management system using AI and image classification to automatically segregate biodegradable and non-biodegradable waste for efficient recycling and disposal.

b). Problem Statement:

Improper waste segregation leads to health hazards and inefficient recycling. Manual sorting is time-consuming and risky. This project automates waste classification using AI and supports cleaner urban environments.

c). Scope:

- Classify waste items.
- Guide disposal or recycling.
- Deploy in homes/offices.

d). Features:

- Image capture via camera module.
- CNN-based object classifier.
- Display bin type on screen.
- Log waste types in database.

e). Tools and Technologies:

- Python, TensorFlow, OpenCV
- Raspberry Pi, Arduino
- SQLite or Firebase

f). Workflow:

- Image Input: Camera captures waste image.
- Processing: Classify object type.
- Output: Segregation instruction.

g). Expected Outcomes:

- Efficient waste sorting.
- Improved recycling rates.
- Cleaner environment.

h). Future Enhancements:

- Integration with smart bins.
- Robotic arm for automated sorting.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

13). Project Title: Blockchain-Based Voting System

a). Objective:

Create a secure, transparent voting platform using blockchain to record and verify votes, ensuring tamper-proof digital elections for institutions or governments.

b). Problem Statement:

Current voting systems face threats such as fraud, manipulation, and lack of transparency. Voter turnout is also low due to inconvenience. A blockchain-based voting system ensures security, anonymity, and trust in democratic processes.

c). Scope:

- Secure vote casting and recording.
- Voter authentication.
- Transparent audit trails.

d). Features:

- Blockchain ledger for votes.
- Biometric or OTP verification.
- Real-time vote counting.
- Immutable transaction log.

e). Tools and Technologies:

- Ethereum, Solidity
- Python/JavaScript for frontend
- Metamask, Ganache

f). Workflow:

- User Registration and Verification.
- Vote Casting via DApp.
- Blockchain Transaction Confirmation.
- Results Display.

g). Expected Outcomes:

- Tamper-proof voting.
- Transparent and auditable results.
- Higher voter trust.

h). Future Enhancements:

- Integration with national ID systems.
- Offline voting support via smart cards.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

14). Project Title: AI-Driven Resume Screening Tool

a). Objective:

Develop an AI tool for HR departments that screens and ranks resumes based on job requirements, improving recruitment efficiency and reducing bias in candidate shortlisting.

b). Problem Statement:

Recruiters face challenges in screening thousands of resumes, often leading to delays and inconsistent selections. This tool uses NLP and ML to match skills with job descriptions and automate candidate ranking.

c). Scope:

- Parse and analyze resumes.
- Match with job descriptions.
- Rank candidates.

d). Features:

- Resume parsing engine.
- Keyword matching.
- NLP-based relevance scoring.
- Dashboard for recruiter view.

e). Tools and Technologies:

- Python, SpaCy, Scikit-learn
- Flask/Django
- Firebase or PostgreSQL

f). Workflow:

- Resume Upload and Parsing.
- JD Matching using NLP.
- Score Calculation and Ranking.
- Visualization of top candidates.

g). Expected Outcomes:

- Reduced time-to-hire.
- Better candidate-job matching.

h). Future Enhancements:

- Video resume analysis.
- Bias detection algorithms.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

15). Project Title: Virtual Healthcare Assistant using AI

a). Objective:

Create an AI-powered chatbot assistant that provides preliminary healthcare advice, symptom checking, and connects users with doctors or emergency services as needed.

b). Problem Statement:

Many patients delay seeking healthcare due to lack of access, awareness, or fear of hospitals. An AI chatbot can act as the first point of contact, triaging patients and offering credible health information.

c). Scope:

- Preliminary health assessment.
- Emergency recommendations.
- Doctor connection.

d). Features:

- Symptom checker using decision trees.
- Chat interface for user queries.
- Emergency red flagging.
- Integration with online consultations.

e). Tools and Technologies:

- Python, Rasa, TensorFlow
- Firebase, Flask

f). Workflow:

- User Query Input.
- Symptom Classification.
- Recommendation or Alert.
- Optional doctor connect.

g). Expected Outcomes:

- Better first-contact care.
- Reduced unnecessary hospital visits.

h). Future Enhancements:

- Voice interface.
- Regional language support.
- Chronic disease follow-up modules.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

16). Project Title: AI-Enabled Disaster Response Mapping

a). Objective:

Develop a platform that uses satellite imagery and AI to map disaster-hit regions, assess damage, and prioritize aid distribution in real-time for faster disaster response.

b). Problem Statement:

During natural disasters, lack of real-time data and visibility delays relief efforts. This AI system processes satellite imagery to detect impacted zones and helps agencies plan response strategies.

c). Scope:

- Image-based damage detection.
- Disaster zone mapping.
- Aid prioritization.

d). Features:

- Satellite image input.
- CNN-based classification.
- Real-time geo-mapping.
- Priority zone detection.

e). Tools and Technologies:

- Python, TensorFlow, OpenCV
- Google Earth Engine
- QGIS for map visualization

f). Workflow:

- Image Input and Preprocessing.
- Model Inference for damage estimation.
- Mapping and Dashboard Output.

g). Expected Outcomes:

- Faster disaster response.
- Efficient resource allocation.

h). Future Enhancements:

- Drone-based imagery.
- Integration with disaster alert systems.

i). SDG Alignment:

- SDG 13: Climate Action

17). Project Title: Smart Energy Consumption Monitoring System

a). Objective:

Create a smart system to monitor and optimize household or industrial energy consumption using sensors and ML-based analytics.

b). Problem Statement:

Unmonitored energy usage leads to wastage and high costs. Manual tracking is inefficient. This system uses IoT and analytics to track, analyze, and optimize energy consumption in real time.

c). Scope:

- Real-time energy usage tracking.
- Pattern analysis and alerting.
- Appliance-wise breakdown.

d). Features:

- IoT energy meters.
- ML models for anomaly detection.
- Energy dashboard and reporting.

e). Tools and Technologies:

- Arduino, Python, MQTT
- Firebase, Keras
- React/Streamlit UI

f). Workflow:

- Data Capture via sensors.
- Stream Analysis for usage patterns.
- ML Prediction for consumption trends.
- Report Generation.

g). Expected Outcomes:

- Energy savings.
- User awareness of consumption.

h). Future Enhancements:

- Integration with solar panels.
- Bill forecasting.

i). SDG Alignment:

- SDG 7: Affordable and Clean Energy

18). Project Title: AI-Driven Personalized News Recommender

a). Objective:

Build a personalized news recommendation engine using user reading behavior and content-based filtering to enhance information relevance and reduce echo chambers.

b). Problem Statement:

Readers are overwhelmed with content and often exposed only to limited perspectives. This system learns user preferences and ensures balanced, relevant news delivery using AI.

c). Scope:

- Content-based news filtering.
- User preference learning.
- Multi-source integration.

d). Features:

- Recommendation engine using NLP.
- User interaction tracking.
- Feedback loop.

e). Tools and Technologies:

- Python, NLP, Flask
- Firebase, Scikit-learn

f). Workflow:

- User login and interaction.
- Article content embedding.
- Model prediction and ranking.
- User feedback input.

g). Expected Outcomes:

- Better news engagement.
- Reduced misinformation.

h). Future Enhancements:

- Bias detection.
- Cross-lingual recommendations.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

19). Project Title: Real-Time Air Quality Monitoring System

a). Objective:

Create a smart air quality monitoring system using IoT sensors to provide real-time pollution data to citizens and authorities for preventive health and environmental actions.

b). Problem Statement:

Air pollution severely affects health and ecosystems. Citizens often lack access to local air quality data. This system provides hyperlocal insights to raise awareness and trigger intervention.

c). Scope:

- Monitor PM2.5, PM10, CO2 levels.
- Mobile and web interface.
- Pollution alerts.

d). Features:

- IoT sensors.
- Real-time AQI updates.
- Mapping and trends visualization.

e). Tools and Technologies:

- Arduino, Python
- Firebase, Streamlit

f). Workflow:

- Sensor data collection.
- AQI calculation.
- Visualization and alerting.

g). Expected Outcomes:

- Health risk reduction.
- Citizen awareness.

h). Future Enhancements:

- Predictive pollution alerts.
- Historical trend analysis.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

20). Project Title: AI-Powered Career Recommendation System

a). Objective:

Design a system that recommends personalized career paths for students based on their skills, interests, and academic background using AI-driven profiling.

b). Problem Statement:

Students often struggle with choosing suitable careers due to lack of guidance and awareness. This system provides data-backed, individualized recommendations to help students make informed decisions.

c). Scope:

- Assess skills and interests.
- Recommend matching career paths.
- Suggest courses and mentors.

d). Features:

- User questionnaire and test.
- Personality analysis (MBTI/Big Five).
- AI-based matching engine.

e). Tools and Technologies:

- Python, Scikit-learn, NLP
- Streamlit or Django
- Firebase/PostgreSQL

f). Workflow:

- User Input and Assessment.
- Profile Matching.
- Career and course suggestion.

g). Expected Outcomes:

- Informed career decisions.
- Skill-aligned academic planning.

h). Future Enhancements:

- Industry expert mentor connect.
- Integration with job platforms.

i). SDG Alignment:

- SDG 4: Quality Education

21). Project Title: ML-Based Forest Fire Prediction System

a). Objective:

Develop a machine learning system that predicts forest fire risks based on weather data, vegetation patterns, and historical fire records to enable early warning and preventive measures.

b). Problem Statement:

Forest fires cause environmental damage and threaten biodiversity. Current methods for fire prediction lack accuracy and depend on manual observation. This project applies ML models to forecast fire likelihood and reduce response time.

c). Scope:

- Predict high-risk fire zones.
- Alert forestry departments.
- Analyze environmental trends.

d). Features:

- Real-time weather data integration.
- Fire risk scoring using ML.
- Heatmaps and dashboard visualization.

e). Tools and Technologies:

- Python, Scikit-learn, Pandas
- Google Maps API, Streamlit
- Weather API (OpenWeatherMap)

f). Workflow:

- Data Collection: Weather, vegetation, fire history.
- Preprocessing: Normalize features.
- Model Training: Logistic regression or Random Forest.
- Alert Generation and Dashboard Deployment.

g). Expected Outcomes:

- Early fire risk prediction.
- Better disaster planning.

h). Future Enhancements:

- Drone surveillance integration.
- Satellite imagery analysis.

i). SDG Alignment:

- SDG 13: Climate Action

22). Project Title: Smart Irrigation System Using IoT and AI

a). Objective:

Build an automated irrigation system that monitors soil moisture and weather data to optimize water usage in agriculture using IoT sensors and AI.

b). Problem Statement:

Traditional irrigation wastes water due to fixed schedules. Farmers often lack data on real-time crop needs. This system reduces water use and increases crop yield through intelligent irrigation planning.

c). Scope:

- Automate irrigation based on soil moisture.
- Weather-adaptive scheduling.
- Dashboard for farmers.

d). Features:

- Soil moisture and humidity sensors.
- AI model to optimize water use.
- SMS alerts and manual override.

e). Tools and Technologies:

- Arduino, DHT11, Moisture sensor
- Python, Firebase
- Streamlit Dashboard

f). Workflow:

- Sensor Data Acquisition.
- Threshold Analysis and Prediction.
- Relay Control for Irrigation.
- Dashboard Visualization.

g). Expected Outcomes:

- Efficient water usage.
- Improved crop productivity.

h). Future Enhancements:

- Solar-powered IoT nodes.
- Weather API-based adjustments.

i). SDG Alignment:

- SDG 6: Clean Water and Sanitation

23). Project Title: AI-Based Language Translator for Education

a). Objective:

Design a language translator tool using NLP to help students from diverse linguistic backgrounds access educational content in their native language.

b). Problem Statement:

Language barriers limit access to quality education. Many students struggle to understand lessons taught in non-native languages. This project provides real-time translation to bridge educational gaps.

c). Scope:

- Translate educational text and speech.
- Support multiple Indian and foreign languages.
- Integrate with LMS.

d). Features:

- Text-to-text and speech-to-text translation.
- Multilingual NLP.
- Language detection and model switching.

e). Tools and Technologies:

- Python, Hugging Face Transformers
- Streamlit, Google Translate API
- SpeechRecognition library

f). Workflow:

- User Input: Text or voice.
- Language Detection.
- Translation and Output Display.

g). Expected Outcomes:

- Improved educational access.
- Better learning outcomes.

h). Future Enhancements:

- Translation of handwritten notes.
- Context-aware translation using BERT.

i). SDG Alignment:

- SDG 4: Quality Education

24). Project Title: Crime Pattern Analysis and Prediction

a). Objective:

Create a system that analyzes historical crime data to predict future crime trends and identify hotspots to assist law enforcement agencies in proactive policing.

b). Problem Statement:

Law enforcement often reacts to crime rather than preventing it. Using data to forecast crime patterns can improve public safety. This system applies data analytics and ML to enhance urban security planning.

c). Scope:

- Identify high-risk areas.
- Predict crime types and timing.
- Provide insights to police departments.

d). Features:

- Heatmap of crime-prone zones.
- Trend analysis of crime frequency.
- Predictive analytics using classification models.

e). Tools and Technologies:

- Python, Pandas, Scikit-learn
- Google Maps API
- Tableau/Power BI

f). Workflow:

- Data Collection from crime databases.
- Preprocessing and Feature Extraction.
- Model Training and Prediction.
- Visual Reporting to Authorities.

g). Expected Outcomes:

- Crime reduction via data-driven strategies.
- Efficient resource deployment.
-
- Real-time emergency prediction using social media feeds.

h). Future Enhancements:

- Integration with CCTV analytics.**i). SDG Alignment:**
- SDG 16: Peace, Justice and Strong Institutions

25). Project Title: AI-Based Personal Finance Advisor

a). Objective:

Build a personal finance advisor that uses AI to analyze user spending patterns, create budgets, and offer investment suggestions.

b). Problem Statement:

Many people struggle with managing finances due to lack of awareness or tools. This AI system helps users gain control over their spending and plan for financial stability.

c). Scope:

- Track expenses and income.
- Generate saving and investment plans.
- Alert for overspending.

d). Features:

- Budget planning tool.
- Expense categorization using NLP.
- Personalized savings tips.
- Visualization dashboard.

e). Tools and Technologies:

- Python, Pandas, Matplotlib
- Flask/Streamlit
- Firebase/PostgreSQL

f). Workflow:

- Transaction Input.
- Expense Categorization.
- Budget and Goal Calculation.
- Dashboard Report.

g). Expected Outcomes:

- Financial awareness.
- Better money management.

h). Future Enhancements:

- Tax calculator.
- Integration with bank APIs.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

26). Project Title: AI-Powered Job Market Analyzer

a). Objective:

Develop an AI tool that monitors job market trends and recommends in-demand skills and courses to students and job seekers.

b). Problem Statement:

Job seekers often pursue outdated skills. Market demands shift rapidly, and many educational paths don't align with them. This system uses AI to match real-time job trends with personalized recommendations.

c). Scope:

- Analyze job postings from portals.
- Recommend trending skills.
- Suggest matching online courses.

d). Features:

- Web scraping of job portals.
- NLP-based skill extraction.
- Course linking from platforms like Coursera.

e). Tools and Technologies:

- Python, BeautifulSoup, NLTK
- Flask/Streamlit
- SQLite/Firebase

f). Workflow:

- Scrape job postings.
- Extract skills and roles.
- Match with user profiles.
- Recommend upskilling paths.

g). Expected Outcomes:

- Improved employability.
- Demand-aligned learning.

h). Future Enhancements:

- Integration with resume builder.
- Employer dashboard.

i). SDG Alignment:

- SDG 4: Quality Education

27). Project Title: AI-Based Facial Emotion Recognition System

a). Objective:

Create a system that recognizes human emotions using facial expressions to enhance human-computer interaction and applications like e-learning, mental health monitoring, and customer feedback analysis.

b). Problem Statement:

Emotion recognition helps systems understand human behavior. This project focuses on interpreting emotions via facial cues, enabling systems to respond more empathetically and intelligently.

c). Scope:

- Detect emotions like happy, sad, angry, etc.
- Apply to virtual classrooms, feedback systems.

d). Features:

- Webcam-based image capture.
- CNN-based emotion classifier.
- Real-time emotion tagging.

e). Tools and Technologies:

- Python, OpenCV, Keras
- Flask or Streamlit

f). Workflow:

- Image Capture from webcam.
- Face Detection and Preprocessing.
- Emotion Classification.
- Dashboard Output.

g). Expected Outcomes:

- Human-aware interfaces.
- Emotional feedback analytics.

h). Future Enhancements:

- Multi-modal emotion analysis with voice.
- Integration with AR/VR.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

28). Project Title: Intelligent Legal Document Summarizer

a). Objective:

Build an AI-based summarization tool to extract key points from lengthy legal documents, improving accessibility and understanding for lawyers and clients.

b). Problem Statement:

- Legal texts are often complex and time-consuming to read. This tool simplifies access to essential legal information, increasing efficiency in law practices.

c). Scope:

- Summarize contracts, policies, laws.
- Highlight clauses and penalties.

d). Features:

- NLP-based extractive summarization.
- Keyword extraction.
- Clause classification.

e). Tools and Technologies:

- Python, Spacy, Transformers
- Flask/Streamlit

f). Workflow:

- Document Upload.
- Preprocessing and Tokenization.
- Summarization Model Output.
- Display Highlights.

g). Expected Outcomes:

- Time-saving for legal work.
- Increased legal awareness.

h). Future Enhancements:

- Multilingual legal summarization.
- Legal chatbot integration.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

29). Project Title: AI-Based Loan Default Prediction

a). Objective:

Design a machine learning model that predicts loan defaults based on applicant financial data to help banks and fintech companies reduce credit risk.

b). Problem Statement:

Banks suffer losses from defaulted loans. Manual risk evaluation is subjective. This system provides data-driven creditworthiness scoring for smarter lending.

c). Scope:

- Analyze loan application data.
- Predict default probability.
- Support risk-based decision-making.

d). Features:

- Classification model for risk scoring.
- Visualization of risk categories.
- Alerts for high-risk applicants.

e). Tools and Technologies:

- Python, Scikit-learn
- Flask, Streamlit
- Firebase/PostgreSQL

f). Workflow:

- Data Collection.
- Feature Engineering.
- Model Training and Prediction.
- Dashboard Visualization.

g). Expected Outcomes:

- Better loan approval decisions.
- Reduced NPA (Non-performing assets).

h). Future Enhancements:

- Real-time risk dashboard.
- Integration with KYC and credit APIs.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

30). Project Title: AI-Enhanced E-Waste Sorting System

a). Objective:

Design a vision-based AI system to detect and sort electronic waste materials for effective recycling and disposal, helping reduce e-waste pollution.

b). Problem Statement:

Improper e-waste disposal harms the environment. Manual sorting is inefficient and hazardous. AI automation can streamline sorting and boost recycling efficiency.

c). Scope:

- Classify e-waste categories (metal, plastic, circuit boards).
- Automate sorting in recycling centers.

d). Features:

- Image classification via CNN.
- Conveyor belt integration.
- Dashboard for waste log.

e). Tools and Technologies:

- Python, TensorFlow, OpenCV
- Arduino/Raspberry Pi
- Streamlit or Flask

f). Workflow:

- Camera Input.
- Image Classification.
- Robotic Arm Sorting Command.
- Logging and Report Generation.

g). Expected Outcomes:

- Safer e-waste handling.
- Efficient material recovery.

h). Future Enhancements:

- Drone-based collection systems.
- AI-powered landfill mapping.

i). SDG Alignment:

- SDG 12: Responsible Consumption and Production

31). Project Title: Cloud-Based Document Collaboration Platform

a). Objective:

Develop a cloud-based document collaboration tool that enables multiple users to edit, review, and share files in real time with version control and AI-assisted editing features.

b). Problem Statement:

Remote teams face challenges in managing document versions and real-time collaboration. Traditional tools lack intelligent editing and real-time syncing. This system enables seamless collaborative editing with AI support.

c). Scope:

- Real-time multi-user editing.
- Version history and rollback.
- AI-based grammar and style suggestions.

d). Features:

- Document editor with live sync.
- Access control and permissions.
- AI proofreading engine.
- Integration with cloud storage.

e). Tools and Technologies:

- Node.js, Firebase, React
- Python (for AI editing)
- Google Cloud Storage

f). Workflow:

- User Authentication.
- Document Editing and Syncing.
- AI Proofreading.
- Storage and Version Control.

g). Expected Outcomes:

- Improved remote collaboration.
- Reduced document errors.

h). Future Enhancements:

- Voice dictation.
- Integration with project management tools.

i). SDG Alignment:

- SDG 9: Industry, Innovation and Infrastructure

32). Project Title: Cybersecurity Threat Detection using AI

a). Objective:

Develop a real-time threat detection system that uses AI to identify cyber attacks and anomalies in network traffic to enhance organizational security.

b). Problem Statement:

Manual cybersecurity monitoring is time-consuming and reactive. AI can detect suspicious activity faster by analyzing patterns in traffic, reducing response time and preventing data breaches.

c). Scope:

- Real-time intrusion detection.
- Threat classification and alerting.
- Dashboard for security analysts.

d). Features:

- Anomaly detection models.
- Traffic log parsing and analysis.
- Alerts for high-risk behavior.
- Visualization of threat levels.

e). Tools and Technologies:

- Python, Scikit-learn, Keras
- Wireshark, Elasticsearch
- Kibana, Flask

f). Workflow:

- Data Collection from logs.
- Preprocessing and Feature Extraction.
- AI Model Prediction.
- Threat Alert Generation.

g). Expected Outcomes:

- Reduced breach incidents.
- Proactive cybersecurity posture.

h). Future Enhancements:

- AI-guided remediation suggestions.
- Cloud environment support.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

33). Project Title: AI-Driven Traffic Violation Detection System

a). Objective:

Build a video surveillance system using computer vision to detect traffic violations like signal jumping, helmet-less riding, and wrong-way driving.

b). Problem Statement:

Manual enforcement of traffic laws is inefficient. Violations often go unpunished. AI-based surveillance increases safety and enforcement without human intervention.

c). Scope:

- Detect traffic violations.
- Capture license plates.
- Generate violation reports.

d). Features:

- Object and vehicle detection.
- License plate recognition (OCR).
- Video recording and flagging.

e). Tools and Technologies:

- Python, OpenCV, YOLO
- TensorFlow, Tesseract OCR
- Flask, SQLite

f). Workflow:

- Video Stream Input.
- Frame Processing.
- Violation Detection.
- Report Generation and Alerting.

g). Expected Outcomes:

- Safer roads.
- Better traffic law enforcement.

h). Future Enhancements:

- Real-time penalty integration.
- AI analysis of traffic patterns.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

34). Project Title: Smart Attendance System using Facial Recognition

a). Objective:

Design an automated attendance system using facial recognition to mark attendance in classrooms or offices, minimizing manual errors and proxy issues.

b). Problem Statement:

Manual attendance is time-consuming and prone to errors and proxy. Facial recognition provides a seamless and secure method for automating attendance tracking.

c). Scope:

- Real-time face detection and recognition.
- Attendance logging and reporting.
- Notification system for absentees.

d). Features:

- Webcam integration.
- Face matching against database.
- Attendance report generation.

e). Tools and Technologies:

- Python, OpenCV, dlib
- Flask/Streamlit
- Firebase/SQLite

f). Workflow:

- Face Registration.
- Daily Face Scanning.
- Attendance Logging.
- Report Generation.

g). Expected Outcomes:

- Accurate and tamper-proof attendance.
- Reduced administrative workload.

h). Future Enhancements:

- Voice authentication.
- Emotion analysis integration.

i). SDG Alignment:

- SDG 4: Quality Education

35). Project Title: AI-Powered Mental Health Chatbot

a). Objective:

Develop a conversational AI chatbot that provides mental health support, coping strategies, and initial guidance for users dealing with anxiety, stress, or depression.

b). Problem Statement:

Mental health support is inaccessible to many due to stigma or lack of resources. An AI chatbot can offer anonymous, accessible first-line support for users in need.

c). Scope:

- User sentiment analysis.
- Resource and suggestion recommendation.
- Emergency guidance if needed.

d). Features:

- Text-based chat interface.
- Emotion detection using NLP.
- Mental health resources suggestion.

e). Tools and Technologies:

- Python, Rasa, NLTK
- Streamlit/Flask
- Firebase or NoSQL database

f). Workflow:

- User Query Handling.
- Sentiment Classification.
- Personalized Response Generation.
- Resource Linking.

g). Expected Outcomes:

- Increased mental health awareness.
- Anonymous early support.

h). Future Enhancements:

- Integration with licensed therapists.
- Voice-based interactions.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

36). Project Title: AI-Based Fake News Detection System

a). Objective:

Create a tool that analyzes news articles and social media posts to determine their credibility and detect misinformation using natural language processing.

b). Problem Statement:

Fake news spreads rapidly online, influencing opinions and decisions. AI can help identify and prevent the spread of misinformation through automated content analysis.

c). Scope:

- Analyze and classify news content.
- Identify sources and credibility.
- Provide reliability scores.

d). Features:

- NLP-based classifier.
- Fact-checking database comparison.
- Chrome extension or web plugin.

e). Tools and Technologies:

- Python, Scikit-learn, SpaCy
- Streamlit, TensorFlow
- Firebase or MongoDB

f). Workflow:

- Article Input.
- Text Analysis and Feature Extraction.
- Classification as fake or real.
- Score and Feedback Display.

g). Expected Outcomes:

- Informed readership.
- Reduced spread of misinformation.

h). Future Enhancements:

- Multilingual support.
- Sentiment-aware filtering.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

37). Project Title: Personalized Learning Path Generator

a). Objective:

Design an AI system that generates personalized study plans for students based on their academic performance, interests, and future goals.

b). Problem Statement:

Generic learning plans fail to address individual student needs. An adaptive AI system tailors resources and schedules to each learner's strengths and weaknesses.

c). Scope:

- Analyze learning patterns.
- Recommend courses and schedules.
- Adjust path based on progress.

d). Features:

- Student profile analysis.
- Resource recommendation.
- Adaptive timetable generator.

e). Tools and Technologies:

- Python, TensorFlow, Pandas
- Firebase, Flask
- Streamlit Dashboard

f). Workflow:

- Profile Input.
- Learning Goal Definition.
- AI Planning and Suggestion.
- Progress Monitoring.

g). Expected Outcomes:

- Enhanced student performance.
- Personalized education.

h). Future Enhancements:

- Integration with MOOCs.
- Parent/teacher progress alerts.

i). SDG Alignment:

- SDG 4: Quality Education

38). Project Title: Smart Flood Monitoring and Alert System

a). Objective:

Create an IoT and AI-enabled flood monitoring system that detects rising water levels and issues real-time alerts to authorities and residents.

b). Problem Statement:

Floods cause massive damage every year, especially in low-lying areas. Delayed warnings lead to loss of life and property. A smart alert system improves preparedness.

c). Scope:

- Monitor river/water body levels.
- Generate SMS/email alerts.
- Display real-time data on dashboards.

d). Features:

- IoT-based water level sensors.
- Threshold detection and alerting.
- Geo-mapped visualization.

e). Tools and Technologies:

- Arduino, Python, MQTT
- Firebase, Google Maps API

f). Workflow:

- Water Level Detection.
- AI-based Threshold Prediction.
- Alert Trigger and Dashboard Update.

g). Expected Outcomes:

- Faster evacuation.
- Disaster risk reduction.

h). Future Enhancements:

- Rain prediction integration.
- Community app for alerts.

i). SDG Alignment:

- SDG 13: Climate Action

39). Project Title: AI-Based Food Expiry Tracker for Households

a). Objective:

Develop an app that uses barcode/label scanning to track expiry dates of food items and send alerts to reduce household food waste.

b). Problem Statement:

Food wastage is a global concern, often due to expired or forgotten items. This system tracks expiry dates and notifies users, promoting mindful consumption.

c). Scope:

- Scan and store product expiry.
- Send alerts before expiration.
- Track consumption patterns.

d). Features:

- Barcode scanning.
- Calendar integration.
- Alert notifications.

e). Tools and Technologies:

- Python, OpenCV, Barcode libraries
- Android/iOS App, Firebase

f). Workflow:

- Item Scan and Data Entry.
- Expiry Date Storage.
- Periodic Check and Alert Generation.

g). Expected Outcomes:

- Reduced food waste.
- Household savings.

h). Future Enhancements:

- Recipe suggestions using expiring items.
- Voice input integration.

i). SDG Alignment:

- SDG 12: Responsible Consumption and Production

40). Project Title: Cloud-Based Virtual Science Lab for Schools

a). Objective:

Design an interactive virtual lab platform using cloud technology that allows school students to perform science experiments online in a simulated environment.

b). Problem Statement:

Many schools lack physical labs due to cost or infrastructure constraints. Virtual labs provide an affordable, scalable solution to offer hands-on science learning remotely.

c). Scope:

- Simulate physics, chemistry, and biology experiments.
- Track student interaction and results.
- Integrate with school LMS.

d). Features:

- 3D experiment simulations.
- Step-by-step guidance.
- Assessment and feedback tools.

e). Tools and Technologies:

- Unity3D, Python, Firebase
- WebGL, Streamlit
- Google Cloud Platform

f). Workflow:

- Experiment Selection.
- Simulation Launch.
- Interaction Logging and Feedback.

g). Expected Outcomes:

- Better STEM learning access.
- Cost-effective practical exposure.

h). Future Enhancements:

- VR headset support.
- Teacher-student live interaction.

i). SDG Alignment:

- SDG 4: Quality Education

41). Project Title: Blockchain-Based Voting System

a). Objective:

Develop a secure, transparent, and tamper-proof voting system using blockchain technology to ensure fair elections in institutions and public sectors.

b). Problem Statement:

Conventional voting systems are vulnerable to tampering and lack transparency. Blockchain can ensure integrity, verifiability, and transparency in the voting process.

c). Scope:

- Facilitate secure digital voting.
- Provide transparent result computation.
- Track voter participation.

d). Features:

- Voter authentication.
- Immutable vote storage.
- Real-time result dashboard.

e). Tools and Technologies:

- Solidity, Ethereum, Web3.js
- React, Ganache
- IPFS for data storage

f). Workflow:

- User Registration and Verification.
- Vote Casting via Smart Contract.
- Ledger Update and Result Display.

g). Expected Outcomes:

- Trustworthy elections.
- Enhanced voter participation.

h). Future Enhancements:

- Biometric voter verification.
- National-level deployment.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

42). Project Title: AI-Based Resume Screening System

a). Objective:

Design an AI-based recruitment tool that screens resumes based on job descriptions and shortlists the most relevant candidates efficiently.

b). Problem Statement:

Manual resume screening is time-intensive and prone to bias. An AI system can automate and standardize screening to improve hiring efficiency.

c). Scope:

- Match resumes with job requirements.
- Rank applicants based on relevance.
- Generate HR analytics reports.

d). Features:

- NLP-based resume parser.
- Keyword matching and ranking.
- Dashboard for HR insights.

e). Tools and Technologies:

- Python, NLTK, Spacy
- Flask, Firebase
- Streamlit for dashboards

f). Workflow:

- Resume Upload.
- Parsing and Feature Extraction.
- Scoring and Ranking.
- Visualization and Export.

g). Expected Outcomes:

- Efficient shortlisting.
- Reduced hiring bias.

h). Future Enhancements:

- Candidate interview scheduling.
- Skill test integration.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

43). Project Title: AI-Based Drug Discovery Simulator

a). Objective:

Build a simulator that uses AI to model drug interactions and suggest compounds with potential medicinal properties, accelerating pharmaceutical research.

b). Problem Statement:

Traditional drug discovery is expensive and time-consuming. AI models can help screen compounds faster, reducing costs and time-to-market.

c). Scope:

- Simulate drug-target interactions.
- Suggest compound modifications.
- Analyze iological activity.

d). Features:

- Molecular descriptor analysis.
- Drug-likeness prediction.
- Compound similarity matching.

e). Tools and Technologies:

- Python, RDKit, TensorFlow
- PubChem API, Streamlit
- Pandas, Matplotlib

f). Workflow:

- Input Molecular Structure.
- Feature Extraction.
- Activity Prediction.
- Visualization of Drug Profiles.

g). Expected Outcomes:

- Faster drug candidate identification.
- Support for biomedical research.

h). Future Enhancements:

- 3D molecule visualization.
- Protein-ligand binding simulation.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

44). Project Title: AI-Based Waste Segregation System

a). Objective:

Design a computer vision-based system that classifies and segregates waste into biodegradable, recyclable, and hazardous categories automatically.

b). Problem Statement:

Improper waste segregation hampers recycling. Manual sorting is unsafe. An AI-based sorter improves efficiency and promotes sustainability.

c). Scope:

- Detect and classify waste.
- Guide waste segregation in bins.
- Track types and volume of waste.

d). Features:

- Real-time camera feed analysis.
- CNN-based image classification.
- Waste category alerts.

e). Tools and Technologies:

- Python, OpenCV, TensorFlow
- Raspberry Pi, Flask
- Firebase

f). Workflow:

- Image Capture.
- Preprocessing and Classification.
- Category Assignment.
- Dashboard Logging.

g). Expected Outcomes:

- Improved recycling rates.
- Clean and safe waste management.

h). Future Enhancements:

- Robotic arm sorting.
- IoT-based smart bin integration.

i). SDG Alignment:

- SDG 12: Responsible Consumption and Production

45). Project Title: AI-Based Energy Consumption Optimizer

a). Objective:

Create a system that analyzes electricity usage in buildings and recommends strategies to reduce consumption and improve efficiency using AI.

b). Problem Statement:

Energy wastage is common in households and offices. Lack of consumption insights leads to high bills. AI can help optimize usage patterns and reduce waste.

c). Scope:

- Monitor and analyze energy usage.
- Identify wasteful appliances.
- Recommend saving strategies.

d). Features:

- Smart meter data analysis.
- Appliance-wise energy breakdown.
- Tips for saving energy.

e). Tools and Technologies:

- Python, Pandas, Scikit-learn
- IoT sensors, Firebase
- Streamlit Dashboard

f). Workflow:

- Data Collection via Sensors.
- Usage Pattern Analysis.
- AI-Based Optimization Suggestions.
- Report Generation.

g). Expected Outcomes:

- Reduced electricity bills.
- Efficient energy use.

h). Future Enhancements:

- Real-time appliance control.
- Solar energy integration.

i). SDG Alignment:

- SDG 7: Affordable and Clean Energy

46). Project Title: Virtual Career Counsellor using AI

a). Objective:

Build an AI-based system that guides students in choosing career paths based on aptitude, interests, and market trends.

b). Problem Statement:

Many students make uninformed career choices. Personalized guidance using AI can align career decisions with interests and job prospects.

c). Scope:

- Suggest career options.
- Recommend educational paths.
- Match profiles to job demand.

d). Features:

- Career quiz and profile analysis.
- Recommendation engine.
- Visualization of job trends.

e). Tools and Technologies:

- Python, Scikit-learn, NLTK
- Flask, Firebase
- Streamlit for UI

f). Workflow:

- User Input: Interests and Aptitude.
- Analysis and Matching.
- Output of Career Paths and Courses.

g). Expected Outcomes:

- Informed career planning.
- Improved student satisfaction.

h). Future Enhancements:

- Industry mentor recommendations.
- Live job matching.

i). SDG Alignment:

- SDG 4: Quality Education

47). Project Title: AI-Based Personalized Diet Planner

a). Objective:

Design a system that generates personalized meal plans based on user preferences, medical conditions, and nutritional needs using AI.

b). Problem Statement:

Generalized diet plans do not suit everyone. AI can personalize nutrition based on health goals, restrictions, and activity levels.

c). Scope:

- Analyze dietary needs.
- Generate weekly meal plans.
- Track health improvements.

d). Features:

- Health profile input.
- Food database matching.
- Calorie and macro tracking.

e). Tools and Technologies:

- Python, Pandas, TensorFlow
- Nutrition APIs, Streamlit
- Firebase/SQLite

f). Workflow:

- Profile Setup.
- Nutritional Requirement Calculation.
- Plan Generation and Monitoring.

g). Expected Outcomes:

- Improved health outcomes.
- Personalized nutrition support.

h). Future Enhancements:

- Recipe suggestions.
- Integration with fitness apps.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

48). Project Title: AI-Enabled Air Quality Monitoring System

a). Objective:

Create a smart air quality monitoring system that measures pollution levels in real-time and provides alerts and health recommendations.

b). Problem Statement:

Urban air pollution poses serious health risks. Real-time monitoring helps raise awareness and reduce exposure.

c). Scope:

- Monitor AQI levels.
- Alert users of hazardous air.
- Provide health recommendations.

d). Features:

- IoT sensors for CO2, PM2.5, PM10.
- Dashboard visualization.
- Health tips based on AQI.

e). Tools and Technologies:

- Arduino, Python, Firebase
- Streamlit Dashboard
- Air Quality APIs

f). Workflow:

- Sensor Data Acquisition.
- Data Analysis and Display.
- Notification and Recommendation.

g). Expected Outcomes:

- Increased air quality awareness.
- Reduced health risks.

h). Future Enhancements:

- Mobile app alerts.
- Predictive pollution mapping.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

49). Project Title: AI-Based Online Proctoring System

a). Objective:

Build an AI-based proctoring system that monitors students during online exams using facial recognition and behaviour tracking.

b). Problem Statement:

Online exams lack supervision, enabling malpractice. AI tools can ensure fairness by detecting suspicious activities automatically.

c). Scope:

- Monitor student activity via webcam.
- Detect anomalies and flags.
- Generate session reports.

d). Features:

- Face tracking and detection.
- Eye movement and voice detection.
- Alert system for unusual activity.

e). Tools and Technologies:

- Python, OpenCV, dlib
- Flask, Streamlit
- Firebase

f). Workflow:

- Exam Session Initialization.
- Live Monitoring.
- Suspicion Detection.
- Report Generation.

g). Expected Outcomes:

- Fair exam environments.
- Scalable assessment solutions.

h). Future Enhancements:

- Browser activity tracking.
- Integration with LMS.

i). SDG Alignment:

- SDG 4: Quality Education

50). Project Title: Smart Vehicle Anti-Theft System using AI

a). Objective:

Develop an AI-driven system that detects unauthorized vehicle access and triggers alerts or immobilizes the engine remotely.

b). Problem Statement:

Vehicle theft is a growing concern. Current systems lack real-time AI-based threat detection. This solution improves safety through intelligence and automation.

c). Scope:

- Detect unauthorized access.
- Track vehicle in real-time.
- Alert vehicle owner and authorities.

d). Features:

- Motion and face detection.
- GPS tracking and geofencing.
- Remote immobilizer.

e). Tools and Technologies:

- Python, OpenCV, GPS Module
- Raspberry Pi, Firebase
- Streamlit Dashboard

f). Workflow:

- Monitor Vehicle Environment.
- Detect Intrusion.
- Alert Generation and Immobilization.

g). Expected Outcomes:

- Theft prevention.
- Quick recovery assistance.

h). Future Enhancements:

- Voice command integration.
- Blockchain vehicle identity record.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

51). Project Title: AI-Based Emergency Response System

a). Objective:

Develop an AI-powered emergency response platform that identifies emergencies (fire, accidents, etc.) through sensor and image data, and dispatches appropriate services instantly.

b). Problem Statement:

Emergency response delays often lead to increased casualties. A real-time AI system can help in early detection and faster action.

c). Scope:

- Detect emergencies through IoT and CCTV.
- Alert authorities with accurate location.
- Dispatch nearest emergency units.

d). Features:

- Image and sensor analysis.
- Real-time alerts with GPS.
- Live dashboard monitoring.

e). Tools and Technologies:

- Python, OpenCV, Firebase
- Arduino sensors, Flask
- Streamlit, Google Maps API

f). Workflow:

- Sensor/CCTV Input.
- AI Detection and Classification.
- Alert Dispatch and Visualization.

g). Expected Outcomes:

- Faster emergency responses.
- Reduced loss of life and property.

h). Future Enhancements:

- Drone deployment for live visuals.
- AI-guided evacuation suggestions.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

52). Project Title: AI-Based Personal Finance Manager

a). Objective:

Design a personal finance manager that uses AI to analyze income, expenses, and spending habits to provide budgeting and saving tips.

b). Problem Statement:

Many people struggle with managing finances. An AI system can help track and optimize spending, improving financial well-being.

c). Scope:

- Track transactions and categorize spending.
- Predict expenses and offer budget goals.
- Suggest saving and investment tips.

d). Features:

- Expense tracking dashboard.
- Budget planner with alerts.
- Predictive analytics for cash flow.

e). Tools and Technologies:

- Python, Pandas, Flask
- Firebase/SQLite
- Streamlit for UI

f). Workflow:

- User Expense Input.
- Categorization and Trend Analysis.
- Budget Creation and Alert Generation.

g). Expected Outcomes:

- Better money management.
- Improved financial discipline.

h). Future Enhancements:

- Integration with banks.
- Credit score improvement suggestions.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

53). Project Title: AI-Based Language Translator for Regional Dialects

a). Objective:

Build an AI-based translator that can translate between English and regional Indian dialects to improve communication and access to information.

b). Problem Statement:

Language barriers limit access to services and information. AI translation can bridge this gap for regional and rural users.

c). Scope:

- Translate text between English and regional languages.
- Support educational and service content.
- Provide speech-to-text and text-to-speech features.

d). Features:

- Language detection and translation.
- Audio input/output options.
- Custom vocabulary adaptation.

e). Tools and Technologies:

- Python, NLTK, Transformers
- Flask, Google Text-to-Speech
- Firebase

f). Workflow:

- User Input Text or Speech.
- Language Identification and Translation.
- Output Generation and Feedback.

g). Expected Outcomes:

- Better inclusion for non-English speakers.
- Wider access to digital content.

h). Future Enhancements:

- Handwriting input recognition.
- Support for more dialects.

i). SDG Alignment:

- SDG 10: Reduced Inequalities

54). Project Title: AI-Powered Legal Document Analyzer

a). Objective:

Design a tool that analyzes legal documents and contracts using NLP to extract key clauses, risks, and compliance violations.

b). Problem Statement:

Legal document review is time-consuming and prone to oversight. AI can assist in quickly identifying critical clauses and risk factors.

c). Scope:

- Scan and extract important clauses.
- Detect potential legal risks.
- Generate summaries and compliance checklists.

d). Features:

- Clause detection using NLP.
- Risk flagging system.
- Legal summary generator.

e). Tools and Technologies:

- Python, SpaCy, BERT
- Streamlit/Flask, Firebase

f). Workflow:

- Document Upload.
- Text Parsing and Clause Extraction.
- Risk Analysis and Summary Display.

g). Expected Outcomes:

- Faster legal reviews.
- Reduced compliance risks.

h). Future Enhancements:

- Multi-jurisdictional rule support.
- Integration with contract databases.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

55). Project Title: AI-Driven Personalized Job Recommender System

a). Objective:

Create a system that recommends jobs to users based on their resume, preferences, and skillsets using AI algorithms.

b). Problem Statement:

Job seekers face difficulty filtering relevant jobs. An AI-based system can personalize job suggestions and improve career matching.

c). Scope:

- Analyze resumes and skills.
- Recommend jobs from portals.
- Track application status.

d). Features:

- Resume parsing.
- AI-based job matching.
- User dashboard with job tracker.

e). Tools and Technologies:

- Python, Scikit-learn, BeautifulSoup
- Flask, Firebase
- Streamlit

f). Workflow:

- Resume Upload and Parsing.
- Job Listing Scraping.
- Matching and Ranking.
- Application Tracker.

g). Expected Outcomes:

- Faster job discovery.
- Improved employment rates.

h). Future Enhancements:

- Interview tips and resume feedback.
- Chatbot-based job assistant.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

56). Project Title: AI-Based Smart Farming Assistant

a). Objective:

Design an AI-based system to assist farmers with crop selection, pest control, and irrigation management using real-time environmental data.

b). Problem Statement:

Small-scale farmers lack access to data-driven decisions. AI can help improve yield and reduce resource use.

c). Scope:

- Crop recommendation engine.
- Disease and pest detection.
- Irrigation suggestions based on weather.

d). Features:

- Satellite and sensor data analysis.
- Smart irrigation alerts.
- Yield estimation tools.

e). Tools and Technologies:

- Python, TensorFlow, OpenCV
- Firebase, IoT sensors
- Streamlit

f). Workflow:

- Data Collection (Soil, Weather).
- AI Analysis.
- Actionable Recommendation Generation.

g). Expected Outcomes:

- Increased crop productivity.
- Resource-efficient farming.

h). Future Enhancements:

- Integration with government agri-schemes.
- Drone-based monitoring.

i). SDG Alignment:

- SDG 2: Zero Hunger

57). Project Title: AI-Powered Inventory Forecasting System

a). Objective:

Develop a system that forecasts inventory demand using machine learning to reduce overstocking and stockouts in retail businesses.

b). Problem Statement:

Inaccurate inventory planning leads to financial losses. AI can predict demand trends and optimize stock levels.

c). Scope:

- Analyze historical sales data.
- Forecast future product demand.
- Generate reorder alerts.

d). Features:

- Time series forecasting.
- Sales trend visualization.
- Inventory optimization alerts.

e). Tools and Technologies:

- Python, Pandas, Prophet
- Streamlit/Flask
- Firebase/SQLite

f). Workflow:

- Sales Data Input.
- Model Training and Forecasting.
- Inventory Report Generation.

g). Expected Outcomes:

- Reduced stock-related losses.
- Streamlined supply chain.

h). Future Enhancements:

- Real-time supplier coordination.
- Integration with ERP systems.

i). SDG Alignment:

- SDG 9: Industry, Innovation and Infrastructure

58). Project Title: AI-Based Virtual Personal Trainer

a). Objective:

Design a fitness app that uses AI to provide personalized workout plans and posture correction using camera-based motion tracking.

b). Problem Statement:

Fitness routines often lack personalization. AI-driven guidance ensures effective and safe workouts.

c). Scope:

- Create user-specific workout plans.
- Detect posture and give corrections.
- Track fitness progress.

d). Features:

- Motion detection using webcam.
- Exercise recommendation engine.
- Progress tracker with goals.

e). Tools and Technologies:

- Python, OpenCV, MediaPipe
- Streamlit/Flask
- Firebase

f). Workflow:

- User Setup and Goals.
- Workout Plan Generation.
- Real-Time Posture Feedback.
- Progress Visualization.

g). Expected Outcomes:

- Safer workouts.
- Personalized fitness growth.

h). Future Enhancements:

- Voice-guided sessions.
- Integration with smartwatches.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

59). Project Title: AI-Powered Smart Parking System

a). Objective:

Develop a smart parking solution that uses computer vision to detect vacant spots and guide vehicles in real time.

b). Problem Statement:

Urban areas face parking issues and congestion. AI can help drivers locate parking quickly, reducing fuel and time.

c). Scope:

- Detect empty parking slots.
- Display slot availability on a mobile app.
- Real-time parking status updates.

d). Features:

- Image-based slot detection.
- User-friendly app interface.
- Real-time alerts.

e). Tools and Technologies:

- Python, OpenCV, Flask
- Firebase, Streamlit
- Google Maps API

f). Workflow:

- Camera Feed Analysis.
- Slot Detection and Status Update.
- Mobile App Notification.

g). Expected Outcomes:

- Less traffic congestion.
- Time-efficient parking.

h). Future Enhancements:

- Payment gateway integration.
- Vehicle license tracking.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

60). Project Title: AI-Based Sustainable Fashion Recommender

a). Objective:

Create a recommendation system that promotes eco-friendly fashion choices based on user preferences, style, and sustainability metrics.

b). Problem Statement:

Fast fashion harms the environment. Consumers lack awareness of sustainable choices. AI can promote greener decisions in fashion.

c). Scope:

- Recommend eco-friendly brands.
- Style matching with ethical options.
- Score items based on sustainability.

d). Features:

- Style preference analysis.
- Eco score generator.
- Purchase suggestions.

e). Tools and Technologies:

- Python, Scikit-learn, BeautifulSoup
- Streamlit/Flask
- Firebase

f). Workflow:

- Style and Brand Input.
- Sustainability Data Scraping.
- Recommendation Output.

g). Expected Outcomes:

- Increased awareness of sustainable fashion.
- Informed and ethical consumerism.

h). Future Enhancements:

- Integration with e-commerce platforms.
- Outfit planning with wardrobe tracking.

i). SDG Alignment:

- SDG 12: Responsible Consumption and Production

61). Project Title: AI-Based Personalized Learning Assistant

a). Objective:

Develop an AI assistant that provides customized learning content, pacing, and feedback to students based on their strengths and weaknesses.

b). Problem Statement:

Students learn at different paces, but traditional methods apply a one-size-fits-all model. AI can personalize content delivery to improve comprehension and performance.

c). Scope:

- Adaptive quizzes and modules.
- Real-time feedback and tracking.
- Performance-based learning path.

d). Features:

- Learning profile generation.
- Content recommendation.
- Progress monitoring.

e). Tools and Technologies:

- Python, Scikit-learn, NLTK
- Flask/Streamlit
- Firebase or MongoDB

f). Workflow:

- Student Diagnostic Test.
- Profile Analysis.
- Personalized Content Delivery.
- Feedback and Assessment.

g). Expected Outcomes:

- Improved learning outcomes.
- Student-centric education.

h). Future Enhancements:

- Voice and chatbot integration.
- Multi-language support.

i). SDG Alignment:

- SDG 4: Quality Education

62). Project Title: AI-Powered Traffic Violation Detection System

a). Objective:

Develop a system that automatically detects traffic rule violations using live CCTV footage and AI-based image analysis.

b). Problem Statement:

Manual monitoring of traffic is inefficient and inconsistent. AI can automate violation detection and enforcement.

c). Scope:

- Detect red light jumps, speeding, and wrong turns.
- Alert traffic authorities.
- Record and store violations.

d). Features:

- Real-time video feed processing.
- Violation classification.
- License plate recognition.

e). Tools and Technologies:

- Python, OpenCV, YOLO
- Flask, Firebase

f). Workflow:

- Video Feed Capture.
- Frame Analysis.
- Violation Detection.
- Alert and Storage.

g). Expected Outcomes:

- Better traffic compliance.
- Enhanced road safety.

h). Future Enhancements:

- Integration with RTO databases.
- Automatic penalty issuance.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

63). Project Title: AI-Driven E-Waste Management System

a). Objective:

Design a system that identifies, sorts, and suggests recycling strategies for electronic waste using AI and image processing.

b). Problem Statement:

Improper e-waste disposal harms the environment. AI can classify waste types and guide proper recycling.

c). Scope:

- Classify e-waste categories.
- Guide recycling methods.
- Connect with recycling centres.

d). Features:

- Image-based classification.
- Geolocation-based recycling centers.
- Toxicity alerts.

e). Tools and Technologies:

- Python, TensorFlow, OpenCV
- Flask, Firebase
- Google Maps API

f). Workflow:

- Image Upload.
- E-Waste Type Detection.
- Recycling Suggestion.
- Center Locator.

g). Expected Outcomes:

- Cleaner environment.
- Safer e-waste handling.

h). Future Enhancements:

- AR-based identification.
- Real-time collection request.

i). SDG Alignment:

- SDG 12: Responsible Consumption and Production

64). Project Title: AI-Powered Smart Water Management System

a). Objective:

Create a system that monitors water usage in homes and industries and provides recommendations to reduce wastage using AI.

b). Problem Statement:

Water scarcity is exacerbated by wastage. AI can help monitor and control water usage more efficiently.

c). Scope:

- Real-time water usage monitoring.
- Leak detection and alerts.
- Consumption prediction.

d). Features:

- Smart meter integration.
- Predictive consumption alerts.
- Usage visualization.

e). Tools and Technologies:

- IoT Sensors, Python
- Firebase, Flask
- Streamlit Dashboard

f). Workflow:

- Data Collection from Sensors.
- AI Analysis and Forecasting.
- Usage Optimization Recommendations.

g). Expected Outcomes:

- Reduced water wastage.
- Sustainable usage habits.

h). Future Enhancements:

- Auto shut-off systems.
- Integration with billing systems.

i). SDG Alignment:

- SDG 6: Clean Water and Sanitation

65). Project Title: AI-Based Mental Health Chatbot

a). Objective:

Build a chatbot powered by NLP and AI that offers emotional support, performs sentiment analysis, and suggests self-care practices.

b). Problem Statement:

Access to mental health support is limited. AI can offer anonymous, round-the-clock assistance to those in need.

c). Scope:

- 24/7 user interaction.
- Mood detection.
- Suggest relaxation activities.

d). Features:

- Chat-based interface.
- Sentiment analysis.
- Resource suggestions.

e). Tools and Technologies:

- Python, NLTK, Rasa
- Flask/Streamlit
- Firebase

f). Workflow:

- User Conversation.
- Emotion Analysis.
- Suggestive Response Generation.
- Log and Analyze Trends.

g). Expected Outcomes:

- Better emotional awareness.
- Early mental health intervention.

h). Future Enhancements:

- Live therapist integration.
- Voice-based interface.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

66). Project Title: AI-Powered Disaster Prediction and Management System

a). Objective:

Develop a system that predicts natural disasters like floods or earthquakes using historical and sensor data to alert authorities and citizens.

b). Problem Statement:

Disasters cause major loss of life and property. Early prediction and automated alerts can reduce impact significantly.

c). Scope:

- Analyze historical weather data.
- Predict disasters with ML.
- Notify emergency services.

d). Features:

- Real-time sensor data analysis.
- Prediction model and dashboard.
- Multi-channel alert system.

e). Tools and Technologies:

- Python, Pandas, TensorFlow
- Flask, Firebase
- Weather APIs

f). Workflow:

- Data Ingestion.
- Model Training.
- Alert Generation and Notification.

g). Expected Outcomes:

- Timely evacuation.
- Reduced disaster impact.

h). Future Enhancements:

- Drone-based post-disaster assessment.
- Cross-border alert systems.

i). SDG Alignment:

- SDG 13: Climate Action

67). Project Title: AI-Based Recruitment Bias Detection System

a). Objective:

Create a system that audits hiring data to detect bias in recruitment based on gender, age, or ethnicity using AI.

b). Problem Statement:

Unconscious bias in recruitment affects diversity. AI can detect patterns of discrimination and promote fairness.

c). Scope:

- Analyze past hiring data.
- Identify bias indicators.
- Recommend inclusive hiring practices.

d). Features:

- Bias scoring system.
- Diversity dashboards.
- Recruitment process analysis.

e). Tools and Technologies:

- Python, Scikit-learn, NLTK
- Streamlit, Firebase

f). Workflow:

- Upload Recruitment Dataset.
- Data Analysis and Bias Detection.
- Insight Report Generation.

g). Expected Outcomes:

- Fairer hiring processes.
- Improved diversity and inclusion.

h). Future Enhancements:

- Integration with ATS platforms.
- Real-time hiring bias alerts.

i). SDG Alignment:

- SDG 5: Gender Equality

68). Project Title: AI-Powered Supply Chain Optimizer

a). Objective:

Design an AI-based tool that analyzes supply chain operations to identify bottlenecks and suggest improvements.

b). Problem Statement:

Inefficient supply chains increase costs and delays. AI can optimize routing, scheduling, and inventory planning.

c). Scope:

- Demand prediction.
- Route optimization.
- Inventory balancing.

d). Features:

- Supply chain analytics.
- Real-time KPIs.
- Delay prediction.

e). Tools and Technologies:

- Python, Pandas, TensorFlow
- Flask, Streamlit
- Firebase

f). Workflow:

- Input Operation Data.
- AI Optimization Engine.
- Output Recommendations.

g). Expected Outcomes:

- Cost reduction.
- Enhanced delivery efficiency.

h). Future Enhancements:

- Integration with ERP tools.
- Blockchain tracking.

i). SDG Alignment:

- SDG 9: Industry, Innovation and Infrastructure

69). Project Title: AI-Based Renewable Energy Load Forecaster

a). Objective:

Develop a system that forecasts energy generation and load balancing for renewable sources like solar and wind.

b). Problem Statement:

Renewable energy sources are intermittent. AI can forecast output to optimize grid load balancing.

c). Scope:

- Predict energy generation.
- Forecast consumption.
- Recommend storage/distribution.

d). Features:

- Time series modeling.
- Weather correlation.
- Smart grid integration.

e). Tools and Technologies:

- Python, Prophet, TensorFlow
- Flask, Firebase
- Energy data APIs

f). Workflow:

- Data Collection.
- Forecast Modeling.
- Load Optimization Suggestions.

g). Expected Outcomes:

- Improved energy reliability.
- Optimized renewable usage.

h). Future Enhancements:

- Real-time load control.
- IoT-based smart grid expansion.

i). SDG Alignment:

- SDG 7: Affordable and Clean Energy

70). Project Title: AI-Based Personalized Travel Planner

a). Objective:

Create a travel planning tool that suggests destinations, itineraries, and budgets tailored to user preferences and constraints using AI.

b). Problem Statement:

Planning trips is time-consuming and often inefficient. AI can create optimal plans based on real-time data and user preferences.

c). Scope:

- User preference analysis.
- Destination and budget suggestions.
- Itinerary creation.

d). Features:

- Interest-based filtering.
- Budget calculator.
- Weather and event sync.

e). Tools and Technologies:

- Python, Flask, Streamlit
- Firebase, Travel APIs

f). Workflow:

- Input User Preferences.
- AI Recommendation Engine.
- Itinerary Generation.

g). Expected Outcomes:

- Stress-free travel planning.
- Budget and time-optimized trips.

h). Future Enhancements:

- Group trip coordination.
- Integration with booking engines.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

71). Project Title: AI-Powered Smart Waste Sorting System

a). Objective:

Design an AI-based waste management system that automatically classifies and sorts waste into recyclable, organic, and hazardous categories using image recognition.

b). Problem Statement:

Manual waste segregation is inefficient and unsafe. AI can automate sorting, improving recycling rates and worker safety.

c). Scope:

- Detect and classify waste types.
- Integrate with smart bins.
- Guide recycling or disposal actions.

d). Features:

- Image-based waste recognition.
- Real-time classification.
- Automated sorting system integration.

e). Tools and Technologies:

- Python, OpenCV, TensorFlow
- Streamlit/Flask
- IoT Sensors

f). Workflow:

- Image Capture.
- Waste Type Detection.
- Sorting/Disposal Recommendation.

g). Expected Outcomes:

- Improved recycling efficiency.
- Reduced landfill waste.

h). Future Enhancements:

- Integration with municipal waste systems.
- AI-powered pickup scheduling.

i). SDG Alignment:

- SDG 11: Sustainable Cities and Communities

72). Project Title: AI-Based Cyberbullying Detection System

a). Objective:

Develop an AI model that detects and flags instances of cyberbullying in online platforms using sentiment analysis and NLP.

b). Problem Statement:

Cyberbullying harms mental health. AI can monitor and detect harmful content in real time to prevent emotional distress.

c). Scope:

- Monitor chats and posts.
- Detect harmful language.
- Alert moderators or parents.

d). Features:

- NLP-based text analysis.
- Toxicity scoring.
- Notification system.

e). Tools and Technologies:

- Python, NLTK, Transformers
- Streamlit, Firebase

f). Workflow:

- Data Stream Monitoring.
- Sentiment and Toxicity Analysis.
- Alert Generation.

g). Expected Outcomes:

- Safer digital environments.
- Early cyberbullying intervention.

h). Future Enhancements:

- Audio/video content detection.
- AI chatbot for victim support.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

73). Project Title: AI-Enabled Smart Resume Analyzer

a). Objective:

Create a system that evaluates resumes and ranks them based on job descriptions using AI and NLP for efficient recruitment.

b). Problem Statement:

Manual resume screening is time-consuming and inconsistent. AI can streamline hiring by matching skills with job requirements.

c). Scope:

- Parse and analyze resumes.
- Match with job roles.
- Rank candidates.

d). Features:

- Resume keyword extraction.
- JD-resume fit score.
- Dashboard for recruiters.

e). Tools and Technologies:

- Python, Spacy, Scikit-learn
- Streamlit/Flask
- Firebase

f). Workflow:

- Resume and JD Input.
- NLP-Based Parsing.
- Matching and Ranking.

g). Expected Outcomes:

- Faster hiring process.
- Improved candidate-job fit.

h). Future Enhancements:

- Bias-free ranking engine.
- Integration with job portals.

i). SDG Alignment:

- SDG 8: Decent Work and Economic Growth

74). Project Title: AI-Powered Fraud Detection in E-Commerce

a). Objective:

Develop a system that detects fraudulent transactions and behaviors in e-commerce using machine learning models.

b). Problem Statement:

Online fraud leads to revenue loss and customer distrust. AI can detect unusual behavior and flag risky transactions.

c). Scope:

- Monitor transactions.
- Flag anomalies.
- Alert investigation teams.

d). Features:

- Anomaly detection engine.
- Risk scoring system.
- Fraud activity logs.

e). Tools and Technologies:

- Python, Scikit-learn, XGBoost
- Flask, Firebase

f). Workflow:

- Transaction Data Analysis.
- Model-Based Detection.
- Alert and Action Logs.

g). Expected Outcomes:

- Reduced e-commerce fraud.
- Safer transactions.

h). Future Enhancements:

- Real-time fraud blocking.
- AI-powered customer authentication.

i). SDG Alignment:

- SDG 9: Industry, Innovation and Infrastructure

75). Project Title: AI-Driven Personalized News Aggregator

a). Objective:

Design a system that curates news based on user interests, sentiment, and trending topics using NLP and machine learning.

b). Problem Statement:

Users are overwhelmed with news. An AI system can filter and deliver personalized, relevant content.

c). Scope:

- Fetch and analyze news articles.
- Match to user profile.
- Display in a ranked feed.

d). Features:

- Sentiment-based filtering.
- Topic clustering.
- Reading history analysis.

e). Tools and Technologies:

- Python, NLTK, Transformers
- Flask, Firebase
- News APIs

f). Workflow:

- User Profile Analysis.
- News Fetch and Scoring.
- Feed Generation.

g). Expected Outcomes:

- Time-saving news reading.
- User-centric content experience.

h). Future Enhancements:

- Multilingual news feeds.
- Audio news summaries.

i). SDG Alignment:

- SDG 4: Quality Education

76). Project Title: AI-Based Personalized Nutrition Advisor

a). Objective:

Develop a system that provides customized diet plans based on health goals, medical conditions, and food preferences.

b). Problem Statement:

Generic diets often don't suit individual needs. AI can offer tailored plans for better health outcomes.

c). Scope:

- Input user goals and health data.
- Generate balanced meals.
- Monitor and suggest adjustments.

d). Features:

- Health condition integration.
- Macronutrient analysis.
- Grocery list generator.

e). Tools and Technologies:

- Python, Scikit-learn, Flask
- Firebase, Nutrition APIs

f). Workflow:

- Health and Food Preference Input.
- Meal Plan Generation.
- Feedback and Revision.

g). Expected Outcomes:

- Improved dietary adherence.
- Personalized wellness support.

h). Future Enhancements:

- Integration with fitness trackers.
- Recipe recommendations.

i). SDG Alignment:

- SDG 3: Good Health and Well-being

77). Project Title: AI-Powered Accessibility Enhancer for the Visually Impaired

a). Objective:

Create a system that reads text from images, recognizes objects, and narrates surroundings to assist visually impaired individuals.

b). Problem Statement:

Visually impaired individuals face barriers in navigating environments. AI can enhance independence through real-time assistance.

c). Scope:

- Text-to-speech for printed text.
- Object recognition.
- Navigation cues.

d). Features:

- OCR-based reading.
- Object and obstacle detection.
- Voice output interface.

e). Tools and Technologies:

- Python, OpenCV, Tesseract
- Streamlit/Flask
- Firebase

f). Workflow:

- Image Capture.
- AI Processing.
- Audio Feedback.

g). Expected Outcomes:

- Improved independence.
- Better access to information.

h). Future Enhancements:

- AR navigation glasses.
- Multilingual support.

i). SDG Alignment:

- SDG 10: Reduced Inequalities

78). Project Title: AI-Based Fake News Detection System

a). Objective:

Develop a system that classifies news content as fake or real based on linguistic features and source credibility using NLP.

b). Problem Statement:

Fake news spreads misinformation. AI can help users verify information before sharing.

c). Scope:

- Analyze articles.
- Classify as genuine or fake.
- Rate source credibility.

d). Features:

- Text classifier model.
- Fact-check database integration.
- Confidence scores.

e). Tools and Technologies:

- Python, Transformers, Scikit-learn
- Streamlit, Firebase

f). Workflow:

- Input News Article.
- NLP-Based Classification.
- Source and Score Display.

g). Expected Outcomes:

- Reduced misinformation spread.
- Enhanced media literacy.

h). Future Enhancements:

- Browser extension for detection.
- Real-time social media scanning.

i). SDG Alignment:

- SDG 16: Peace, Justice and Strong Institutions

79). Project Title: AI-Based Personalized Career Counseling System

a). Objective:

Design a career advisor tool that suggests career paths based on student skills, interests, and aptitude tests using AI.

b). Problem Statement:

Students often lack guidance in choosing the right career. AI can provide evidence-based, personalized recommendations.

c). Scope:

- Assess user skills and interests.
- Suggest matching careers.
- Provide educational resources.

d). Features:

- Psychometric test analysis.
- Career role matching.
- Course recommendation engine.

e). Tools and Technologies:

- Python, Scikit-learn, Flask
- Firebase

f). Workflow:

- Skill and Interest Assessment.
- Career Mapping.
- Output Plan and Resources.

g). Expected Outcomes:

- Better career alignment.
- Reduced dropout rates.

h). Future Enhancements:

- Alumni feedback integration.
- Virtual mentorship pairing.

i). SDG Alignment:

- SDG 4: Quality Education

80). Project Title: AI-Driven Climate Change Impact Analyzer

a). Objective:

Develop a system that visualizes and predicts the impact of climate change on specific regions based on environmental data.

b). Problem Statement:

Understanding climate change at the local level is difficult. AI can help visualize regional impacts and aid in planning.

c). Scope:

- Collect and analyze climate data.
- Model regional changes.
- Recommend adaptation strategies.

d). Features:

- Data visualization dashboard.
- Impact prediction models.
- Region-wise reports.

e). Tools and Technologies:

- Python, Pandas, Seaborn
- Streamlit, GIS APIs

f). Workflow:

- Data Ingestion.
- Model Simulation.
- Report and Recommendation Output.

g). Expected Outcomes:

- Informed decision-making.
- Localized climate resilience planning.

h). Future Enhancements:

- Policy impact modeling.
- Integration with early-warning systems.

i). SDG Alignment:

- SDG 13: Climate Action