MotoHawk ECU based rapid prototyping and general model based control engineering

This three-day course introduces the MotoHawk tool chain and provides hands-on experience in building, deploying, calibrating, and refining a real world control application.

Prerequisites:

- Working knowledge of Simulink
- Control, calibration and/or embedded software experience
- Each delegate must bring a computer running MATLAB, Simulink, Real Time Workshop and Real Time Workshop Embedded Coder. The MathWorks can provide trial licences

Each delegate will receive:

- Hands-on experience of MotoHawk
- Course notes
- Certificate of participation

Day 1

- Basics of MATLAB, Simulink and MotoHawk
- Model based design and history
    - Physics and the Simulink model
- Workflow and processes
    - Build and flash first model
- Setup of delegates' computers
- MotoHawk introduction:
    - RTI Triggers
    - Calibrations
    - Probes
    - Overrides
- Embedded software introduction, organisation
    - DLL
    - SRZ
    - Cal file
- Basics of MotoTune
    - Display
    - Calibration
- Analogue I/O
- Closed loop PI control
    - Management of time in embedded Simulink
    - Throttle actuator project
- Introductions to software architecture within the model

Day 2

- Tables
  - Uses
  - MotoTune calibration
  - Sensor characterisation
  - Feed forward to PI
- Calibration manipulation techniques
  - Transfer/upgrade
  - Extraction
  - Merge
- Faults management
  - Detection
  - Mitigation
- Improved throttle actuator project
- Data storage techniques and blocks
  - Read function
  - VarDec detail
  - Organisation in MotoTune
- Hardware features
  - Memory layout
  - Processors
- Diagnostic capabilities
- CAN
  - Hardware requirements
  - Function
- CAN bus capacity
  - Arbitration
  - Rules
- Anatomy of a CAN message
- CAN
  - Define standards versus protocols
- “Raw” access versus whole message access
- CAN Message
  - Packing/unpacking
- Example Project
  - CAN based throttle actuator project

Day 3

- Reusable Code
  - Introduction to libraries
  - Build example element
- Palate Tour
  - The rest of MotoHawk
- MotoHawk Components
- Customer model security
- More advanced architecture
  - Annotation
  - Specification
- Engine I/O
  - Encoder
  - Pseudo encoder
  - Crank/cam inputs
  - Fuel injection
  - Spark control
- Simulink libraries
  - Control primitives
  - Application specific libraries
  - Reusability
- AutoDoc introduction
- Multirate subsystems
  - Memory usage
  - Organisation
- Base engine controller

Course venue: Milton Keynes, client offices, or Ann Arbor, Michigan, USA.

Apply to training@automotivemechatronics.com

Automotive Mechatronics provides products and services for the control and calibration of low carbon and hybrid electric vehicles. Automotive Mechatronics is a system integrator for MotoHawk providing technical support within Europe.
www.automotivemechatronics.com