Module Specification

Digital Design

Version: 2023-24, v2.0, 17 Jan 2023

Contents

Part 1: Information

Module title: Digital Design

Module code: UFCFCS-30-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Computer Sci & Creative Tech

Partner institutions: None

Field: Computer Science and Creative Technologies

Module type: Module

Pre-requisites: Introductory Audio Programming 2022-23, Principles of Programming 2022-23

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Pre-requisites: students must take one out of UFCFF4-30-1 Introductory Audio Programming or UFCFHS-30-1 Principles of Programming

Digital Design combines the approaches of Physical Computing and Product Design. The course makes no assumes that students have little or no prior knowledge in one or more of the associated subjects of electronic control and feedback systems but

requires some previous programming experience. The module takes an active learning approach, with most of the real work happening in the workshops and programming and interacting with your peers and tutors. A broad overview of tools and techniques used in Physical Computing and Product Design will be provided, with emphasis on mechanisms.

Features: Not applicable

Educational aims: This module aims to build on the students' programming knowledge and extend that into the area of smart devices.

Outline syllabus: Prototyping

Lo-fi and Hi-fi

Electrical circuit design

Paper circuits, E-textiles, and Printed Circuit Boards (PCBs)

PCB design and fabrication

Tools such as KiCAD and Eagle for PCD design

Soldering and other tools for PCB manufactory

2D Graphics Software and 3D Computer Aided Design tools for product design, e.g. Adobe Illustrator and Solidworks.

Prototype design Physical Systems, including laser cutting and 3D printing.

Sensors and actuators, e.g. buttons, capacitive touch, LEDs, conductive threads, electric motors, gears, planar linkages, and bearings.

Introduction to industrial design in the context of smarts systems.

Engineering methodologies for smart devices

Part 3: Teaching and learning methods

Teaching and learning methods: Laboratory exercises will allow students 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.

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

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Demonstrate design process methodologies and how they are used in human-centered design approach

MO2 Discuss the characteristics and processes involved in designing a smart digital device.

MO3 Design, specify, and build a range of electrical circuits.

MO4 Plan and create lo-fi and hi-fi prototyping to explore, test and validate smart digital device concepts

MO5 Apply a range of design tools and methods within categories of design process and types of design communication for smart digital devices

MO6 Analyse a product and related system in the context of sustainability principles

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Frl.talis.com%2F3%2Fuwe%2Flists%2FD3BAAFB1-0018-68C8-62EC-73947AB7B362.html%3Flang%3Den-GB%26login%3D1&data=02%7C01%7CElias.Pimenidis%40uwe.ac.uk%7Ccd913533534e403ebc0908d7afb4b1ad%7C07ef1208413c4b5e9cdd64ef305754f0%7C0%7C0%7C637171062922461404&sdata=dJoJyB3U%2BbuQnXODWh5xpkrc7cKVD4ecmgwLNqNmwh4%3D&reserved=0

Part 4: Assessment

Assessment strategy: Students will be supported in their learning through formative assessment, achieved through the demonstration and discussion of their solutions to the graded problems in the worksheets.

Part 1

Students complete a series of worksheets which enable them to build on and demonstrate the skills developed around each tool used and taught on the course. For example, they will learn how to use some 3D design software, and for the worksheets they will be asked to modify some existing designs. This is essentially a portfolio assessment culminating in a single mark.

An essay encapsulating and reflecting on the learning from the worksheets approx 1500 words.

Part 2 - Building a prototype system

Students to work individually to design an artefact relevant to the theme of Smart Devices. They will be expected to demonstrate practical application of the design principals covered in the module.

Students will be assessed on the design and implementation of their project through delivered design documents, and the demonstration of the physical artefact with a Q and A session. One set of documents and demo expected per project (individual) Students will be following a template to guide documentation.

For the referral coursework the students will be required to provide evidence of their achievements on the practical worksheets. They will also either rework their project, or be given a suitably sized task to complete, and will present their artefact through a video if required, with Q and A.

Assessment tasks:

Portfolio (First Sit)
Description: Portfolio to include practical individual coursework demonstration (5 to 6 minutes)and signoff and documentation reflecting on skills acquired in practical sessions.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO3, MO4, MO5

Practical Skills Assessment (First Sit)
Description: Creation and demonstration (5 to 6 minutes) of artefact with design documentation and Q and A session.
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Portfolio (Resit)
Description: Evidence of completed practical worksheets. The evidence will be provided by the submission of a video, or a demonstration (5 to 6 minutes) or via some other verifiable method.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO3, MO4, MO5

Practical Skills Assessment (Resit)
Description: Assessment and feedback of product development, with final demonstration (5 to 6 minutes). Submission will include video for demonstration.
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Computer Science [Villa] BSc (Hons) 2022-23

Computer Science [Frenchay] BSc (Hons) 2022-23

Computer Science {Foundation}[Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Computer Science {Foundation}[Sep][SW][Frenchay][5yrs] BSc (Hons) 2021-22

Computer Science (Smart Devices) {Foundation}[Oct][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science (Smart Devices) {Foundation}[Feb][FT][GCET][4yrs] BSc (Hons) 2021-22