SPYPRO SECURITY SOLUTIONS Pvt. Ltd.,

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

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

Day 1: Introduction to IoT and Hardware Setup

Morning Session

1. **Welcome and Introduction**
- **Overview of the Workshop**
- **Learning Objectives**
- **Introduction to IoT**
2. **Basics of IoT**
- **Definition and Scope**
- **IoT Architecture and Components**
- **IoT Applications and Use Cases**
3. **Hardware Platforms for IoT**
- **Arduino, Raspberry Pi, ESP8266/ESP32 overview**
- **Selection criteria for IoT projects**

Afternoon Session

4. Setting Up IoT Hardware

- **Installing drivers and software**
- **Hands-on: Blinking LED, Reading Sensor Data**

5. **Introduction to Sensors and Actuators**

- **Types of Sensors (Temperature, Humidity, Motion)**
- **Types of Actuators (Motors, Relays)**
- **Hands-on: Connecting sensors and reading data**

Evening Session

6. Basic Networking for IoT

- **Networking concepts for IoT**
- **Connecting IoT Devices to the Internet**
- **Hands-on: Sending sensor data to the cloud**

Day 2: Data Collection, Storage, and Visualization

Morning Session

1. **Data Collection in IoT**

- **Data collection techniques**
- **IoT communication protocols: MQTT, HTTP, CoAP**

2. **Storing IoT Data**

- **Cloud storage: AWS, Azure, Google Cloud**
- **Local storage solutions (Databases, Files)**

Afternoon Session

3. Introduction to Data Analytics

- **Importance of analytics in IoT**
- **Basics of descriptive analytics**

4. **Data Preprocessing**

- **Cleaning, normalization, feature extraction**
- **Hands-on: Preprocessing IoT Data**

Evening Session

5. Visualization of IoT Data

- **Tools: Matplotlib, Plotly, Grafana**
- **Hands-on: Visualizing IoT Data in real-time**

Day 3: Machine Learning for IoT

Morning Session

1. **Introduction to ML**

- **Overview of ML concepts**
- **Supervised, Unsupervised, Reinforcement Learning**

2. **ML for IoT**

- **IoT-ML use cases: predictive maintenance, smart homes, healthcare**
- **ML workflow: data → training → deployment**

Afternoon Session

3. Building a Simple ML Model

- **Selecting datasets**
- **Splitting into training/testing sets**
- **Hands-on: Train a model (Linear Regression, Decision Tree)**

4. **Deploying ML Models on IoT Devices**

- **Introduction to Edge Computing**
- **Tools: TensorFlow Lite, Edge Impulse**
- **Hands-on: Deploying trained model on IoT hardware**

Evening Session

5. Advanced Topics in IoT-ML

- **Fog & Edge Computing**
- **TinyML and AIoT concepts**
- **Q&A and Wrap-Up**

Day 4: Advanced IoT-ML Integration

Morning Session

1. **Real-Time IoT Data with ML**

- **Handling streaming data**
- **Case study: anomaly detection in IoT sensors**

Afternoon Session

2. ML Model Optimization for IoT

- **Reducing model size for edge devices**
- **Quantization, pruning, and lightweight ML**

Evening Session

3. Security in IoT-ML

- **Threats in IoT + ML systems**
- **Data encryption, secure transmission**
- **Hands-on: Secure IoT data pipeline**

Day 5: Project Development and Future Trends

Morning Session

1. **Capstone Project Kickoff**

- **Teams plan and design IoT-ML projects**
- **Example domains: Smart Farming, Health Monitoring, Automation**

Afternoon Session

2. Project Implementation

- **Building IoT-ML solutions with sensors + ML model**
- **Cloud/Edge deployment**

Evening Session

3. Project Demonstration & Closing

- **Team presentations and demos**
- **Future Trends: Federated Learning, Digital Twins, AIoT**
- **Feedback & Certification Ceremony**

Capstone Project Example:

Smart Farming System

- **Sensors: Temperature, Humidity, Soil Moisture**
- **ML Model: Predict water needs of crops**

- **Tools: NodeMCU, TensorFlow Lite, Python**