SIT225 Data Capture Technologies

Pass Task: Arduino IoT Cloud

Overview

Arduino Cloud is your next exciting journey to build, control and monitor your connected projects. You can connect anything to Arduino Cloud including a wide range of compatible Arduino boards such as Arduino Nano 33 IoT or a third-party device that speaks Python, MicroPython, Javascript or Node-RED. Arduino Cloud is an all-in-one IoT solution that empowers makers to create from anywhere, control their devices with stunning dashboards and share their projects with anyone. Data can be downloaded from the Cloud Dashboards.

Hardware Required

i. Arduino Nano 33 IoT device,
ii. USB cable,
iii. Any of the sensors including DHT22 Temperature and Humidity sensor, HC-SR04 Ultrasonic sensor or LSM6DS3 module on the Arduino Nano 33 IoT for accelerometer data.

Software Required

i. Arduino IoT Cloud
ii. Arduino Web IDE
iii. Python 3 (in case custom Python board is used to connect Arduino IoT Cloud).

Pre-requisites: You must do the following before this task

Week 3 activities in the unit site.

Task Objective

In this week, you have created Arduino Cloud Dashboards and connected some of your Things (sensors). Based on the sensors you used, the number of Cloud variables will be different. You will need to collect data for 10 minutes or more. You will need to gather data as a CSV file (comma separated values) and plot each variable as a line graph. Try to use a different sensor other than the one you have used in week 2 to avoid the data visualisation and analysis being similar.

Steps:

1. Setup Arduino Cloud to add Arduino Nano 33 IoT device and Things which are your sensors. This requires you to connect Arduino board using Wi-Fi where you can share your smartphone's Wi-Fi to Arduino as a hotspot.
2. Arduino board is attached to any of the sensors you have used in the weekly activities. Keep collecting data for a while so you have enough data.
3. You can download the data from the Arduino Cloud dashboard or alternatively, create a Python script to connect to Arduino Cloud can continuously receive data by synchronising your Arduino Thing's variables (the synchronisation is covered by one of the weekly activities) and keep storing them into CSV files in your computer's drive.
4. You will need to produce a CSV data file where the number of columns is the number of data variables you have in your sensor (such as DHT22 will have 2 columns – temperature and humidity) with an additional timestamp column as the first column.
5. Clean your data through a manual inspection by opening CSV file in Excel, or you are free to use Python tools to do so. Cleaning data, at a very basic level, may involve the identification of empty, malformed or unreadable data and removing them. Comment on your cleaning methods and tools used.
6. Plot data as a suitable graph (a line graph is commonly used). Separate plots per data variable, as well as a plot combining all the variables.
7. Observe the data changing pattern in the sensor plot and try to come up with your comments. Following items are subject to observation, but not limited to, -
    a. Any repeating pattern,
    b. Up or down trends in data variables, or
    c. Relative changes of 2 or more variables (such as x, y and z variables in accelerometer data or temperature and humidity variables in DHT22 sensor)

Submission details

Q1. Perform week 3 activities mentioned in the unit site and produce outputs.

Q2. State the hypothesis you can think out of your data. Show the graph created from the sensor data, analyse it and describe if there are any interesting patterns you can observe. Justify if your hypothesis holds, at what level; if not, then what might be the reason?

Q3. Create a video in Panopto/Cloud Deakin showing your Arduino Cloud Dashboard with your Thing's data variables being updated, briefly discussing your graph and share the video link here.

Q4. Create a subdirectory 'week-3' under directory 'SIT225_2024T2', which you created for week 1 task, in your drive where you copy the Python script file, Arduino sketch file, data file and the generated graphs. Commit and push to changes to GitHub. Include the link to your repository here with a GitHub page screenshot of weekly folder content. A tutor may try to access your

GitHub link, if necessary. Give access to your tutor by adding tutor's email address as a collaborator of your **private** repository.

Instructions

Consolidate outputs following the submission details above into a single PDF file.

Submit your work

When you are ready, login to OnTrack and submit your pdf which consolidates all the items mentioned in the submission detail section above. Remember to save and backup your work.

Complete your work

After your submission, your OnTrack reviewer (tutor) will review your submission and give you feedback in about 5 business days. Your reviewer may further ask you some questions on the weekly topics and/or about your submissions. You are required to address your OnTrack reviewer's questions as a form of task discussions. Please frequently login to OnTrack for the task ***Discuss/Demonstrate*** or ***Resubmit*** equivalent to fix your work (if needed) based on the feedback to get your task signed as ***Complete***.