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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** | |
| 13th February 2023  (Week 3) | 17th April 2023 (Week 12) | | | 30% | |
| **Assignment 2 title** | Feed sensor data onto a cloud service (400 words) | | | | |
| This assessment assesses the following course learning outcomes | | | | | |
| **# as in course guide** | **UOW Malaysia KDU Penang University College learning outcomes** | | | | |
| **CLO1** | N/A | | | | |
| **CLO2** | Evaluate and design IoT system architecture for a real world application. | | | | |
| **CLO3** | Develop a virtual IoT system for a specific application using cloud services and network sensors. | | | | |
| **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 via TurnItIn and Microsoft Teams*  *Question 1: Project file (A zip file,* ***code.zip****, which includes, Arduino file(s),* ***\*.ino*** *for cloud services), via Microsoft Teams.*  *Question 2: Report file,* ***report.pdf*** *based on the submission arrangement section, via TurnItIn.* |
| **Date by which work, feedback and marks will be returned to students** | 2nd May 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 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 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 a list of 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. Reference list or bibliography list (whichever applicable)
6. Marking rubric (in landscape orientation)

# Assignment instructions/ Background

**Feed sensor data onto a cloud service (30%)**

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

**Introduction**

In the developments of computing devices for an Internet of things (IoT) system, one may face a problem where a computing device will have limited space in persistent storage. Besides, the collected data from the sensors are useful to perform data analytics and enable the users to make smart decisions, when they are using an IoT system.

**Question 1: Establish a cloud service (Score: 50%)**

In a heart rate monitoring system, sensor data are collected, which could be used to estimate the actual heart rate in beats per minute, over a short period of time. You are required to create a cloud service. Then, write Arduino sketch to establish the connection between the microcontroller units (MCUs) and a cloud server. Design and implement a tree structure of sensor data to feed into your cloud service account. Lastly, compute the root mean square (RMS) values, based on the data collected for at least three categories of the heart rates.

**Question 2: Evaluate sensor data (Score: 50%)**

High resting heart pulse is a major cause to cardiovascular related diseases for human. Generate the suitable graph(s) to visualise the collected sensor datasets. Based on the graph and RMS values, analyze the factors or variables which could cause cardiovascular related diseases. Then, write a report to evaluate the possible solutions to improve and reconfigure the heart rate monitoring system, for heart rate accurateness and stability in the readings. This report should not exceed **400 words threshold**. Module tutor will not consider reading the report after the threshold.

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| **CET3063/N/CET3064 Internet of Things**  **MARKING RUBRIC**  **Assignment 2**  **Feed sensor data onto a cloud service (Weighted marks: 30%)** | | | | | | | |
| **Question 1: Establish a cloud service (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** |
| **CLO3: Develop a virtual IoT system for a specific application using cloud services and network sensors.** | **1(a) Cloud service configuration**  **(10%)** | No cloud service has created. | Cloud service has created, but without authentication and certain inappropriate settings have set. | Cloud service has created with an authentication feature, however certain inappropriate settings have set. | Good configuration of cloud service with proper authentication and settings have set. | Excellent configuration of cloud service with comprehensive authentication and parameters have set. |  |
| **1(b) Code implementation**  **(20%)** | No implementation for the cloud service. | Erroneous in the implementation for the cloud service. CRUD operations could not be performed. | Good implementation for the cloud service. However, two CRUD operations could not be performed. | Good implementation for the cloud service. All required CRUD operations can be performed. | Excellent implementation for the cloud service. All required CRUD operations can be performed. Code are well written for efficiency. |  |
| **1(c) Data structure**  **(10%)** | No implementation for the data structure. | Brief design for the data structure. It is relatively hard to interpret the sensor data. | Good implementation for the data structure, however there are some mistakes in the naming of attributes. | Good implementation for the data structure with correct naming of attributes. It is easy to interpret the sensor data. | Excellent implementation for the data structure with compact naming of attributes. It is relatively easy to interpret the sensor data. |  |
| **1(d) Data estimation**  **(10%)** | No implementation for the data estimation. | Erroneous in the implementation for the data estimation. Inappropriate usages of formulation and data types in the program. | Good implementation for the data estimation. However, inappropriate usage of either formulation or data types in the program. | Good implementation for the data estimation. Appropriate usages of formulation and data types in the program. Accurate results are obtained. | Excellent implementation for the data estimation with comprehensive usages of formulations and data types in the program. Precise results are obtained. |  |
| **Total (50%)** | | | | | |  |

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| **Question 2: Evaluate sensor data (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) Graph(s) representation**  **(20%)** | No graph has generated. | | Graph(s) has/have generated, but it is insufficient to represent the developed IoT system due to limited sensor datasets are collected. | | Proper graph(s) has/have generated with sufficient datasets have collected. However, there are certain inappropriate uses of graphic elements. | | Proper graph(s) has/have generated with sufficient datasets have collected and proper uses of graphic elements. | | Outstanding graph(s) has/have generated with sufficient datasets have collected and proper uses of graphic elements, as well as resolution to highlight certain important. |  |
| **2(b) Key points identification**  **(10%)** | No key point has identified. | | Unclear points have identified to reflect the developed IoT system. | | Good key points have identified to reflect the developed IoT system. However, there are certain misconceptions in the discussions. | | Good key points have identified to reflect the developed IoT system with proper concepts. However, technical details need to be further clarified. | | Excellent key points have identified to reflect the developed IoT system with proper concepts and technically sound. |  |
| **2(c) Feasibility of the solutions**  **(20%)** | No solution has discussed. | | Unclear solutions have suggested to improve the developed IoT system. | | Good solutions have suggested to improve the developed IoT system. However, there are certain misconceptions in the discussions. | | Good solutions have suggested to improve the developed IoT system with proper concepts. However, technical details need to be further clarified. | | Feasible solutions have suggested to improve the developed IoT system with proper concepts and technically sound. |  |
| **Total (50%)** | | | | | | | | | |  |
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| **Overall score (100%)** | | | | | | | | | | |  |
| **Weighted marks (30%)** | | | | | | | | | | |  |