Faculty of Engineering & Applied Science

Design and Analysis of IoT Software Systems

SOFE4610 - dropTemp Project Progress Report

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Sensing and Power

Component	Justification
DHT11	We decided to utilize the DHT11 as it is a low-cost temperature sensor that provides relatively accurate readings that strikes a good balance between cost and performance.

Data communication

Component	Justification
HC-05	Arduino Uno does not come with in-built bluetooth, hence we are using HC-05 bluetooth module that is acting as a bridge for the connection between the Arduino Uno and Raspberry Pi 4. This bluetooth module can switch modes between receiving and transmitting data.

Edge Computing

Component	Justification
Raspberry Pi 4	The Raspberry Pi is utilized as our far edge computer to collect and compile data received from the sensing device before periodically transmitting it to our Droplet for further analysis. While other Raspberry models may be more suitable for the task, the development team has decided to utilize the resources given to them.
Arduino Uno	The Arduino Uno is used to collect data using the DHT11 and encode it for transmission over BLE using the HC-05 to the Raspberry Pi. As with the Raspberry Pi, there may be more suitable Arduino models for the task.

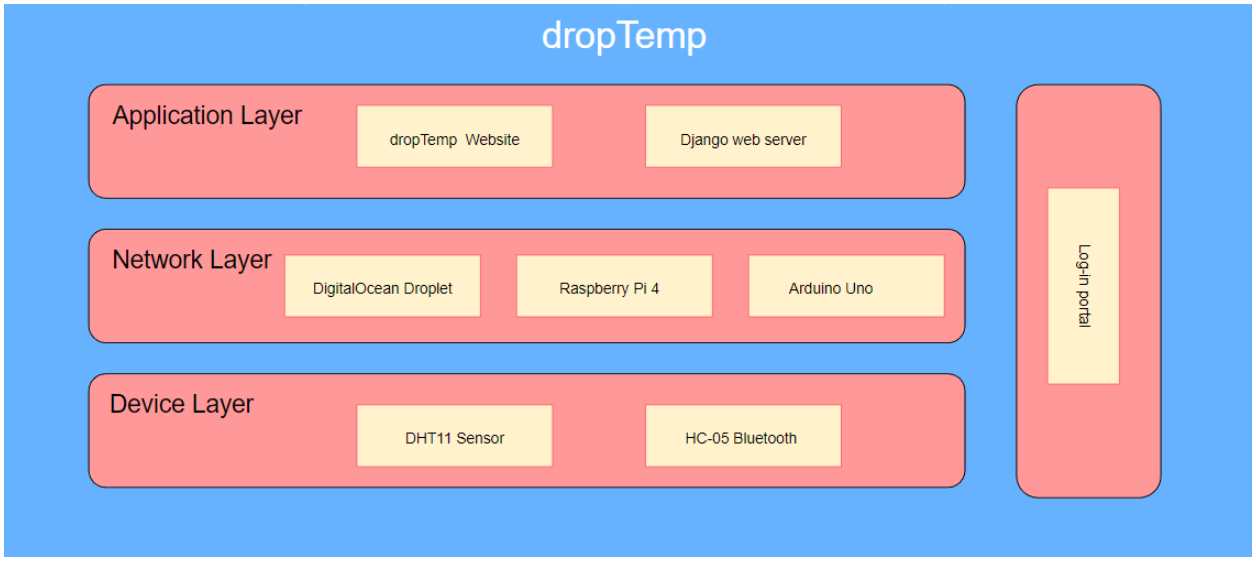
Computing and analytics

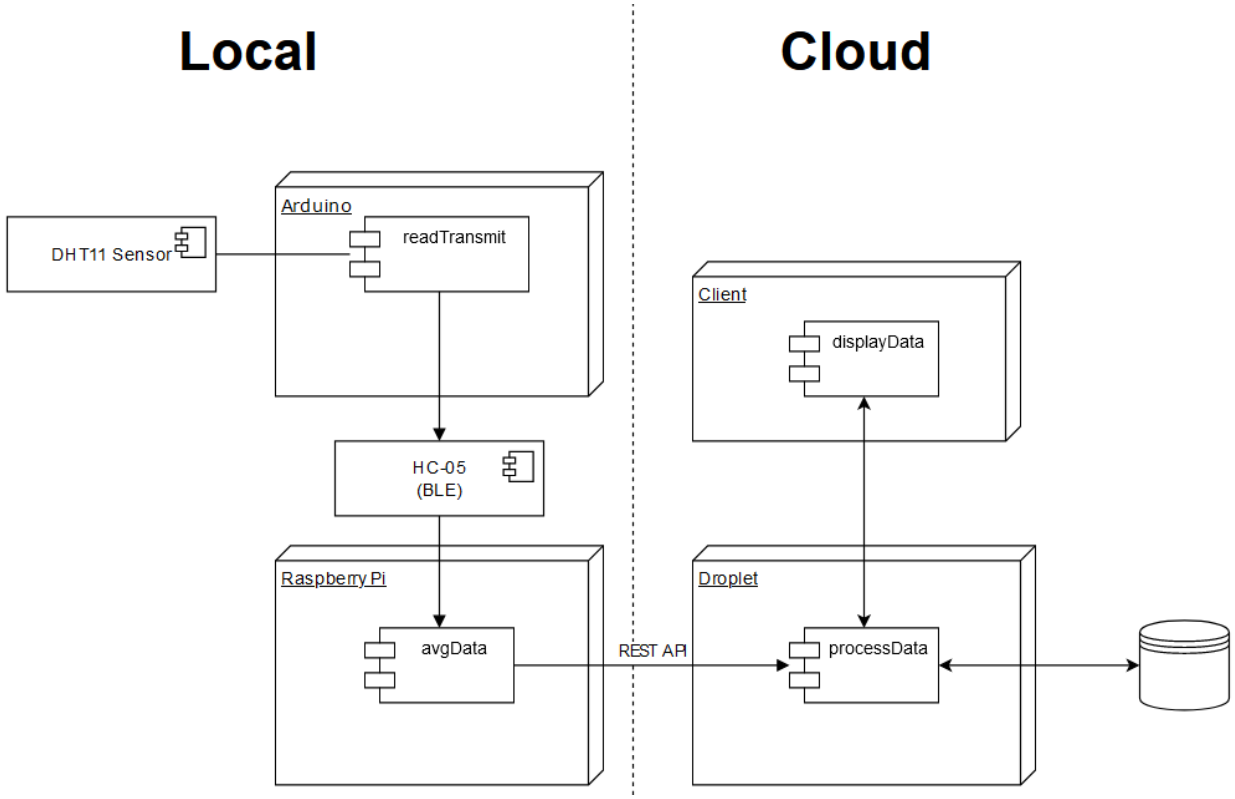
Component	Justification
DigitalOcean Droplet	We chose to use DigitalOcean for cloud computing because that is what the development team is familiar with.
Django web server	Our web server will run on Django to both provide a website for users to interact with, as well as RESTful APIs that the system can use to receive data from the edge devices as well as serve it to the users.

Security

Component	Justification
Log-in portal	The log-in portal would help secure each user’s data and personalize

	the device to our users.





Module	Purpose
readTransmit	Arduino periodically (approx. every 2 seconds) reads the temperature and humidity data from the DHT11 before concating them into a string which is then encoded into a char array which is then transmitted over BLE using the HC-05.

avgData	The Raspberry Pi periodically (approx. every 2 seconds as well) reads the next incoming line from the HC-05 and decodes array to receive the temperature and humidity. These values are added to a running total which is then averaged every 30 repetitions (approx. every 61-62 seconds). Averaged values are currently just printed out, however the goal is to transmit them to our Droplet, likely using a REST endpoint, for further processing.
processData	The goal of processData is to efficiently return data spreads of temp/humidity data for various timescales (say 10 min, 1 hr, 1 day, and 1 week for now) based on the request passed from displayData.
displayData	Client facing app (likely just a webapp) that allows users to login (possibly using a set password and MAC address of HC-05 as UUID) and present them with a UI to select which values they want reported.