

Internet of Things(IoT) Based Smart Greenhouse Monitoring System

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Introduction

- IoT-based monitoring systems have been widely used in various sectors, including remote sensing, data logging, and device control. This technology has made cost-effective sensor data logging and monitoring possible and has brought a significant change in farming practices.
- In greenhouse farming, it is crucial to monitor environmental conditions such as temperature, humidity, and soil moisture for optimal plant growth.
- This project describes the design and implementation of an IoT-based smart monitoring system for small-scale greenhouse farming.
- The system efficiently monitors a range of environmental characteristics in real-time and logs the sensor data in the cloud. Cloud-based monitoring systems allow users to operate and monitor devices such as humidifiers and heating systems over the Internet.
- The system is also capable of controlling humidity and heating systems to maintain the desired temperature.

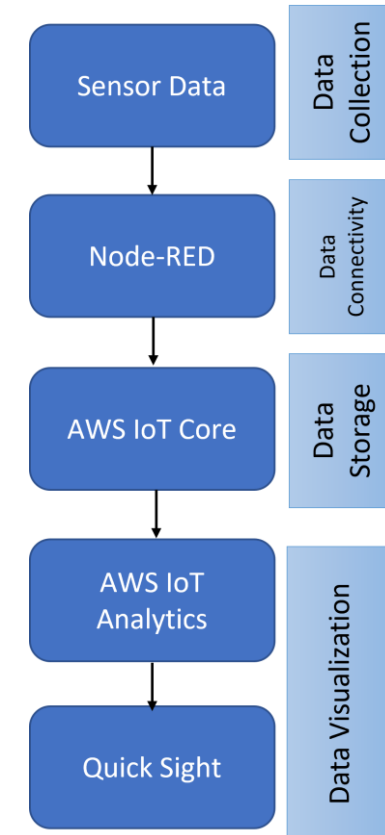
Current Problems



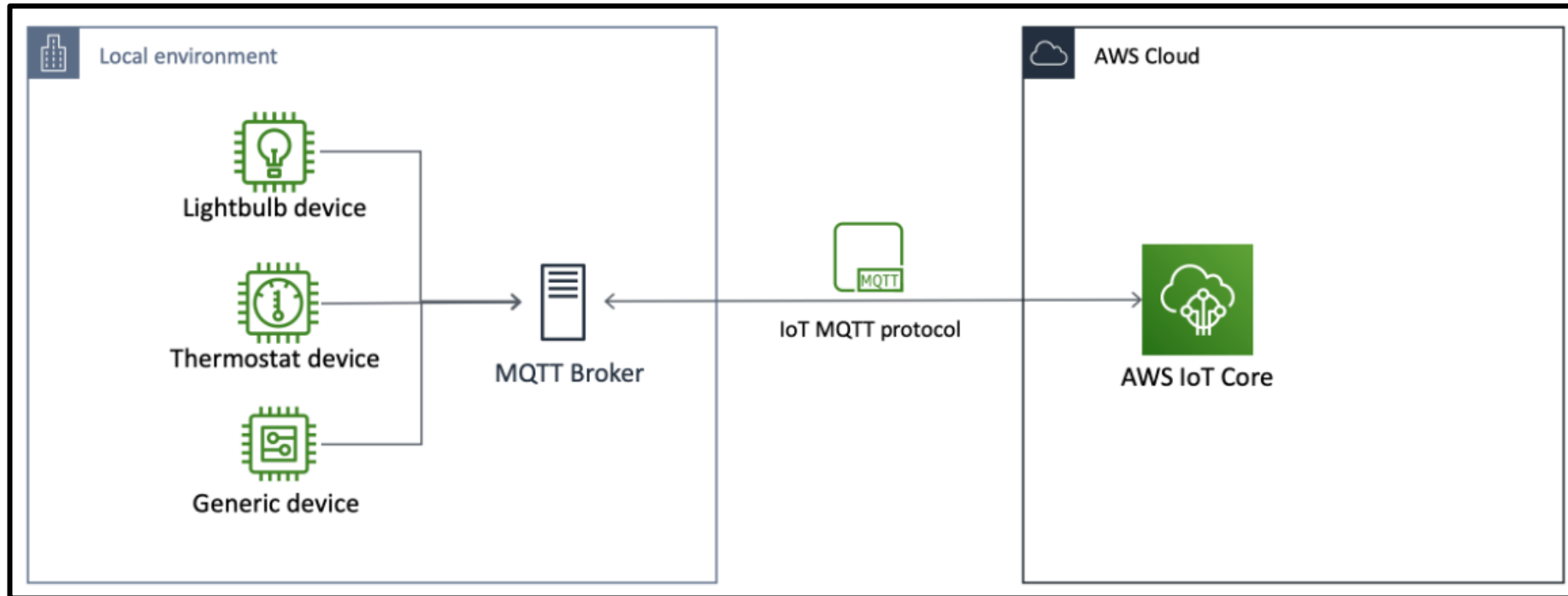
Because of inadequate monitoring and nourishment, plants are not growing properly.

Proposed Solution

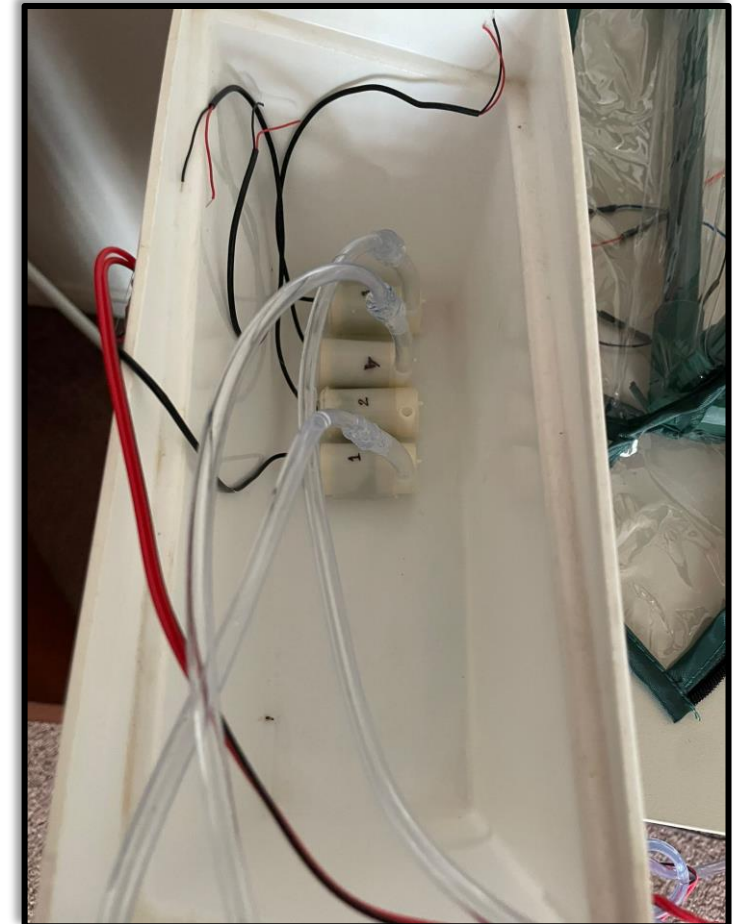
- Taking real-time data through some sensors (temperature sensor, soil moisture sensor) by using a microcontroller device like Arduino, ESP32, etc.
- Send those data to a cloud base platform like Amazon AWS, Google Firebase, etc.
- After analyzing the data make a decision to perform on/off such devices as water pumps, humidifiers, lights, etc.
- The devices are connected with MCUs and analyzed data will come from the cloud platform to the MCU then MCU is going to start the devices or stop the devices based upon the data and predesigned decisions.

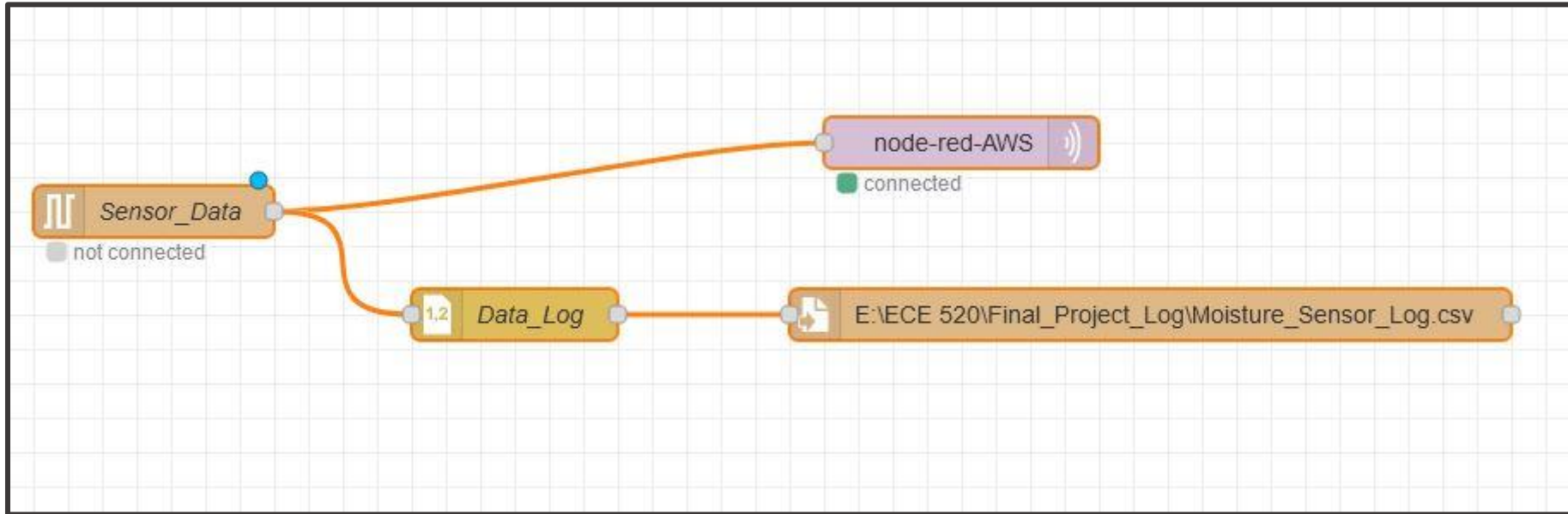


MQTT – AWS Data connectivity

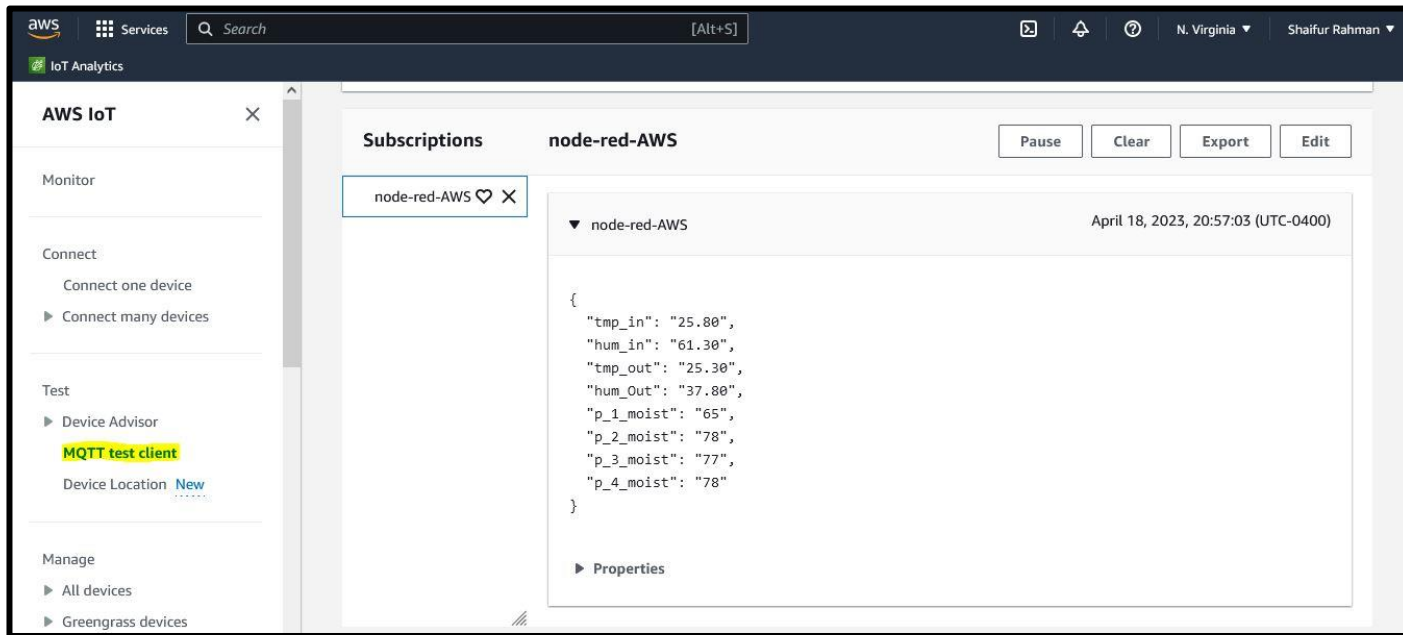


Model Demonstration



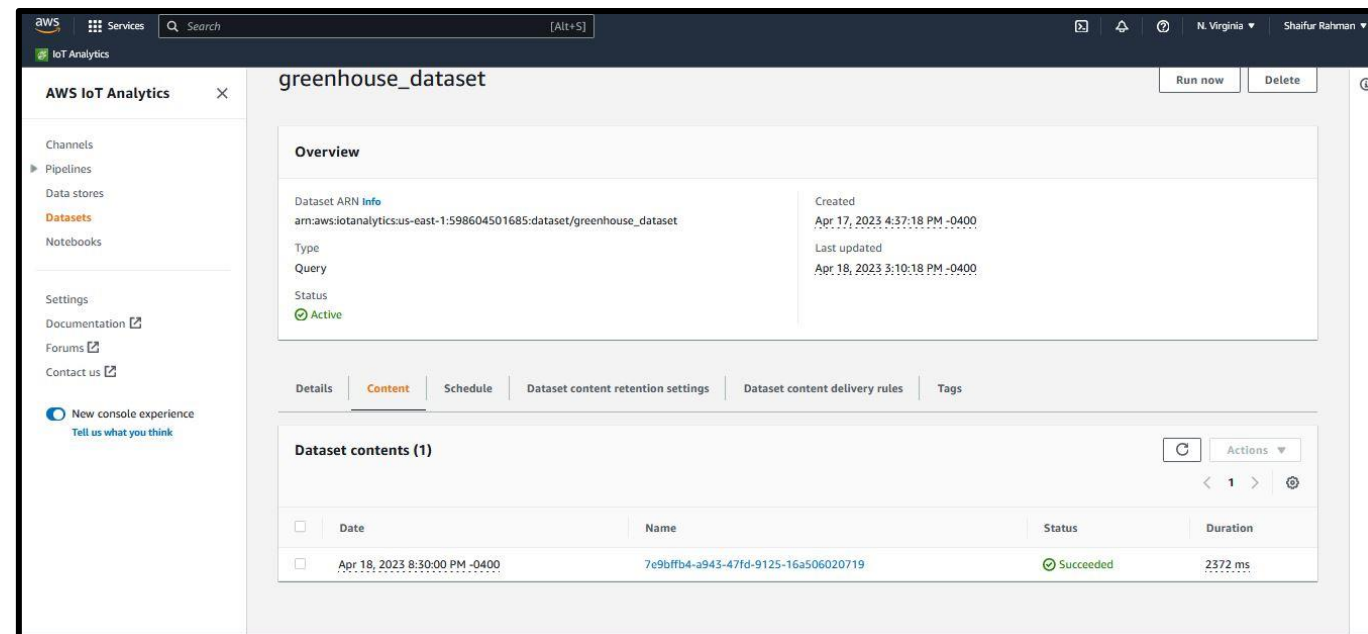


Node-Red Flow

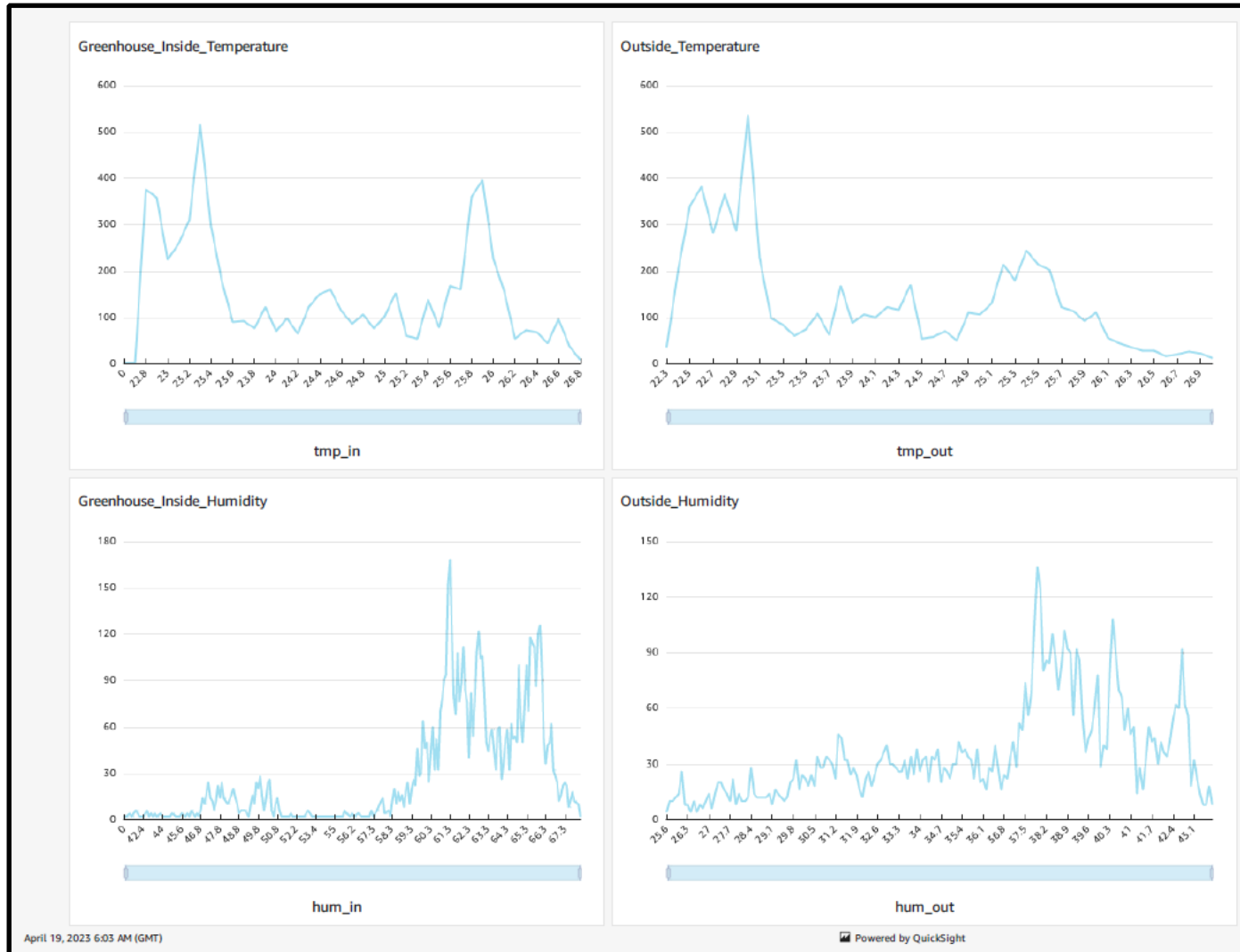


AWS IoT Core

AWS IoT Analytics



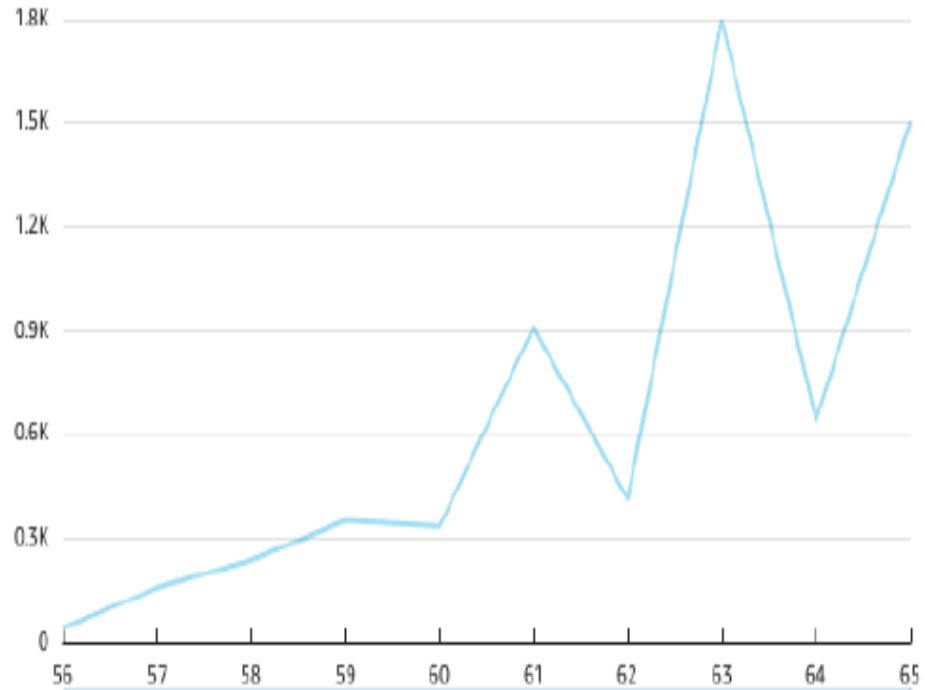
Data Visualization Dashboard



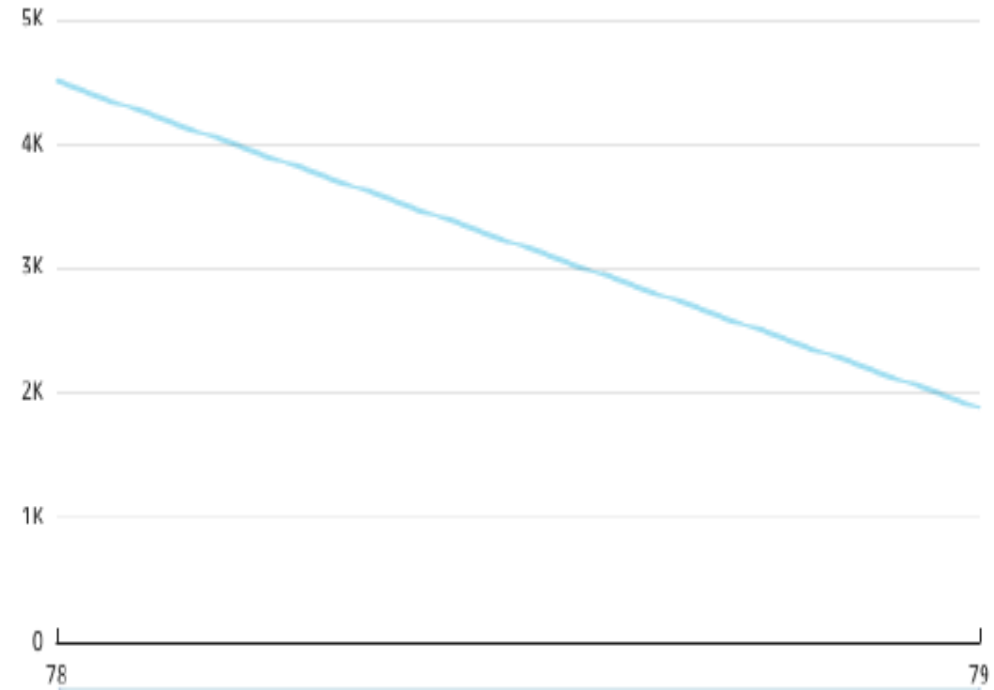
The number of occurrences of the temperature and humidity both inside and outside of the Greenhouse over a period of time.



Plant_1_Soil_Moisture



Plant_2_Soil_Moisture



The number of occurrences of the soil moisture data of two plants over a time period

Future Scope

It is required to test in various environmental conditions

Operation scalability can be increased for Agricultural uses.

Plant and Soil health condition monitoring systems can be incorporated with the current functionality



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Thank You....