



PROFESSIONAL CERTIFICATE IN

BATTERY MANAGEMENT SYSTEMS

Power. Protect. Optimize.

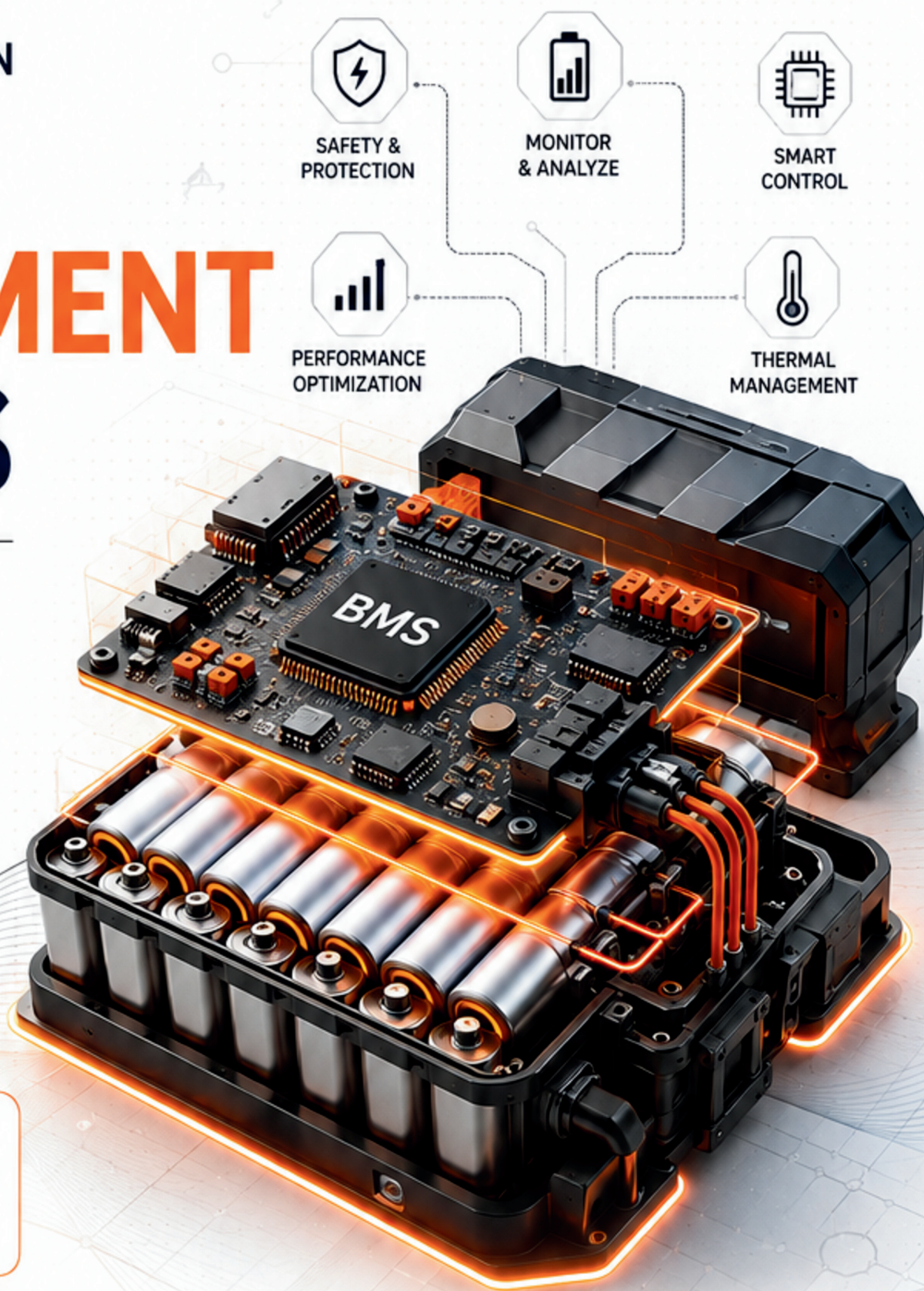
Intelligence that drives every battery.

Master the complete BMS lifecycle –
from battery fundamentals to advanced
monitoring, protection, communication
and real-world BMS design.

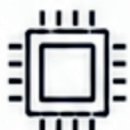


60
HOURS

HANDS-ON
PROGRAM



BATTERY
TECHNOLOGY



BMS
ARCHITECTURE



PROTECTION
& SAFETY



SOC • SOH
CELL BALANCING



COMMUNICATION
CAN • RS485



DIAGNOSTICS
& FAULTS



DESIGN • ANALYZE • PROTECT • OPTIMIZE

Build smarter, safer and more efficient battery-powered systems.

CAPSTONE PROJECT

Build a Smart BMS Prototype
(4S/8S)





POWERING THE FUTURE THROUGH SMART ENERGY SYSTEMS

Battery Management Systems (BMS) are the intelligence behind safe, efficient and reliable battery-powered applications. From electric vehicles to energy storage systems, BMS ensures optimal performance, extended battery life and maximum safety.



PROGRAM OVERVIEW

This **60-hour** hands-on program takes you through the entire BMS lifecycle – from battery fundamentals to advanced monitoring, protection, communication and real-world BMS design with a capstone project.



WHAT YOU'LL LEARN



BATTERY TECHNOLOGY

Chemistry, cell types, characteristics and electrochemistry basics.



BATTERY PACK DESIGN

Series/parallel configuration, sizing and pack architecture.



BMS ARCHITECTURE

Hardware, firmware & software design fundamentals.



MONITORING & MEASUREMENT

Voltage, current and temperature sensing & data acquisition.



PROTECTION MECHANISMS

OV, UV, OC, OT protections for safe battery operation.



CELL BALANCING

Passive & active balancing techniques for longer life.



SOC • SOH • SOP ESTIMATION

Advanced algorithms for accurate state estimation.



THERMAL MANAGEMENT

Temperature control, heat dissipation and safety strategies.



COMMUNICATION

UART, RS485, CAN, Modbus and smart BMS protocols.



DIAGNOSTICS & DATA ANALYTICS

Fault detection, logging and performance analysis.

WHO IS THIS FOR?



Engineering Students
(Electrical / Electronics /
Mechanical / Mechatronics)



EV, E-Mobility & Automotive
Professionals



Battery, Energy Storage &
Power Electronics Engineers



Embedded System
Developers



Service, Maintenance &
Testing Professionals



Entrepreneurs & Startups
in Energy & EV domain



REAL-WORLD IMPACT

- ✓ Ensure battery safety and reliability
- ✓ Maximize performance and efficiency
- ✓ Extend battery life and reduce downtime
- ✓ Enable smarter energy management



SMARTER BATTERIES.
SAFER SYSTEMS.
SUSTAINABLE FUTURE.

Get in Touch >



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Bharat Institute
for Skill Development





60-HOUR LEARNING JOURNEY FROM CONCEPT TO WORKING BMS

Step-by-step. Hands-on. Industry-relevant.



01

UNDERSTAND THE BATTERY



- Battery chemistry & fundamentals
- Cell & pack characteristics
- Pack configuration (Series / Parallel)
- Capacity, C-Rate & energy

02

MEASURE & MONITOR



- Voltage, current & temperature sensing
- Data acquisition & signal conditioning
- Cell monitoring techniques

03

PROTECT THE SYSTEM



- OV / UV / OC / OT protection
- Short circuit protection
- Pre-charge & contactors
- Fail-safe design principles

04

MANAGE INTELLIGENTLY



- SOC / SOH / SOP estimation
- Cell balancing (passive & active)
- State estimation algorithms
- Fault detection & handling

05

COMMUNICATE & INTEGRATE



- UART, RS485, CAN communication
- Modbus protocols
- Data logging & diagnostics
- HMI / Dashboard integration

06

BUILD & VALIDATE



- BMS hardware design
- Firmware implementation
- Testing, validation & calibration
- Real-world scenarios

TOOLS & TECHNOLOGIES YOU WILL WORK WITH



Arduino IDE & PlatformIO



STM32CubeIDE (Where applicable)



Embedded C / C++



CAN Analyzer & Tools



RS485 / Modbus Tools



Multimeter & Oscilloscope



Battery Tester & Load



Excel for Data Analysis



Python (Basics) for Analysis



Git & Version Control

HANDS-ON FOCUS AREAS

- ✓ Work with real battery cells & packs
- ✓ Develop & test BMS algorithms
- ✓ Implement protection & balancing
- ✓ Design communication protocols
- ✓ Analyze data & diagnose faults
- ✓ Build and validate a complete BMS



LEARN BY DOING. BUILD WITH CONFIDENCE.

Gain practical expertise at every step and move from fundamentals to a fully functional BMS.



Expert-Guided Training



Practical Hands-on



Industry Relevant



Certificate of Participation

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BECOME A BMS EXPERT. DESIGN. PROTECT. OPTIMIZE.

From understanding battery fundamentals to building a fully functional BMS prototype – gain the skills to design **smarter, safer** and **more reliable** battery systems.

BY THE END OF THIS PROGRAM, YOU WILL BE ABLE TO:

- ✓ Understand battery chemistry, cell behavior and pack design principles
- ✓ Design BMS architecture for different battery configurations
- ✓ Monitor voltage, current, temperature and estimate SOC, SOH, SOP
- ✓ Implement protection against over-voltage, under-voltage, over-current and over-temperature
- ✓ Implement active and passive cell balancing strategies
- ✓ Manage thermal performance for safe and efficient operation
- ✓ Implement communication using UART, RS485 and CAN
- ✓ Diagnose faults and optimize battery performance
- ✓ Build and validate a working BMS prototype for real-world use



CAPSTONE PROJECT

SMART 4S/8S BATTERY MANAGEMENT SYSTEM

- Real-world BMS design & development for 4S/8S Li-ion battery packs
- Includes monitoring, protection, cell balancing & communication
- Firmware development & system validation
- Complete testing with real battery cells & loads



HANDS-ON
REAL DEVICES



PRACTICAL
CODING



INDUSTRY
RELEVANT



CAREER
FOCUSED

CAREER OPPORTUNITIES



EV & E-MOBILITY
BMS ENGINEER



ENERGY STORAGE
SYSTEMS ENGINEER



BATTERY DESIGN
ENGINEER



TEST & VALIDATION
ENGINEER



SERVICE & DIAGNOSTICS
ENGINEER



ENTREPRENEUR
& CONSULTANT

PROGRAM HIGHLIGHTS



60 HOURS
Structured
Hands-on Learning



EXPERT
MENTORSHIP
Guided by Industry
Professionals



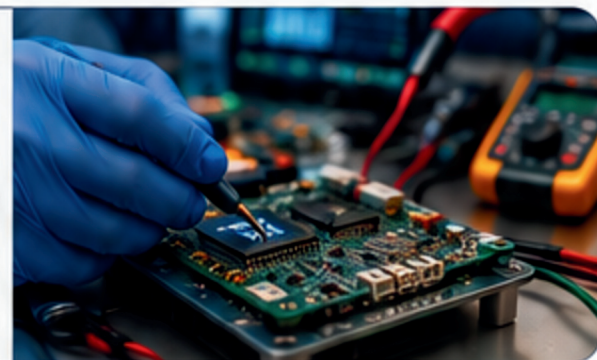
HANDS-ON LAB
SESSIONS
Real Devices.
Real Learning.



CERTIFICATE OF
PARTICIPATION
Recognized &
Valuable



FUTURE-READY
SKILLS
For EV, ESS &
Emerging Tech



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