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|  | | **ASSIGNMENT COVER PAGE** | | | C:\Users\hoching.tay\Desktop\Lincoln_UK_06092017-01.png |
| **Programme** | | | **Course code and title** | | |
| Bachelor of Computer Science (Hons)/  Bachelor of Computer Science (Hons) in Computer and Network Technology/  Bachelor of Information Systems (Hons)/  Bachelor of Software Engineering (Hons) | | | CET3063/N/CET3064 Internet of Things | | |
| **Student’s name / student’s ID** | | | **Lecturer’s name** | | |
|  | | | Dr. Khoo Hee Kooi | | |
| **Date issued** | **Submission deadline** | | | **Indicative weighting** | |
| 13rd February 2023  (Week 3) | 6th March 2023 (Week 6) | | | 30% | |
| **Assignment 1 title** | Implement an IoT system (400 words) | | | | |
| This assessment assesses the following course learning outcomes | | | | | |
| **# as in course guide** | **UOW Malaysia KDU Penang University College learning outcomes** | | | | |
| **CLO1** | Review the various components of Internet of Things (IoT) at various scales. | | | | |
| **CLO2** | Evaluate and design IoT system architecture for a real world application. | | | | |
| **CLO3** | N/A | | | | |
| **CLO4** | N/A | | | | |
| **# as in course guide** | **University of Lincoln learning outcomes** | | | | |
| **CLO1** | Critically evaluate the strengths, weaknesses, and resource constraints of IoT computing systems in comparison to traditional computing models | | | | |
| **CLO2** | Design and implement a connected prototype IoT software system that utilises sensor data | | | | |
| **CLO3** | Implement industry standard IoT messaging protocols | | | | |
| **CLO4** | N/A | | | | |
| **Student’s declaration** | | | | | |
| I certify that the work submitted for this assignment is my own and research sources are fully acknowledged.  Student’s signature: Submission date: | | | | | |

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| **Dates and mechanisms for assessment submission and feedback** | |
| **Mechanism for handout to students** | Microsoft Teams |
| **Mechanism for submission of work by student** | *Soft copy online submission.*  ***Question 1:*** *Report file,* ***report.pdf*** *based on the submission arrangement section, via TurnItIn.*  ***Question 2:*** *Project file (A zip file,* ***code.zip*** *which includes Arduino file(s),* ***\*.ino****, and a video file,* ***\*.mp4*** *to show the functionality of the IoT system), via Microsoft Teams.* |
| **Date by which work, feedback, and marks will be returned to students** | 20th March 2023 |
| **Mechanism for return of assignment work, feedback and marks to students** | Feedback will be provided by a marking template. This will be available to students via Microsoft Teams. The discussions at the walkthroughs will also provide informal feedback |

# COURSEWORK SUBMISSION GENERAL INFORMATION

# Academic integrity statement

You must adhere to the university college regulations on academic conduct. Formal inquiry proceedings will be instigated if there is any suspicion of plagiarism or any other form of misconduct in your work. Students must **not** collude with other students or plagiarise their work.

# Nature of the submission required

A soft copy of your assignment save in **PDF version** should be submitted to lecturer, no later than the date and time stipulated on the cover sheet. In addition, Word document copy of your work must be submitted to TurnItIn. The first page of your report, immediately after the cover page, must be a page from TurnItIn clearly showing your name and your originality score (Please refer to [submission arrangement](#_Submission_arrangement)). Resubmission must be committed, if the submitted report exceeded **20%** of TurnItIn originality, otherwise **10 marks** will be deducted for plagiarism.

Diagrams may be used where they are helpful to support your arguments or description. If they are not your own work, the source must be cited and referenced. Please help us to handle and mark your work efficiently.

# Documentation guidelines

Student is required to submit a **soft copy** of the report and ensure that it uses the following formatted styles: 1) Font family: **Arial (For all pages in the report)**, 2) Font size: **12** **points (1em)**, 3) Line spacing: **2.0**, and 4) Page layouts: **Justify**. Please make sure you have proper format alignment for all paragraphs, following standard writing style and use **Harvard citation style** for references and citations. Please include a **header** with the following information: **Student ID, student name, course code, and assignment type**. Please also include a proper cover page for your submission which contains information about the students, assignment, course, and department with UOW Malaysia KDU Penang University College and University of Lincoln (UoL) logos on top. Also include page number and references, which are shown on the last page, before marking rubric.

# Penalties for late submission

For late submission of this assignment, a penalty of a reduction by 10% of the maximum mark may be applicable for each calendar day or part thereof that the submission is late. An Assignment submitted more than **ten** calendar days after the deadline will have a mark of zero recorded for this assignment.

# Submission arrangement

1. Cover page
2. TurnItIn similarity report
3. Table of content
4. Main report
5. References or bibliography (whichever applicable)
6. Marking rubric (in landscape orientation)

# Assignment instructions/ Background

**Implement an IoT system (30%)**

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| **Maximum number of students** | One (Individual) |

**Introduction**

Internet of things (IoTs) is a system which connects the relevant devices to perform operations, such as control, monitor, optimise, and even make a prediction based on the collected data. Its application is fairly broad for Internet-based systems, which cover almost any area as part of the Industrial 4.0 framework. Cardiovascular disease is one of the main factors that lead to human fatality. There is a high correlation for this disease to form, due to either unhealthy food intakes, lack of exercises, regularly smoke, genetically inheritance, or the mixture of those. The early diagnosis for this disease could potentially alert the patients to change their daily habits, to prevent high resting heart pulse occurred.

**Question 1: Reviews on an IoT system (Score: 50%)**

Analyse a heart rate monitoring system in the aspects of finite-state machine (FSM), sensors involved, functional requirements, and non-functional requirements. The FSM diagram should comprise the four layers, which are the sensor, network, platform, and application. The scope of measurement includes the heart rate, which is the beats per minute(bpm), *bpm* = 60(*c* - *l*)/ 1000, where *c* is the current time and *l* is the time from the previous beat. Next, identify the hardware components which are required to build a heart rate monitoring system for at least two controllers. Then, compile the total cost in a bill of materials (BOM). For each item in BOM, you are required to carefully justify the purpose of usage to prevent the wastage of budget during the procurement of materials. Note that any figures or images which have been borrowed should be properly cited and referenced. This technical report should not exceed **400 words threshold**, which includes the FSM diagram. Module tutor will not consider reading the report after the threshold.

**Question 2: Develop an IoT system (Score: 50%)**

Build a heart rate monitoring system using the available hardware components based on the approved BOM. Then, write Arduino sketch to program the microcontroller unit (MCU) to communicate with the sensors and feedback involved. Note that both hardware and software built should cover the aspects of sensor, network, platform, and application layers. Record a maximum five-minute video to demonstrate the functionality of this system. In addition, you are required to strictly follow the standard procedures taught during the lab sessions to ensure the longevity of the hardware components, for each time in performing the assembly and integration of the hardware components.

**Important note:** It is critically important that one must not attempt to either assemble or operate any high voltage electrical appliance, without proper supervision from the course lecturer or respective tutors. The department shall not bear any responsibility for any incident that happened, without proper risk assessments, approved by the department beforehand.

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| **CET3063/N/CET3064 Internet of Things**  **MARKING RUBRIC**  **Assignment 1**  **Implement an IoT system (Weighted marks: 30%)** | | | | | | | |
| **Question 1: Reviews on an IoT system (Score: 50%)** | | | | | | | |
| **LEARNING OUTCOME** | **MARKING CRITERIA** | **SCALE** | | | | | |
| **Failed**  **(0% to 49%)** | **3rd class**  **(50% to 59%)** | **2nd lower**  **(60% to 69%)** | **2nd upper**  **(70% to 79%)** | **1st class**  **(80% to 100%)** | **YOUR MARKS/COMMENTS** |
| **CLO1: Review the various components of Internet of Things (IoT) at various scales.** | **1(a) Finite-state machine (FSM)**  **(10%)** | No FSM has illustrated for the IoT system. | Brief FSM has drawn for the IoT system. There are major flaws in the FSM. | Good FSM has drawn for the IoT system with minor flaws, however lack of technical details. | Good FSM has drawn for the IoT system with appropriate concepts and technical details are stated. | Excellent FSM has drawn for the IoT system with proper concepts and in-depth technical details are stated. |  |
| **1(b) Sensors justifications**  **(10%)** | No discussion on the sensors involved. | Brief discussion on the sensors involved and there are misconceptions for certain terms. | Good discussion on the sensors involved, however lack of technical details. | Good discussion on the sensors involved with proper concepts and technical details are stated. | Excellent discussion on the sensors involved with proper concepts and in-depth technical details are stated. |  |
| **1(c) Functional requirements**  **(20%)** | No discussion on the functional requirements for the IoT system. | Brief discussion on the functional requirements for the IoT system. There are misconceptions in the discussion. | Good discussion on the functional requirements for the IoT system, however lack of technical justifications. | Good discussion on the functional requirements for the IoT system with proper concepts and technical details are stated. | Excellent discussion on the functional requirements for the IoT system with proper concepts and in-depth technical details are stated. |  |
| **1(d) Non-functional requirements**  **(10%)** | No discussion on the non-functional requirements for the IoT system. | Brief discussion on the non-functional requirements for the IoT system. There are misconceptions in the discussion. | Good discussion on the non-functional requirements for the IoT system, however lack of technical justifications. | Good discussion on the non-functional requirements for the IoT system with proper concepts and technical details are stated. | Excellent discussion on the non-functional requirements for the IoT system with proper concepts and in-depth technical details are stated. |  |
| **Total (50%)** | | | | | |  |

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| **Question 2: Develop an IoT system (Score: 50%)** | | | | | | | | | | | | |
| **LEARNING OUTCOME** | **MARKING CRITERIA** | | **SCALE** | | | | | | | | | |
| **Failed**  **(0% to 49%)** | | **3rd class**  **(50% to 59%)** | | **2nd lower**  **(60% to 69%)** | | **2nd upper**  **(70% to 79%)** | | **1st class**  **(80% to 100%)** | **YOUR MARKS/COMMENTS** |
| **CLO2: Evaluate and design IoT system architecture for a real world application.** | **2(a) Sensor layer**  **(10%)** | | No development on sensor layer. | | Erroneous in the program code for sensor layer, however there are some relevant codes are implemented. | | Good developments of sensor layer with error free. However, there are some bugs occurred during runtime. | | Good developments of sensor layer with error free. There are shortcomings for the flow during runtime. | | Outstanding developments of sensor layer with error free. Efficient process flow during runtime. |  |
| **2(b) Network layer**  **(10%)** | | No development on network layer. | | Erroneous in the program code for network layer, however there are some relevant codes are implemented. | | Good developments of network layer with error free. However, there are some bugs occurred during runtime. | | Good developments of network layer with error free. There are shortcomings for the flow during runtime. | | Outstanding developments of network layer with error free. Efficient process flow during runtime. |  |
| **2(c) Platform layer**  **(10%)** | | No development on platform layer. | | Erroneous in the program code for platform layer, however there are some relevant codes are implemented. | | Good developments of platform layer with error free. However, there are some bugs occurred during runtime. | | Good developments of platform layer with error free. There are shortcomings for the flow during runtime. | | Outstanding developments of platform layer with error free. Efficient process flow during runtime. |  |
| **2(d) Application layer**  **(20%)** | | No development on application layer. | | Erroneous in the program code for application layer, however there are some relevant codes are implemented. | | Good developments of application layer with error free. However, there are some bugs occurred during runtime. | | Good developments of application layer with error free. There are shortcomings for the flow during runtime. | | Outstanding developments of application layer with error free. Efficient process flow during runtime. |  |
| **Total (50%)** | | | | | | | | | | |  |
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| **Overall score (100%)** | | | | | | | | | | | |  |
| **Weighted marks (30%)** | | | | | | | | | | | |  |