

Internet of Things – Web technologies for Electrical and Electronic Engineers

This is an introductory module for Electrical and Electronic Engineers into the important concepts of the Internet of Things. Engineers work in an environment where their designs and innovations need to be “connected” and this requires knowledge of web technologies that is often outside the scope of traditional engineering programmes.

The module is delivered through a sequence of workshops where an end-to-end system is developed using technologies such as Bluetooth Low Energy (BLE), NodeJS, MQTT, client-side Javascript, SQL and NoSql databases.

To complete the module students require a laptop that can boot from a USB key and that has at least two USB ports. A reasonable knowledge of a high level programming language such as C, C++, Java or Python is also necessary. A basic knowledge of using Linux terminal would also be an advantage.

An outline of the course is as follows:

- Introduction to the BLE standard. Setup of BLE services and characteristics on a BBC Microbit
- Interrogation of BLE services and characteristics from the Linux command line using `bluetoothctl`
- Introduction to asynchronous and event driven programming for IoT using NodeJS
- Interrogation of BLE services and characteristics using the BLE Noble NodeJS module
- Introduction to using MQTT communication protocol for data transfer from constrained devices to an MQTT Cloud based middleware broker.
- Programming using the MQTT NodeJS module
- Introduction to a NoSQL database, MongoDB
- Programming using the MongoDB NodeJS module.