SPYPRO SECURITY SOLUTIONS Pvt. Ltd.,

C Y B E R S E C U R I T Y

5-Day Workshop on IoT Integrated with Machine Learning (ML)

Day 1: Fundamentals of IoT and ML

Session 1: Introduction to IoT

- **What is IoT? Importance and applications**
- **IoT architecture: Sensors, actuators, gateways, and cloud platforms**
- **IoT communication protocols: MQTT, HTTP**

Hands-On

- **Setting up an IoT device (e.g., ESP8266/NodeMCU)**
- **Reading sensor data (temperature, humidity) and sending it to ThingSpeak/Blynk**

Session 2: Basics of Machine Learning

- **Introduction to ML: supervised, unsupervised, reinforcement learning**
- **Overview of algorithms: Linear Regression, Decision Trees, K-Means**
- **Role of ML in IoT: predictive maintenance, anomaly detection**

Hands-On

- **Writing a simple Python ML model (e.g., Linear Regression with sklearn)**

Day 2: IoT Data & Preprocessing for ML

Session 1: Data Collection and Preprocessing

- **IoT data pipeline: collection, storage, processing**
- **Data preprocessing: cleaning, normalization, feature extraction**
- **Real-time data in ML models**

Hands-On

- **Collect sensor data, store in the cloud**
- **Import into Python and preprocess with pandas & NumPy**

Session 2: ML Model Training Foundations

- **Training ML models with IoT data (classification & regression)**
- **Popular ML frameworks: scikit-learn, TensorFlow basics**

Hands-On

- **Build and evaluate a regression model (predict sensor readings)**

Day 3: Integrating ML with IoT Systems

Session 1: Model Deployment

- **Deploy ML models on IoT devices**
- **Cloud vs. Edge deployment approaches**
- **Lightweight ML frameworks for IoT**

Hands-On

- **Deploy an ML model on NodeMCU/Raspberry Pi**
- **Connect deployment to a cloud-based IoT service**

Session 2: IoT Security & Communication in ML

- **IoT communication protocols in ML-enabled systems**
- **Challenges: latency, bandwidth, data privacy**
- **Security in IoT-ML integration**

Hands-On

- **Demonstration of secure IoT data transfer with ML prediction**

Day 4: Advanced IoT-ML Applications

Session 1: Real-World Use Cases

- **Smart farming, predictive maintenance, healthcare, smart homes**
- **Optimizing ML for edge devices**
- **Introduction to AutoML and pre-trained ML models**

Hands-On

- **Use a pre-trained ML model for image recognition or prediction**
- **Example: Predict soil moisture for smart irrigation**

Session 2: Mini Project Kickoff

- **Students choose a domain (agriculture, healthcare, automation)**
- **Define project scope and data needs**

Day 5: Project Development & Future Trends

Session 1: Project Development

- **Teams develop IoT-ML projects with sensors, cloud, and ML models**
- **Debugging and integration support**

Session 2: Presentation & Closing

- **Project demos and presentations**
- **Discussion on challenges and solutions**
- **Future trends: Federated Learning, TinyML, Edge ML**

Closing Session

- **Certificates distribution & feedback**

Capstone Project Example:
Smart Farming System with ML

- **Sensors: temperature, humidity, soil moisture**
- **ML Model: Predict crop water needs**
- **Tools: NodeMCU, TensorFlow, scikit-learn**