Subject Description Form

Subject Code	EIE3128
Subject Title	IoT Workshop & Project
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite ENG2002 Computer Programming EIE2113 Introduction to Internet of Things
Objectives	At a mid-stage of the programme, this subject plays the role of applying knowledge acquired in other subjects in an integrated manner. While the emphasis will be placed on the technical challenges that may encompass system integration, software development and troubleshooting, students will also be given opportunities to face various non-technical difficulties behind the development of Internet-of-Things (IoT) systems.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand technical knowledge specific to IoT systems and applications. 2. Design effective and reliable software programs, and integrate them into hardware platforms to achieve the objectives of a project. 3. Critically evaluate different alternatives and strategies when implementing a project. 4. Locate and resolve practical problems in an IoT system and the related hardware/software. Category B: Attributes for all-roundedness 5. Search, self-learn and try untaught solutions. 6. Exercise discipline and time-planning to meet deadlines. 7. Present ideas and findings effectively. 8. Work with others in a team collaboratively and exercise leadership.

Subject Synopsis/ Indicative Syllabus	**Syllabus / Operation:** The project(s) shall be of software development and system integration in nature with defined milestones (or Subtasks). The scope to be covered will be IoT system design, but does not exclude the possibilities of extending into areas such as artificial intelligence and robotics. The project will not be close-ended in nature and will provide ample headroom for the more enthusiastic students to excel. Students will work in groups of two or three. Each Subtask will be given a certain period of time to complete. Progress will be measured by functional **Demonstrations**, and one or two written **Progress Reports**. Upon the completion of the project, each group will give a demonstration / presentation of the completed system and submit a **Final Report**. Students are required to individually keep a **Logbook** on the work performed during the entire period. The logbooks are to be evaluated and signed by the supervisor /assessor on a monthly or more frequent basis. At the end of the project, the logbooks will be collected and graded. **Lectures:** Lectures are to be conducted at the beginning of the semester. During these lectures, the instructor shall provide an overview of IoT systems and applications, and give clear explanation on the functional and technical requirements on the project, with a schedule for submitting deliverables. Concepts specific to the project(s), which are not yet learnt by the students, are to be covered in these lectures. Concepts behind critical use of tools and equipment will also be strengthened. Copies of supplementary/reference material will be distributed, or, links to on-line material will be provided for self-paced learning. **Guided Laboratory Experiments:** The project will normally require the students to learn to use specific tools and/or equipment. Laboratory demonstrations and exercises will be arranged in the early weeks. Below are some examples: 1. Use of the project-specific IoT development kit and tools. 2. Implementation of the basic framework of the IoT system. 3. Software techniques to optimize the performance of the IoT system. **Self-Paced Work:** Multiple sessions of laboratory will be scheduled to cater for self-paced work in the laboratory, particularly during the second half of the semester. To ensure the students are working in a correct direction, defined milestones are given in the course of their work. Students are required to demonstrate their works at each milestone to show their progress.

Teaching/Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures	1, 2, 3, 4	Principles and key concepts of the IoT platform used in the project are explained to students. Uses of tools are demonstrated. The goals are specified. The various problems to be encountered are explained.
Supervised Laboratory Sessions	1, 2, 3, 4	Students need to learn to implement an IoT system with the provided hardware platform. They also need to learn to use the provided software modules and expand them to accommodate new functionalities.
Extended Self-paced Laboratory Work	1 - 8	Students will work in teams of two or three to construct an IoT system. They need to learn to implement an IoT system with the provided hardware platform. They also need to use the provided software modules and expand them to accommodate new functionalities.

Assessment Methods in Alignment with Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)							
		1	2	3	4	5	6	7	8
Continuous Assessment	100%								
• Lab Reports	25%	✓	✓	✓	✓				
• Logbook & Reports	25%	✓	✓	✓	✓	✓	✓	✓	✓
• Progress & Final Demonstration	50%	✓	✓	✓	✓	✓	✓	✓	✓
Total	100%								

Assessment on individual student's ability and contribution will be conducted, according to the attributes detailed below.

INSIGHT	as evidenced by how well the concepts are understood
CREATIVITY	as evidenced by ingenuity and imagination
WORKMANSHIP	as evidenced by how well ideas are implemented and how problems are resolved
DRIVE	as evidenced by initiative, diligence and tenacity
COMMUNICATION	as evidenced by an ability to express ideas clearly and succinctly
MANAGEMENT	as evidenced by how time, manpower and other resources are effectively used

At the completion of each subtask, team members will be asked to give a demonstration to the assessor. Based on the presentation and response to questions addressed to the members, the assessor will rate the contribution, achievement, and performance of each member. Other assessment items include lab reports, logbook, progress report, final demonstration, report and presentation.

<table>
<tr><td></td><td colspan="2">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
<table>
<tr><th>Specific Assessment Methods/Tasks</th><th>Remark</th></tr>
<tr><td>Lab Reports</td><td>To measure the students' understanding of the theories and concepts as well as some practical issues in their subject materials.</td></tr>
<tr><td>Progress & Final Demonstrations</td><td>Students need to think critically and creatively in order to come up with good alternate solution for an existing problem. Oral examination on the approach taken will be conducted for each group member to evaluate his contribution, technical knowledge and communication skills.</td></tr>
<tr><td>Logbook & Reports</td><td>Each group of students is required to produce one or two progress reports and a final report. Accuracy and the presentation of the reports will be assessed. Each group needs to explain in the reports the solutions they plan to use or have been used in the project. The reason behind of choosing such solutions should also be exemplified. The students also need to explain how the limited resources are used in the project and how the team members work together to achieve the project goal. Logbooks are assessed to evaluate contributions and the quality of records on the progress.</td></tr>
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<tr><td rowspan="9">Student Study Effort Expected</td><td>Class contact (time-tabled):</td><td></td></tr>
<tr><td>• Lectures</td><td>12 Hours</td></tr>
<tr><td>• Laboratory</td><td>12 Hours</td></tr>
<tr><td>• Mini-project / Meetings / Presentation</td><td>15 Hours</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Revision</td><td>12 Hours</td></tr>
<tr><td>• Additional laboratory work</td><td>12 Hours</td></tr>
<tr><td>• Mini-project Work / Presentation / Report writing</td><td>42 Hours</td></tr>
<tr><td>Total student study effort:</td><td>105 Hours</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Textbook:

1. R. Buyya, A. V. Dastjerdi, Internet of Things: Principles and Paradigms. Morgan Kaufmann, Cambridge, MA, USA, 2016.
2. C. Dow, Internet of Things Programming Projects: Build modern IoT solutions with the Raspberry Pi 3 and Python. Packt Publishing, Birmingham, UK, 2018.

Reference Materials:

1. Selected Reading from recent issues of IEEE Journals and Transactions.
2. Other materials to be specified by the subject lecturer for each project.</td></tr>
<tr><td>Last Updated</td><td colspan="2">October 2022</td></tr>
<tr><td>Prepared by</td><td colspan="2">Dr Yuyi MAO, Dr Liang LIU</td></tr>
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