Assignment 1 - Internet of Things

This assignment contributes **15%** to your overall assessment mark for this course. **This work is done individually.**

Due date: *The lecturer will publish the actual deadline on Stream*

Purpose:
> By using the *RPi, sensors, actuators* and *Internet connectivity* or *AWS IoT*, *design, implement, measure and demonstrate* a ~~Cloud~~ IoT system centred around a "Thing" that could be used in the daily life of a modern ordinary human being or organisation/business either within the home or mobile or organisational or community or city environment.

Learning outcome/s being assessed: *(as per those stated for the course)*
> Learning Objective 5: *Build*, from existing components, a complete environment of the Cloud Internet of Things that *involves collecting data from sensors, analysing the data and sending a command to an actuator.* You are also required to collect metrics that will allow you to determine the real-time performance of the underlying packet-based networks for supporting this environment.

Assessment Scheme/Rubric: Available [**here**]

Tasks:

1. **Identify** a real-life problem that can be solved by an **ordinary object** that is currently used in daily life or business environment. It may be wise to send a one-page project proposal to the lecturer for advice and *informal* approval.
2. **Determine** how the object can be "thingified" to become a **smart object** that can be a participant as a "Thing" in the ~~Cloud~~ *Internet of Things;*
3. **Design** and **implement** a **IoT system** to solve the problem you have identified in (1) by realising the "Thing" in (2) above. *Check to ensure that your design specifies components across the IoT architectural layers covered in the lectures. There is no requirement to use the Cloud in this assignment. However, your Thing must be connected to the Internet. Most importantly, your Thing must also send data as well as receive a command through the Internet without necessarily using the Cloud.*
4. Use basic **metrics** (e.g., measurements for speed, memory usage, etc) to determine the real-time performance of the IoT system you created in (3) above *(NB: Use any measurements as long as they relate to the performance of your system OR aspects of your application domain);*
5. **Demonstrate** your system to the class by circulating a **video** to the Stream forum. Monitor and attend to comments, suggestions and questions from the class.
6. Write a **report** that documents your work in (1) to (5) above. Use diagrams where possible. rt.

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Instructions and Guidelines:

1. Your full name(s) and student ID number(s) must precede your *project title* on the cover page of your report. Include these details for all members of your group.

2. Your report must include a reference list at the end for all materials that you cited in the report;

3. Your report must not exceed **8 pages** under the following formatting specifications in MS Word/LibreOffice: *1.5 line spacing, Times New Roman font, 12pt font size, including diagrams and excluding the cover page and the reference list page.* See also the general formatting instructions.

4. Submit, via Stream, the following evidence for **final assessment**:

    a. Your **report**, submitted as a separate file. Make sure you have less than 3% similarity in the plagiarism detection tool, TurnItIn.

    b. A ZIP archive containing all **programming code, scripts** and **configuration files** for the completed prototype system as described in your reports. *Your report must be OUTSIDE this ZIP archive.*

    c. **Video recording**, as a separate file, demonstrating the workings of your prototype system. Only one video file submission is required. *This is important as the examiner needs to determine that you built a working prototype system.*

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