H8IOTAD: IoT Application Development

Module Code:	H8IOTAD
Long Title	IoT Application Development APPROVED
Title	IoT Application Development
Module Level:	LEVEL 8
EQF Level:	6
EHEA Level:	First Cycle
Credits:	5
Module Coordinator:	
Module Author:	Alex Courtney
Departments:	
Specifications of the qualifications and experience required of staff	Either PhD or MSc in Computer Science or Cognate Discipline

Learning Outcomes

On successful completion of this module the learner will be able to:

#	Learning Outcome Description
LO1	Differentiate the features and the support provided by various hardware development boards and platforms that support development of IoT applications
LO2	Design, implement, and test IoT services and applications using underlying industry standard hardware
LO3	Investigate, evaluate, and contrast how IoT services and applications can be deployed on the WWW.

Dependencies

Module Recommendations

No recommendations listed

Co-requisite Modules

No Co-requisite modules listed

Entry requirements	Learners should have attained the knowledge, skills and competence gained from stage 3 of the BSc (Hons) in Computing.

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Module Content & Assessment

Indicative Content
Introduction to IoT development boards and software platforms Introduction into hardware development boards and software platforms for IoT• Role, features and functionalities of hardware development boards• Programming language support (e.g. Python, Node.js)
Development Boards and Software Platforms (continued) Examples to hardware development boards and platforms for IoT (e.g. Intel Galileo, Arduino, Raspberry Pi). Practical work with above development boards
Programming the IoT Examination of the diversity of Programming approaches to IoT, from high level to low.. Low-level programming language will be explored for example C or C++.
Programming the IoT (continued) Development will be examined with a higher-level programming abstraction such as Python, or Ruby
Application Development for IoT Platforms Practical usage (e.g. home automation control of lights, bicycle odometer). Setup requirements for an IoT platform e.g. Load OS, setup SSH server, setup LAN connectivity. Interfacing hardware: various ways of connecting the devices e.g. GPIO
Application Development for IoT Platforms (continued) Examples of real-life applications developed for Raspberry Pi making use of the hardware device and/or device emulator tool
Programming a "Thing" Programming a low-level 'thing', through the use of lower-level programming languages such as C++• Introduction to low-level Sensor Nodes
Programming a "Thing" (continued) Arduino Linux OS and setup requirements. For example, Arduino IDE e.g., Visual Micro for Microsoft Visual Studio). Arduino Simulator
Programming a "Thing" (continued) Arduino Simulator (continued). Usage of sensor devices with Arduino
Software Applications for Information Processing Processing information transmitted by smart sensors (e.g. healthcare sensors, weather/temperature sensors). Interacting with, and processing information from intelligent tags (e.g. NFC, RFID)
Software Applications for Information Processing Developing web app, e.g. using Google App Engine, in order to make available the information processed by the Arduino• Visualise the information on various computing devices (e.g. laptop, PC, smartphones)
Revision Week Revision of all the above topics

Assessment Breakdown	%
Coursework	100.00%

Assessments

Full Time

Coursework

Assessment Type:	Formative Assessment	**% of total:**	Non-Marked
Assessment Date:	n/a	**Outcome addressed:**	1,2,3
Non-Marked:	Yes		

Assessment Description:
Formative assessment will be provided on the in-class individual or group activities.

Assessment Type:	Continuous Assessment	**% of total:**	40
Assessment Date:	n/a	**Outcome addressed:**	1,2,3
Non-Marked:	No		

Assessment Description:
In class assessments (e.g. in-class quiz-based assessments, practical lab exercises) will evaluate learners' understanding of hardware equipment and IDE tools that may be used to develop IoT services/applications

Assessment Type:	Project	**% of total:**	60
Assessment Date:	n/a	**Outcome addressed:**	1,2,3
Non-Marked:	No		

Assessment Description:
Practical work will be conducted throughout the semester to assess the learner's skills in terms of design, application development for a given case study IoT service, using a hardware development board and its IDE. Practical work will involve working in a team

No End of Module Assessment

No Workplace Assessment

Reassessment Requirement

Repeat examination
Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

Reassessment Description
Coursework Only This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination. Learners who fail this module will be afforded an opportunity to take the repeat module assessment where all learning outcomes will be assessed. Learning EnvironmentLearning will take place in a classroom/lab environment with access IT resources. Learners will have access to library resources, both physical and electronic and to faculty outside of the classroom where required. Module materials will be placed on Moodle, the College's virtual learning environment

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Module Workload

Module Target Workload Hours 0 Hours

Workload: Full Time

Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Classroom & Demonstrations (hours)	24	Every Week	24.00
Tutorial	Other hours (Practical/Tutorial)	24	Every Week	24.00
Independent Learning	Independent learning (hours)	77	Every Week	77.00
			Total Weekly Contact Hours	48.00

Module Resources

Recommended Book Resources

Julien Bayle. (2013), C Programming for Arduino, Packt Publishing.

Simon Monk. (2012), Programming Arduino Getting Started with Sketches, Tab Electronics.

Mark Lutz. (2011), Programming Python, O'Reilly Media.

(2013), , Programming the Raspberry Pi: Getting Started with Python, Tab Electronics, [ISBN: SIMON MONK].

Supplementary Book Resources

Stephen Chin, James Weaver. (2015), Raspberry Pi with Java: Programming the Internet of Things,, McGrawHill Education.

John Oxer. (2010), Practical Arduino Cool Projects for Open Source Hardware,, Aprino.

This module does not have any article/paper resources

This module does not have any other resources

Discussion Note:	