SM3610: HARDWARE HACKING

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Hardware Hacking

Subject Code
SM - School of Creative Media

Course Number
3610

Academic Unit
School of Creative Media (SM)

College/School
School of Creative Media (SM)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
For BScCM students: (CS1103 Introduction to Media Computing and CS1303 Introduction to Internet and Programming) or CS2313 Computer Programming

For BACM & BAS students: SM2705 Creative Media Studio III: Technology, Space and Intangible Media OR SM2716 Physical Computing and Tangible Media

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This is a workshop based programme to provide an interactive environment to practice the knowledge of basic computer organization to installation art. Through the exploration of robotics and embodied system programming, students are expected to be able to construct simple electronics circuits and make simple modifications to existing electronic devices, in order to adapt existing hardware to suit their needs. The course aims to prepare students to further research into the area of installation art and electronic creative works. This course assumes no prior knowledge of electronics but require fundamental programming skills such as basic C/C++ or java programming.

The definition of hacking used for this course:

"In home computing, a hacker is a person who heavily modifies the software or hardware of their own computer system. It includes building, rebuilding, modifying and creating software (software cracking, demo scene) and electronic hardware (hardware hacking, modding) either to make it better, faster, give added features or to make it do something it was never intended to do."

[Hacker (hobbyist). (2010, April 12). In Wikipedia, The Free Encyclopedia. Retrieved 10:36, May 17, 2010, from http://en.wikipedia.org/w/index.php?title=Hacker_(hobbyist)&oldid=355505096]

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify and explain the use of key electronic components, circuits and theories.			x	
2	Create electronic artworks or products as embedded system controlled with microprocess.			x	
3	Adapt existing hardware, create software and/or hardware extensions for use in an electronic artwork.		x	x	x
4	Document and present learning achievements, challenges and the creation of an electronic artwork.		x		x
5	Create technical documentations and exhibition-oriented maintenance instructions.		x		x
6	Assign or link up extra self-initiated tasks on top of an assignment / coursework for further exploration of the subject		x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture & In-class practice	Practical sessions and lecture on the use of key electronic components, circuits and theories.	1, 6	
2	Lecture & In-class practice	Practical sessions and lecture on the embedded system and microprocessor.	2, 6	
3	Lecture & In-class practice	Presentation of relevant examples of media art works and demonstration of design and modification of simple electronic circuits.	3, 6	
4	Group project	Practical sessions, group tutorials and critique sessions on the students' proposed projects. Presentation and lecture on production of project documentation.	4, 6	
5	Group project	Presentation of different examples of documentations and pair-based exercises on how to setup and maintain works in an exhibition context.	5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	In-class practical exercises on the practical application of theories, circuits and electronic components.	1	10	-	Yes
2	Creation of an electronic work with the use of microprocessor and embedding programming skills.	2	20	-	Yes

3	Creation of an electronic work based on existing hardware devices and concepts presented in class.	3	20	-	Yes
4	Creation and presentation of a final electronic work based on knowledge gathered during the course.	4, 6	50	-	Yes
5	Creation of a blog related to the course that should be maintained and updated throughout the course relating the challenges faced, the personal research and the final results.	4	0	Part of final project	Yes

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)

Assessment Task

1. In-Class Exercises

Criterion

Ability to understand the basic principle of electronic theories, circuits and electronic components.Ability to complete the assigned tasks.

Excellent (A+, A, A-)

- Active in-class participation, positive listening, strong ability to stimulate class discussion and comment on other points
- In-depth pre-class preparation and familiarity with peer reports and other materials
- Interpret others' views with an open mind and ready to negotiate
- Readiness to share personal insight via analysis and synthesis with informed views
- Constructively critical, thus facilitating the discovery of new issues

Good (B+, B, B-)

- Active in-class participation, positive listening, ability to initiate class discussion and comment on other points

- Adequate pre-class preparation and familiarity with peer reports and other materials
- Interpret opinions effectively

Fair (C+, C, C-)

- Attentive in in-class participation, listening with comprehension, but only infrequently contributing
- Adequate pre-class preparation but little familiarity with peer reports and other materials
- Fair ability in interpreting opinions

Marginal (D)

- Unmotivated to participate in class discussion or comment on other people’s views
- Little pre-class preparation and familiarity with peer reports and other materials
- Poor ability in interpreting opinions

Failure (F)

- Unwilling to participate in class discussion and comment on other points, even when requested by the teacher
- No pre-class preparation and familiarity with peer reports and other materials
- Minimal ability in interpreting opinions

Assessment Task

2. Electronic Work Creation

Criterion

Ability to create basic circuits with electronic components and sensors.

Ability to adopt existing resources to develop software for controlling microprocessor and other components.

Excellent (A+, A, A-)

- Work has strong affective quality and the articulation of personal styles and signature
- Excellent appreciation, exploration and/or application of the aesthetic and expressive qualities of the medium
- Work raises questions and instill insights about the process of conception, creative strategization and production
- Innovative exploration by combining knowledge from different disciplines (e.g. mathematics, psychology, physics, anthropology, etc.) to create an inter-disciplinary project
- Efficient adjustment of plans and strategies in response to resources (time, space, equipment, etc) available with constructive adjustment

Good (B+, B, B-)

- Strong appreciation, exploration and/or application of the aesthetic and expressive qualities of the medium
- Ability to create project/ work that demonstrate the processes of thinking and creative exploration
- Proper adjustment of plans and strategies in response to resources (time, space, equipment, etc) available and constructive feedback/ suggestions

Fair (C+, C, C-)

- Basic appreciation and/or application of the aesthetic and expressive qualities of the medium
- Limited ability to create project/ work that demonstrate the processes of thinking and creative exploration
- Adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

Marginal (D)

- Marginal appreciation of the aesthetic and expressive qualities of the medium
- Marginal ability to create project/ work that demonstrate the processes of thinking and creative exploration
- Limited adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

Failure (F)

- No appreciation of the aesthetics and expressive qualities of the medium
- Fail to create project/ work that demonstrate the processes of thinking and creative exploration

- Minimal adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

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Assessment Task

3. Group Project and Presentation

Criterion

Ability to design, evaluate and implement electronic media work with microcontroller, sensors and other components.

Ability to explain in details the idea and background, methodology, implementation and references in creating the electronic media work of the group project.

Excellent (A+, A, A-)

- Rich, informative content, excellent grasp of the material with in-depth and extensive knowledge of the subject matter
- Rigorous organization, coherent structure, and systematic exposition with a strong sense of narrative
- Superior presentation skills: distinct pronunciation, fluent expression and appropriate diction, exact time-management
- Critical analysis with insightful comments opening up new issues, or suggesting the ability to theorize

Good (B+, B, B-)

- Adequate content with firm grasp of the material that informs the audience on a subject matter
- Reasonable organization, balanced structure and composition
- Good verbal communication: comprehensible pronunciation, fluent expression and diction, fair time-management

Fair (C+, C, C-)

- Adequate content with comprehensive grasp of the material demonstrating basic knowledge of the subject matter
- Fair organization, weak structure and composition
- Fair presentation skills: acceptable pronunciation, expression and diction, fair time-management

Marginal (D)

- Weak content, loose grasp of the general ideas with some knowledge of the subject matter
- Poor organization, structure and composition
- Poor presentation skills: marginal pronunciation, expression and diction, poor time-management

Failure (F)

- Inadequate content, fail to identify the general ideas with knowledge of the subject matter
- No organization, structure or/and composition
- Poor presentation skills: marginal pronunciation, expression and diction, minimal time-management

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Assessment Task

4. Course Blog

Criterion

Ability to organize the collected materials and regularly maintain and update the blob.

Capacities for self-directed learning and research to understand challenges faced and solve the problems in the development of group project.

Excellent (A+, A, A-)

- Excellent grasp of materials, ability to explain key concepts, assumptions, and debates, demonstrating sound knowledge of the field
- Rich content, exceptional ability to integrate various resources into primary and secondary levels based on demand;
- Design and conduct research which is firmly built on thorough knowledge of existing theoretical frameworks
- Evaluative judgments about existing research and demonstrate application of strong critical thinking skills

· Strong ability to approach a text or a theme using a variety of theories and analytical tools
· Strong organization of research findings with effective organization and procedural clarity at the same time demonstrating the importance of the process
· Insightful suggestion of how the research findings may lead to future research

Good (B+, B, B-)

· Firm grasp of materials, ability to explain key concepts and assumptions
· Adequate content, strong ability to integrate various resources into primary and secondary levels based on demand;
· Design and conduct research which is built on thorough knowledge of existing theoretical frameworks
· Appropriate judgments about existing research and demonstrate application of critical thinking skills
· Ability to approach a text or a theme using a variety of theories and analytical tools

Fair (C+, C, C-)

· Comprehensive grasp of materials, able to explain key concepts
· Adequate content, fair ability to integrate various resources into primary and secondary levels based on demand
· Design and conduct research which is built on knowledge of theoretical frameworks
· Appropriate judgments about existing research
· Weak ability to approach a text or a theme using a variety of theories and analytical tools

Marginal (D)

· Loose grasp of materials, cannot explain key concepts
· Weak content, with primary and secondary levels
· Design and conduct research which is appropriate for the research objective
· Marginal judgments about existing research
· Poor ability to approach a text or a theme using a variety of theories and analytical tools

Failure (F)

· Poor grasp of materials
· Inadequate content, without primary and secondary levels
· Fail to design and conduct research which is appropriate for the research objective
· Fail to make reasonable judgments about existing research
· Fail to approach a text or a theme using a variety of theories and analytical tools

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Additional Information for AR

All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

Part III Other Information

Keyword Syllabus

Advanced installation technique; Installation organisation; Interactivity; Creative Electronics; Robotics; Hardware; Hacking; Microprocessor; Sensors; Circuit; Embedded Programming.

Reading List

Compulsory Readings

	Title
1	Banzi, Massimo. Getting Started with Arduino, 2nd Edition. Make, 2011.
2	Noble, Joshua. Programming Interactivity, 2nd Edition. O'Reilly Media, Inc., 2012.

Additional Readings

	Title
1	Igoe, Tom. Making Things Talk: Practical Methods for Connecting Physical Objects. Make, 2007.
2	Horowitz & Hayes. Art of Electronics: Art Electronics, Standard Manual. Cambridge University Press, 1995.
3	Michael Margolis. Arduino Cookbook, 2nd Edition. O'Reilly Media, Inc., 2011.
4	Forrest M., III Mims. Getting Started in Electronics.
5	Forrest M., III Mims. Electronic Sensor Circuits & Projects.
6	MAKE: magazine http://www.makezine.com
7	Arduino http://www.arduino.cc
8	Adafruit Industries http://www.adafruit.com
9	Instructables http://www.instructables.com
10	CRAFT: magazine http://www.craftzine.com
11	MIT Media Lab http://www.media.mit.edu
12	Sparkfun Tutorials http://www.sparkfun.com/commerce/tutorials.php