IoT Product Cybersecurity and Testing

Course Syllabus

Topic 1: Essential Knowledge of Internet-of-things (3 hours)

- **Basic IoT Architecture**:
  - Sensing Layer
  - Networking Layer
  - Application Layer
- **Sensing Layer in IoT**:
  - Introduction to Sensors
  - Basic Knowledge of Microcontroller Unit (MCU) in Sensing Layer
  - Interfaces for Sensors
  - IoT Communication Module
- **Networking Layer in IoT**:
  - Introduction to Radio Middleware
  - Network Management Platform
  - Communication in Radio Middleware
- **Application Layer in IoT**:
  - Data Exchange Protocols
  - Access Control
  - Examples of IoT Applications
- **IoT Standards**:
  - IEEE 1451 and IEEE P2668

Topic 2: Fundamentals of Cybersecurity (3 hours)

- **Cyber Threats**
- **Security Requirements**
  - Confidentiality
  - Integrity
  - Availability
  - Privacy
- **Sensing Layer Security**
  - Data Accuracy and Calibration
  - Radio Communication Security
  - Firmware Security
- **Networking Layer and Application Layer Security**
  - Data Exchanging Protocols
  - Transport Layer Security (TLS)
  - Access Control Security

Topic 3: Cybersecurity Testing Methods for IoT Products (3 hours)

- **Vulnerability Assessment**
- **Product Evaluation**
- **Risk Analysis**
- **Introduction of the Key Certifications for IoT Products, including:**
  - Information Security Management Systems (ISMS) Standards, e.g. ISO 27000-series;
  - Cryptographic-based Security, e.g. FIPS140-2/ISO 19790;
  - Automotive Cybersecurity, e.g. ISO/SAE DIS 21434;
  - Medical Device Cybersecurity, e.g. IEC 62442-4-1/ 4-2, IEC 80001;

Topic 4: Cybersecurity Testing, Practices, and Certification (3 hours)

- **Cybersecurity Testing and Certification in IoT Industry**
- **Consumer IoT**
- **Medical IoT**
- **Automotive IoT**

Topic 5: Design of EN303645 consumer IoT Cybersecurity Test Plan (3 hours)

- **Test Plan Design of IoT Cybersecurity Tests according to Product Type and Regulatory Requirements. (e.g. the required test facilities, equipment, test levels)**
- **Security Profile**
- **Basic, Substantial, High**
- **Provisions**
- **Test Cases Preparation**

Topic 6: Cybersecurity Practices in Laboratory (3 hours)

- **Introduction of Kali Linux**
- **Introduction of Firmware analysis**
- **Extracting firmware from IoT device**
- **Using online tools to analyse the extracted firmware**