Introduction to IoT and Its Industrial Applications (CS698T)
Indian Institute of Technology Kanpur
Assignment 2

Member Names: Abhinav Dudeja, Manish Kumar
Member Emails: abhinavd21@iitk.ac.in, manishk21@iitk.ac.in
Member Roll Numbers: 21111001, 21111037
Date: November 3, 2021

---

1 REPORT

A smart irrigation system to provide right amount of water to the plants using the temperature and humidity data has been built. We have used different IOT sensors and actuator to build this system. Also, a machine learning algorithm has been deployed for smart and accurate flow of water to the plants. We have used the following components to built this system.

1.1 Sensors and other hardware

1. Arduino Mega micro-controller
2. DHT22 sensors
3. Micro Servo motors
4. LCD1602
5. NTC Temperature sensor

1.1.1 Arduino Mega

We have used arduino mega micro-controller as the brain of our irrigation system. Arduino stores all the instructions and controls the servo motors based on the temperature and humidity input from the DHT22 sensors. Signals to and from each actuator and sensor are processed here.

1.1.2 DHT22 sensors

4 DHT22 sensors have been used to get the temperature and humidity readings from the surroundings which are further sent to the ML model, where these attributes are used to get the percentage water flow required for the plants. Each of 4 DHT22 sensors give reading for the respective water supply.

1.1.3 Micro Servo motors

4 servo motors have been used to control the water supply to the plants by closing or opening to a certain angle. Servo motor are kept at 0 degree during night time as no water is to be supplied during night. During the day servo can be rotated to any value from 0 to 180 degrees depending on the percentage water flow needed. 0 degree is mapped to 0 percent water supply and 180 degree is mapped to 100 percent water supply.

1.1.4 LCD1602

A LCD screen has been used to output the percentage water supply from all of the 4 water outlets.

1.1.5 NTC temperature sensor

This sensor is used to toggle day time and night time. temperature reading of less than 50 degrees represents night time and temperature reading of more than 50 degrees represents day time. This sensor does not represent the temperature of the surroundings and has only one purpose of toggling day and night.

1.2 Machine Learning Algorithm

We have implemented the machine learning algorithm in two parts:

1. MLP Two Layer Classifier
2. MLP Two Layer Regressor

1.2.1 MLP Classifier

We have implemented two layer perceptron classifier using relu activation function. We have implemented this algorithm to classify the output into one of the two classes:

1. Non-Zero water flow - represented by 1
2. Zero water flow - represented by 0

If the classifier's prediction comes out to be zero then the percentage water flow is zero. But, if the classifier predicts a 1 then we implement the regression model on the values to generate the actual water flow percentage

1.2.2 MLP Regressor

We have implemented two layer perceptron regressor using relu activation function. We have used two nuerons at each layer of the perceptron. We have used 2000 iters for this model. We are getting a RMSE value of less than 10 which means the predictions are very accurate.

1.2.3 How to run the model

ML model has been provided in an ipynb file. The model can be run using jupyter notebook. All the commands used in the code are elaborated using the comments within the code.

1.3 Link

To open our simulated project click here