Lab: IoT Experiment Worksheet

| Name: | ***ARUMUGAM VIJAYAKUMAR BHAVYA*** | Student ID: | ***A0289393J*** |
| --- | --- | --- | --- |

Submit this completed worksheet, modified Jupyter notebook and logged data (.csv) files in a single zip file on Canvas by the announced deadline. Your zip file should be named with your matriculation ID. For example, if your matriculation ID is A1234567Z, the filename will be ‘A1234567Z.zip’.

*The size of the box we allocated to the question hints at how long an answer you will need to give.*

| **Q1 – The pub-sub architecture is actually very prevalent in day-to-day activities, notably in social media and media consumption. Fill in the table below with one social media (e.g. Instagram, WeChat, X, Weibo) and one media (e.g. YouTube, Bilibili) platform as parallels to the pub-sub architecture. The magazine publisher analogy given in the summary is filled in as an example.** | | | |
| --- | --- | --- | --- |
|  | **Broker** | **Publish Action** | **Subscribe Action** |
| Example  **Magazine Publishing** | Magazine Publisher | Magazine writer sends magazine to publisher | Magazine reader subscribes to magazine through publisher |
| Social Media Platform | Instagram | User posts a photo/video that is shared with followers | Users follow accounts to see posts in their feed |
| Media Platform | Youtube | Video creator uploads a video to their channel | Users subscribe to the channel to receive video updates |

Worksheet continues on the next page →

| **Q2a – Plot the two sets of data you have collected (Graph 1: Brightness against Time; Graph 2: Temperature against Time). By visual inspection, the two sets of data appear to have some correlation. Provide a short comment to suggest a possible reason on why the two sets of data appear to be correlated.**  Graph 1    Graph 2    One reason for this correlation is how sunlight and temperature naturally go together. When the sun is out and it’s bright during the day, it gets warmer because of the sun’s rays. In the evening and at night, when it gets darker, the temperature drops. You can see this happening outside, where sunlight is the main thing that makes it warmer. The brightest times of the day are usually the hottest, which explains why the temperature peaks then.  Also, fill in the following table:   | Average Sunrise Time | 05 : 21 AM | | --- | --- | | Average Sunset Time | 19 : 06 PM | | Average Temperature in a Day | 26.123 °C | | Maximum Temperature | 32.41 °C | | Minimum Temperature | 21.36 °C | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Worksheet continues on the next page →

| **Q2b – Machine learning algorithms are described as learning a target function, , that best maps input variables, , to an output variable, such that .**  **Fit 3 suitable machine learning models fulfilling the following requirements:**  **Model 1: is historical values of temperature; is current temperature**  **Model 2: is historical values of brightness; is current temperature**  **Model 3: is historical values of brightness and temperature, is current temperature.**  *The algorithm used for each of the model need not be the same.*  **Plot curves of current temperature against time for ALL 3 models to illustrate how well each model fits the collected data. Note that we would also like to see the models’ prediction beyond the timestamp of the last collected datapoint to illustrate how well the models generalise.** |
| --- |