H9SAI: Software Applications for Internet of Things

Module Code:	H9SAI
Long Title	Software Applications for Internet of Things APPROVED
Title	Software Applications for Internet of Things
Module Level:	LEVEL 9
EQF Level:	7
EHEA Level:	Second Cycle
Credits:	10
Module Coordinator:	CRISTINA HAVA MUNTEAN
Module Author:	CRISTINA HAVA MUNTEAN
Departments:	School of Computing
Specifications of the qualifications and experience required of staff	

Learning Outcomes	
On successful completion of this module the learner will be able to:	
#	**Learning Outcome Description**
LO1	Compare and contrast the features and the support provided by various hardware development boards and platforms that support development of IoT applications
LO2	Design, develop and test IoT services/ applications using the underlying hardware components
LO3	Investigate how IoT services/applications can be deployed on the Web

Dependencies
Module Recommendations
No recommendations listed
Co-requisite Modules
No Co-requisite modules listed

Entry requirements	

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Module Content & Assessment

Indicative Content

Introduction hardware development boards and software platforms forIoT
Introduction into hardware development boards and software platforms for IoT (10%) • Role, features and functionalities of hardware development boards • Programming language support (e.g Python , Node.js) • Examples of hardware development boards and platforms for IoT (e.g. Intel Galileo, Arduino, Raspberry Pi, etc.)

Python Programming language
Python Programming language (20%) • Python Basics: Numbers, Variables, loops, if and while statements, • Strings, Modules, Classes and Methods • Files, Pickling, Internet • Example of applications implemented with Python

Application Development for Raspberry Pi
Application Development for Raspberry Pi (20%) • Device description and practical usage (e.g. home automation control of lights, bicycle odometer) • Commonly used OS on Raspberry Pi (e.g. Raspbian, Linux, Android) • Setup requirements (e.g. Load OS, setup SSH server, setup LAN connectivity) • Interfacing hardware: various ways of connecting the PI to electronic devices though GPIO • Extending the functionally of Raspberry Pi with Arduino • Examples of real-life applications developed for Raspberry Pi making use of the hardware device and/or device emulator tool

Application Development for Intel Galileo
Application Development for Intel Galileo (20%) • Device description and practical usage (e.g. WiFi based applications, sensors, tags) • Arduino Linux OS and setup requirements • Arduino Integrated Development environments (e.g. Visual Micro for Microsoft Visual Studio) • Example of real-life applications developed for Intel Galileo making use of Arduino IDE

Software Applications for Information Processing
Software Applications for Information Processing (30%) • Processing information transmitted by smart sensors (e.g. healthcare sensors, weather/temperature sensors) • Interacting with tags and processing information transmitted by intelligent tags (e.g. NFC, RFID) • Linking Arduino with Google App Engine (e.g. developing webapp using Google App Engine in order to make available on the web the information processed by the Arduino • Visualise the Arduino web deployed information on various computing devices (e.g. laptop, PC, smartphones)

Assessment Breakdown	%
Coursework	100.00%

Assessments

Full Time

Coursework

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

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

Assessment Type:	Project (0050)	% of total:	40
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 an hardware development board and its IDE. Practical work will involve working in a team

No End of Module Assessment

No Workplace Assessment

Reassessment Requirement

Coursework Only
This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.

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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	No Description	2	Every Week	2.00
Tutorial	No Description	2	Every Week	2.00
Independent Learning Time	No Description	17	Once per semester	1.42
			Total Weekly Contact Hours	4.00
Workload: Part Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	No Description	2	Every Week	2.00
Tutorial	No Description	2	Every Week	2.00
Independent Learning Time	No Description	17	Once per semester	1.42
			Total Weekly Contact Hours	4.00

Module Resources

Recommended Book Resources

Simon Monk. (2013), Programming the Raspberry Pi: Getting Started with Python, Tab Electronics.

Mark Lutz. (2011), Programming Phyton, 4th. O'Reilly Media.

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

Supplementary Book Resources

Sean McManus. (2013), Raspberry Pi For Dummies, 1st. John Wiley & Sons.

John Nussey. (2013), Arduino For Dummies, 1st. John Wiley & Sons.

This module does not have any article/paper resources

Other Resources

[website], Qemu: Raspberry Pi emulator for Windows,
http://sourceforge.net/projects/rpiqemuw indows/

[website], Arduino Integrated Development Environment (IDE),
https://learn.sparkfun.com/tutorials/ins talling-arduino-ide

[website], Visual Micro - Arduino IDE for Microsoft Visual Studio and Atmel Studio (free),
http://www.visualmicro.com/ http://playground.arduino.cc/Code/Visual Micro

[website], Intel® Galileo Gen 2 Development Board,
http://www.intel.ie/content/www/ie/en/do -it-yourself/galileo-maker-quark-board.h tml

Discussion Note: