Module Specification

Embedded Systems Programming

Version: 2021-22, v2.0, 21 Sep 2021

Contents

Part 1: Information

Module title: Embedded Systems Programming

Module code: UFCFBS-15-2

Level: Level 5

For implementation from: 2021-22

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Computer Sci & Creative Tech

Partner institutions: None

Delivery locations: Frenchay Campus

Field: Computer Science and Creative Technologies

Module type: Standard

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module explores the background and some of the fundamental characteristics of embedded systems. Based on this knowledge will develop solutions to problems involving such systems.

Features: Not applicable

Educational aims: This module aims to equip the students with an appreciation of the particular characteristics of embedded systems and to enable them to build and manipulate such systems.

Outline syllabus: In this module you will cover the following areas:

The history of embedded systems and mobile computing.
Architecture of low powered mobile systems, exemplified by the ARM Cortex-M series processors.
The nature of security in embedded and network systems

Cross development and cross compilation Booting embedded systems JTAG - controlling dead or locked systems, recovering data - system initialization, security implications Memory technologies at the device level - Flash, SD

Data communications – serial data comms, SPI I2C

Networking technologies - wired and wireless

Configuring, building and booting embedded OS

File systems for embedded systems on a range of devices

Open source development methodologies. Working in OS communities, responsibilities, professionalism and legal implications.

Power saving features of mobile and embedded systems: Booting, suspending, sleeping and hibernating

Part 3: Teaching and learning methods

Teaching and learning methods: The module will be delivered through a combination of lectures, demonstrations, practicals and tutorials. Some of the tutorials will be student-led.

The lectures will be supported by weekly practical sessions in which the students have the opportunity to apply some of the concepts discussed during the lecture. The practicals will allow the students to explore and debug mobile devices and/or device simulations using a range of tools.

In addition, laboratory exercises will allow the student to gain familiarisation with the tools and techniques required for the implementation and verification of safe embedded systems.
Students will be expected to demonstrate self-direction and originality in their learning which will be facilitated through student directed tutorials.

Module Learning outcomes:

MO1 Discuss the characteristics of secure, low-powered mobile and embedded technology

MO2 Analyse and manipulate higher-level software architectures, file systems and memory

MO3 Develop software for mobile and embedded devices for a range of purposes

MO4 Explore and evaluate booting, system initialisation and data communication methods in a range of devices

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/027B7927-D8A4-9012-87CA-7AD8F23E356A.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: Students will develop their embedded programming skills through a series of graded problems. The problems are presented as a series of worksheets of increasing difficulty. The problem solution will be assessed through a demonstration and discussion Students will receive feedback at the demonstration and are expected to use this feedback to improve their performance on subsequent exercises. Once a problem has been demonstrated, the exercise will be signed off and the sign off sheet will be handed in as evidence that the work has been completed.

The underpinning theoretical understanding of tools and technologies will be assessed through the 2 hour examination. In the exam, students will also need to demonstrate that they recognise how to use these tools and technologies effectively

The same assessment strategy is used in the referral with the exception that, for the referral coursework students will be required to provide evidence of their achievements on the practical worksheets rather than an in person demonstration.

Assessment components:

Examination (Online) - Component A (First Sit)
Description: Online Exam
Weighting: 60 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO4

Practical Skills Assessment - Component B (First Sit)
Description: A series of graded practical tasks.
Weighting: 40 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Online) - Component A (Resit)

Description: Online Exam

Weighting: 60 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO4

Practical Skills Assessment - Component B (Resit)

Description: Series of graded practical tasks, evidenced by code and screen shots.

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Computer Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21

Computer Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21