AI-POWERED ELECTRIC VEHICLE TRACKING SYSTEM & FLEET INTELLIGENCE

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INTRODUCTION

Duration: 30 hours

The global shift towards electric mobility has created a new era in intelligent transportation, where real-time tracking, telematics, and data-driven decision-making play a central role. As electric vehicles (EVs) continue to dominate two-wheelers, three-wheelers, fleets, and shared mobility systems, the demand for engineers who understand EV tracking, battery analytics, IoT communication, and telematics integration has grown rapidly.

This training program is designed to equip learners with industry-ready skills to work on end-to-end Electric Vehicle Tracking Systems (EVTS). The course covers everything from GPS/GNSS fundamentals, telematics hardware installation, CAN/OBD-II data acquisition, cloud integration, IoT communication, dashboard analytics, and real-world troubleshooting.

Unlike traditional vehicle tracking, EV tracking requires deeper knowledge of battery systems, BMS signals, SOC/SOH monitoring, temperature alerts, charging patterns, and predictive maintenance. This course bridges that crucial gap by combining core telematics knowledge with EV-specific technologies, ensuring that participants gain practical, job-oriented expertise.

Through hands-on labs, IoT demos, GPS packet decoding, dashboards, and EV CAN data interpretation, learners will understand how modern EV fleets are tracked, monitored, managed, and optimised for performance and safety. Whether you are an Engineering Student, EV Technician, IoT Developer, eMobility Startup Founder, or Telematics Engineer, this course gives you the technical foundation to excel in the growing electric mobility ecosystem.

By the end of the 30 hours, participants will be able to:

- Install and configure real-world EV tracking devices
- Decode GPS/GNSS packets and telematics data
- Understand EV CAN, battery parameters, and BMS data flow
- Integrate GPS devices with cloud platforms (MQTT/Firebase/ThingsBoard)
- Build fleet dashboards and analyse trips, alerts, and energy consumption
- Perform on-field troubleshooting and telematics diagnostics
- Apply AI/ML techniques for predictive maintenance and battery intelligence

MODULE 1 — INTRODUCTION TO VEHICLE & EV TRACKING

2 Hours

1.1 Overview of Vehicle Tracking Systems

- Purpose and evolution of vehicle tracking
- Fleet management concepts
- Real-world use cases: logistics, rental, taxi, security

1.2 Core Components of a Tracking System

- GPS/GNSS device
- GSM/LTE/4G/5G modem
- Backend server
- Web dashboard & Mobile app

1.3 Tracking Types

- Active vs Passive tracking
- Real-time vs interval-based tracking

1.4 Regulatory Framework

- AIS-140 India requirements
- Mandatory panic button
- Vehicle health & data standards

MODULE 2 — GPS / GNSS FUNDAMENTALS

3 Hours

2.1 How GPS Works

- Satellite constellation
- Trilateration principles
- Time synchronization

2.2 Global GNSS Systems

- GPS
- GLONASS
- Galileo
- IRNSS / NavIC

2.3 GPS Accuracy & Errors

- Multipath
- Ionospheric & tropospheric delays
- HDOP, PDOP

2.4 Location & Mapping Concepts

- Coordinate formats (DD, DMS)
- Map projections
- GeoJSON basics

MODULE 3 — EV HARDWARE & INSTALLATION 5 Hours

Theory (2 Hours)

3.1 GPS Tracker Hardware Components

- GSM modem
- GNSS antenna
- Power supply system
- Memory, CPU, battery backup

3.2 Vehicle Electrical Systems

- Ignition line
- ACC wire
- Grounding
- Fuse concepts

3.3 EV-specific Electrical Systems

- 48V/60V/72V EV battery architecture
- BMS overview
- CAN bus data wires
- Controller connections

3.4 Sensors Overview

- Ignition sensor
- Door sensor
- Temperature sensor
- Tilt sensor
- Panic button

Practical (3 Hours)

3.5 Installation & Mounting

- Device mounting positions
- Wiring best practices
- Cable routing techniques

3.6 Device Activation & Testing

- SIM insertion
- APN configuration
- LED indicators
- Live tracking test

3.7 Troubleshooting Common Issues

- No GPS fix
- No GSM signal
- Wrong wiring
- Power failure resets

MODULE 4 — COMMUNICATION & NETWORKING 3 Hours

4.1 GSM/GPRS/4G Communication

- How IoT data is transmitted
- Network registration sequence

4.2 Device Configuration

- SIM activation
- APN settings
- IP & Port configuration

4.3 GPS Device Data Packet Structure

- IMEI
- Timestamp
- Latitude / Longitude
- Speed
- Heading
- Battery voltage
- Event flags

4.4 Server Communication

- TCP vs UDP
- Packet encryption basics
- Server connectivity tests

MODULE 5 — FLEET MANAGEMENT SOFTWARE & CLOUD DASHBOARD 4 Hours

Theory (2 Hours)

5.1 Dashboard Features

- Real-time location
- Route playback
- Trip summary
- Driver behaviour analysis

5.2 Alerts & Notifications

- Overspeed
- Geofencing
- Idling
- Route deviation

5.3 EV-specific Dashboard Insights

- SOC (State of Charge)
- SOH (State of Health)
- Battery temperature
- Charging/discharging cycles

Practical (2 Hours)

5.4 Platform Demonstration

- Admin vs driver login
- User & vehicle creation
- Organising fleets

5.5 Data Analysis

- Trip history review
- Driver scoring
- Exporting reports

MODULE 6 — EV SENSORS & ADVANCED INTEGRATIONS 5 Hours

6.1 Sensor Integrations

- Door sensor
- Ignition sensor
- Temperature & tilt sensors
- Panic button

6.2 EV Battery & Controller Data

- SOC, SOH, Voltage, Current
- Battery temperature
- Motor RPM, speed, torque

6.3 OBD-II / CAN BUS

- CAN frame basics
- PIDs (Parameter IDs)
- EV-specific diagnostic data

6.4 IoT & Cloud Connectivity

- MQTT protocol
- HTTP REST APIs
- ThingsBoard integration
- Firebase integration
- Blynk integration

MODULE 7 — AI/ML & ANALYTICS FOR EV TRACKING

3 Hours

7.1 Predictive Maintenance Concepts

- Identifying unsafe conditions
- Fault pattern detection

7.2 Battery Analytics

- SOC prediction
- SOH degradation modeling

7.3 Trip & Route Intelligence

- ETA prediction
- Driver behaviour analytics

7.4 Geo-AI & Mapping Intelligence

- Hotspot mapping
- Risk zones detection

MODULE 8 — TELEMATICS SERVER & BACKEND ARCHITECTURE 3 Hours

8.1 Telematics Platform Architecture

- Device layer
- Communication layer
- Processing layer
- Cloud storage layer

8.2 Data Processing Pipelines

- MQTT broker
- WebSocket for live tracking
- Batch vs real-time data

8.3 Database Design

- GPS logs
- Trip table
- Events collection
- Error logs

8.4 Security in Telematics

- API authentication
- Token-based access
- Data encryption basics

MODULE 9 — TROUBLESHOOTING & FIELD MAINTENANCE 2 Hours

9.1 Common Hardware Issues

- Poor GPS signal
- SIM/network issues
- Loose wiring
- Device overheating

9.2 Software Issues

- Wrong APN
- Packet format errors
- Server timeout

9.3 Firmware & Diagnostics

- OTA firmware update
- Soft reset vs hard reset
- Debug logs interpretation

9.4 Field Maintenance Practices

- Daily/weekly checklists
- Installation audits
- Customer complaint handling