5-Day Workshop on IoT Integrated with Artificial Intelligence (AI)

Day 1: Fundamentals of IoT and Artificial Intelligence

- Session 1: Introduction to IoT
- • What is IoT? Importance and real-world applications.
- • IoT architecture: Devices, communication protocols, and cloud platforms.
- • Sensors, actuators, and data collection in IoT systems.
- Hands-On Activity: Setting up an IoT device (ESP8266/NodeMCU), reading sensor data, and uploading to a cloud platform (ThingSpeak/Blynk).
- Session 2: Basics of Artificial Intelligence
- • Overview of AI: Machine learning, deep learning, and their role in IoT.
- • Difference between AI, ML, and IoT.
- • Tools for AI development: Python, TensorFlow, and OpenCV.
- Hands-On Activity: Writing a simple AI algorithm in Python, exploring IBM Watson/Google AI.

Day 2: IoT Data Handling and AI Integration

- Session 1: Data Collection and Preprocessing
- • IoT data pipeline: Collection, storage, preprocessing.
- • Techniques: Cleaning, feature selection, normalization.
- • Real-time IoT data handling for AI.
- Hands-On Activity: Collect IoT sensor data, preprocess using pandas/NumPy.
- Session 2: AI Model Development
- • Training models on IoT data.
- • Supervised learning, classification, regression.
- • Edge vs cloud deployment.
- Hands-On Activity: Train a predictive model (e.g., anomaly detection) and deploy.

Day 3: Advanced Applications and AI-IoT Projects

- Session 1: Real-World Applications
- • Smart cities, healthcare, smart homes, industry 4.0.
- • Edge AI on low-power devices.
- • Using pre-trained AI models and AutoML for IoT.
- Hands-On Activity: Object detection/voice recognition with IoT devices.
- Session 2: Project Building
- • Mini Project: Smart door lock with face recognition using IoT+AI.

Day 4: IoT Platforms and Edge AI

- Session 1: IoT Cloud Platforms
- • AWS IoT, Azure IoT, Google Cloud IoT.
- • Data pipelines and dashboards.
- • Integration of AI services in IoT platforms.
- Hands-On Activity: Connect IoT devices to AWS IoT and visualize data.
- Session 2: Edge AI Concepts
- • Deploying AI models on microcontrollers and Raspberry Pi.
- • TensorFlow Lite, OpenVINO, NVIDIA Jetson.

- Hands-On Activity: Deploy a lightweight AI model on Raspberry Pi.

Day 5: Final Project & Future of IoT+AI

- Session 1: Capstone Project
- • Build an AI-powered IoT system (e.g., Smart Home Automation, Health Monitoring).
- • Sensors: Motion, light, temperature, voice input.
- • AI Component: Predictive analytics and automation.
- Session 2: Ethics, Security, and Future Trends
- • IoT+AI security concerns and solutions.
- • Ethical considerations in AI for IoT.
- • Future trends: 5G, Digital Twins, Industry 5.0.
- Closing Session: Project presentations, feedback, and certification.