

Building Cross-Platform MAUI Apps with Bluetooth, GPS, and Device Sensors

Course Duration: 40 Hours

Course code: MAUI

1. Course Overview

This course equips participants to develop cross-platform mobile applications using .NET MAUI with integration of Bluetooth, GPS, and device sensors. Learners will gain practical experience in accessing hardware features, handling permissions, designing responsive UIs, and deploying apps on both Android and iOS.

2. What you'll learn?

- Understand the .NET MAUI architecture for cross-platform development.
- Implement Bluetooth LE communication in mobile apps.
- Use GPS and geolocation services for real-time tracking and mapping.
- Access and utilize device sensors like accelerometer, gyroscope, and magnetometer.
- Handle platform-specific permissions and capabilities.
- Debug, optimize, and deploy sensor-driven mobile applications.

3. Target Audience

- Mobile developers working on cross-platform applications.
- IoT developers building sensor-driven apps.
- Students and IT professionals seeking advanced mobile app development skills.
- Developers creating location-aware or Bluetooth-enabled applications.

4. Pre-Requisites

- Knowledge of C# and .NET development.

- Basic mobile app development experience.
- Familiarity with object-oriented programming (OOP).
- Prior exposure to Xamarin or .NET MAUI is helpful but not mandatory.

5. Course content

Module 1: Introduction to .NET MAUI

- .NET MAUI overview and cross-platform capabilities
- Project structure, tools, and setup (Visual Studio, MAUI CLI)
- Building a simple MAUI app for Android and iOS
- UI layout, navigation, and responsive design

Module 2: Bluetooth Integration

- Overview of Bluetooth LE (Low Energy)
- Scanning, pairing, and connecting to devices
- Reading and writing data from Bluetooth peripherals
- Handling permissions for Android and iOS
- Hands-on: Build an app that connects to a Bluetooth sensor

Module 3: GPS and Geolocation Services

- Accessing device GPS and location services
- Handling runtime permissions for location
- Geocoding and reverse geocoding
- Real-time tracking and map integration
- Hands-on: Build a location tracking app

Module 4: Device Sensors

- Overview of accelerometer, gyroscope, magnetometer, and other sensors
- Accessing sensor data in MAUI apps
- Implementing sensor-driven features (motion detection, step counter)
- Hands-on: Build a motion-tracking app

Module 5: Permissions and Platform-Specific Features

- Managing runtime permissions across platforms
- Platform-specific APIs in MAUI
- DependencyService and partial classes for platform-specific functionality

Module 6: Data Management and Connectivity

- Storing sensor and GPS data locally (SQLite, Preferences)
- Sending data to cloud or web APIs
- Optimizing polling and battery usage

Module 7: Testing and Debugging

- Debugging on Android and iOS emulators/devices
- Performance profiling and battery optimization
- Exception handling and edge case management

Module 8: Deployment and Publishing

- Preparing Android and iOS apps for release
- Signing, provisioning, and publishing apps
- App store submission best practices

Module 9: Capstone Project

- Develop a full-featured MAUI app integrating Bluetooth, GPS, and multiple sensors
- Implement real-time data visualization
- Test app on Android and iOS devices
- Project presentation and review