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South East Technological University

Module Descriptor

Internet of Things Applications (Computing and Mathematics)

Internet of Things Applications (A11563)

Short Title: Internet of Things Apps
Department: Computing and Mathematics
Credits: 5 **Level:** Advanced

Description of Module / Aims

Internet of Things (IoT) applications combine low-level physical world devices with higher level IT and cloud-based services. In this module, students learn how to develop software applications with the connectivity and interoperability required for distributed IoT-based applications. The characteristics and requirements of IoT distributed systems is covered in addition to development platforms and technology standards currently used in IoT applications. The overall focus of this module is the practical design and implementation of full stack IoT-enabled distributed applications.

Programmes

		stage/semester/status
COMP-0676	BSc (Hons) in Applied Computing (WD_KACCM_B)	4 / 8 / E
COMP-0676	BSc (Hons) in Applied Computing (WD_KCOMP_B)	4 / 8 / E
COMP-0676	BSc (Hons) in Computer Science (WD_KCMSC_B)	4 / 8 / E
COMP-0676	BSc (Hons) in Physics for Modern Technology (WD_KPHTE_B)	4 / 8 / E
COMP-0676	BSc (Hons) in the Internet of Things (International) (WD_KINTT_BI)	4 / 8 / M

Indicative Content

- IoT Application Fundamentals: Device communication characteristics; Device data characteristics; Event-based integration
- IoT Architectures: Device centric; Cloud centric; Gateway centric
- Development Frameworks and Platforms: IoT-specific Microcontroller Platforms; Cloud-based application development platforms
- IoT-based Services: Device Solution Development kits; Device access and configuration; Cloud based data and operational services integration
- Device and Application interactions (middleware): Device discovery and addressing; Listeners and Message brokers
- Sensor data: Real-time sensor data access; Filtering, aggregation, Time-series archiving

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Design, develop and implement software applications that interconnect heterogeneous physical world devices and sensors, mobile devices, and cloud-based services.
2. Evaluate and use a suitable development platform for IoT applications.
3. Design, develop and implement software APIs that promote scalable, modular access to physical world sensors, actuators and devices.
4. Integrate cloud based data storage solutions with device and sensor data.
5. Integrate suitable messaging, gateway, and middleware solutions to develop applications that provide direct, real-time access to low level devices and sensors.
6. Develop a knowledge discovery based web application that utilises the storage and computational power of the cloud.

Learning and Teaching Methods

- Combination of lectures and computer-based practicals.
- Lectures will cover key topics in IoT application architectures, frameworks, and services.
- Practicals will allow students to explore the tools and technologies used to build and connect that components of an IoT application.

Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	24	
Practical	24	
Independent Learning	87	

Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
Assignment	50%	1,2,3
Assignment	50%	4,5,6

Assessment Criteria

<40%: Unable to explain the key concepts of IoT based distributed applications; unable to successfully apply technologies that provide integration necessary for IoT distributed applications.

40%–49%: Sufficient grasp of the concepts and technology to successfully implement a skeleton IoT based application. Can explain the architecture's use of technology at all layers.

50%–59%: Can design and implement a prototype IoT distributed application, demonstrating a range of styles and technologies. Is competent in the use of the tools, frameworks and components covered in the labs and lectures.

60%–69%: Be able to solve problems within the specific knowledge domain(s) by experimenting with the appropriate skills and tools. Is complete in their understanding and demonstration of the IoT software technology stacks and architecture choices.

70%–100%: All the above to an excellent level. Be able to analyse and design solutions to a high standard for a range of both complex and unforeseen problems through the use and modification of appropriate skills and tools.

Supplementary Material(s)

- McEwan, A. *Designing the Internet of Things.* NY: Wiley, 2014.

Requested Resources

- Computer Lab: BYOD Lab