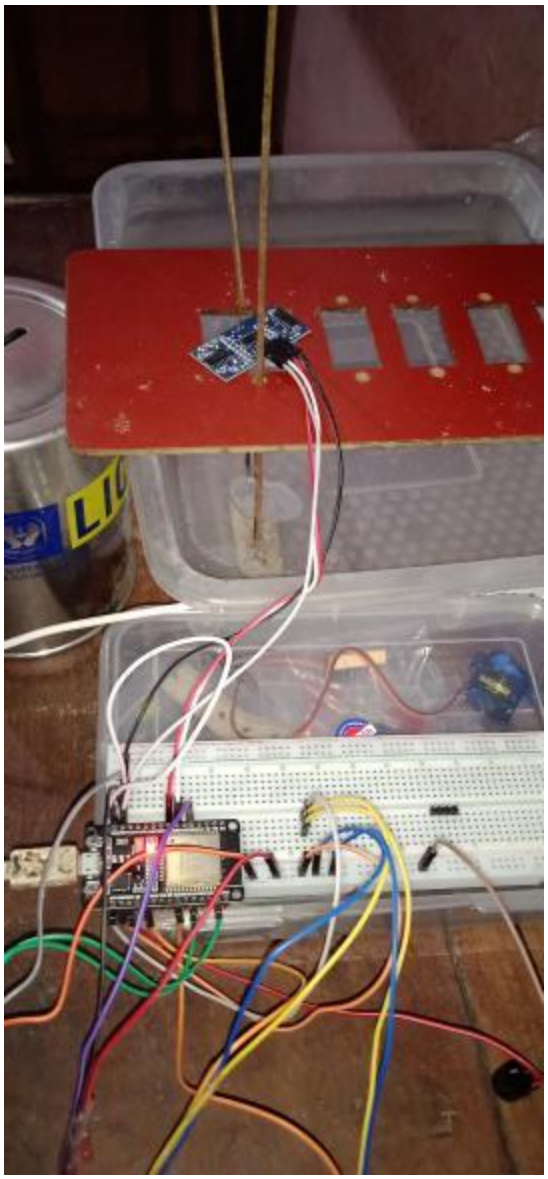
Explaining the experiment setup:

> Components:

1. 2 DHT11 sensors
2. 1 Ultrasonic sensor
3. Water level Sensor
4. Barometric pressure sensor

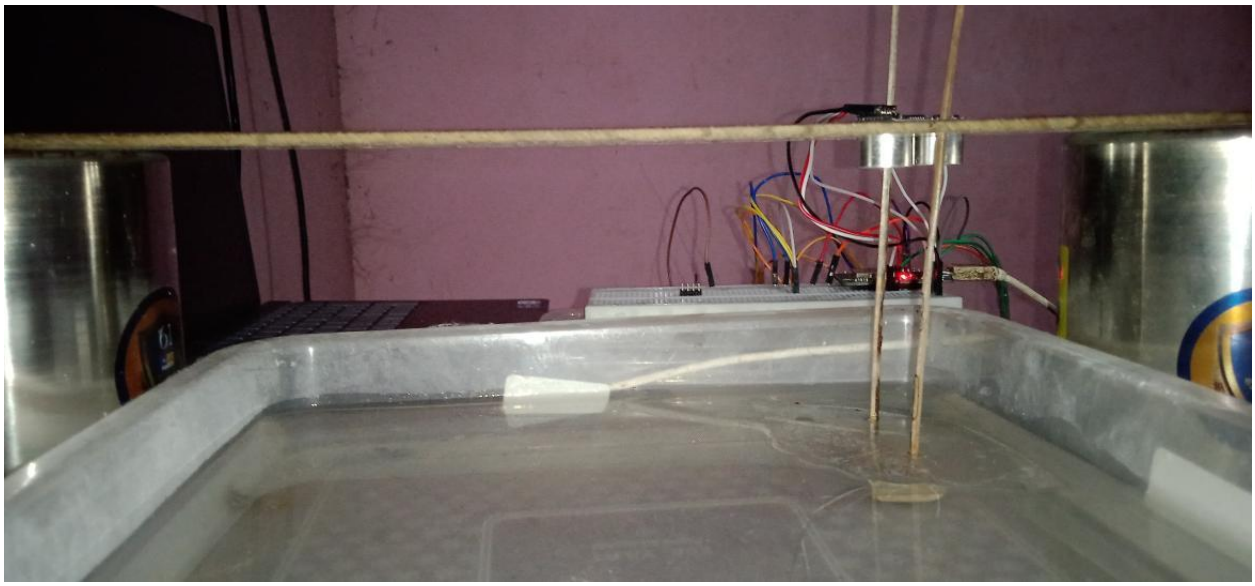


> Setup:

- The ultrasonic sensor and a floating plate are connected via a rod. We note the distance between the ultrasonic sensor and the end of the rods, which will be planted to the ground(in the field).
- Now, with the help of the ultrasonic sensor we can determine the distance between it and the floating plate.
- Therefore the water level is the(height of ultrasonic sensor - distance from floating plate to ultrasonic sensor).
- We also used the dht11 sensors to track the humidity and temperature of the field.
- We also used a barometric pressure sensor to find atmospheric pressure.
- We used a water level sensor to detect rain.

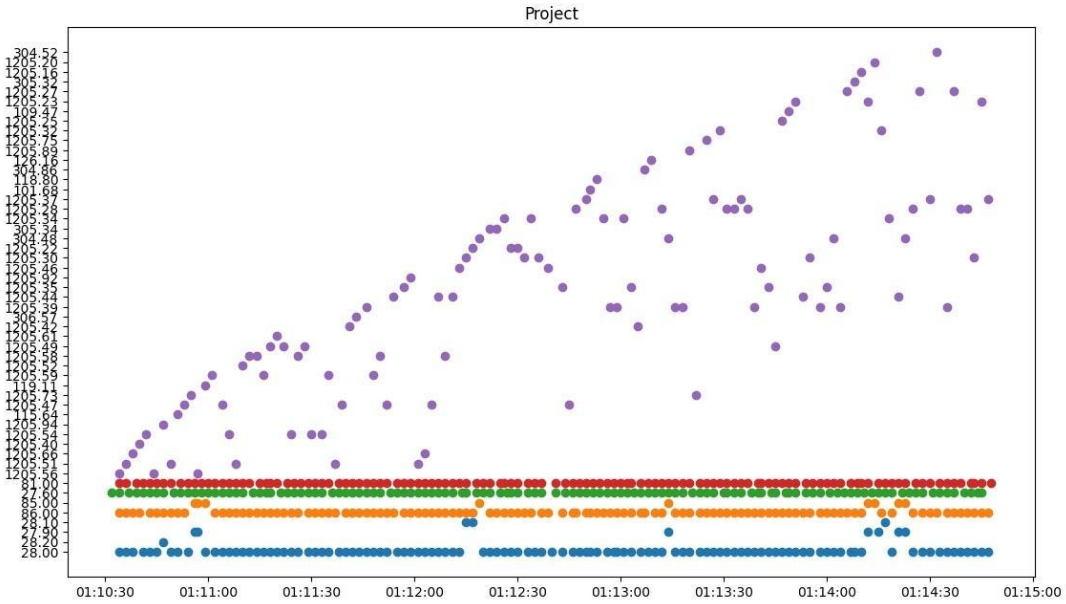
Improvisation:

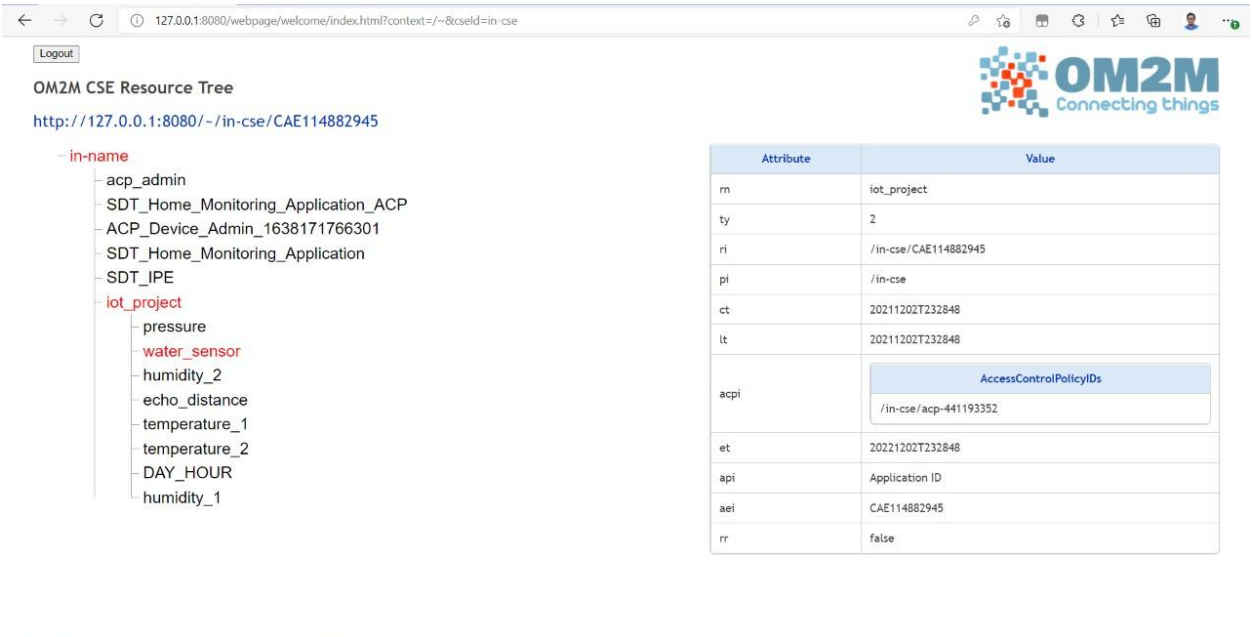
Though originally this setup is meant to be used in fields, for practical reasons the demonstration is done using an at-home setup which can explain the purpose of this project in a similar way.



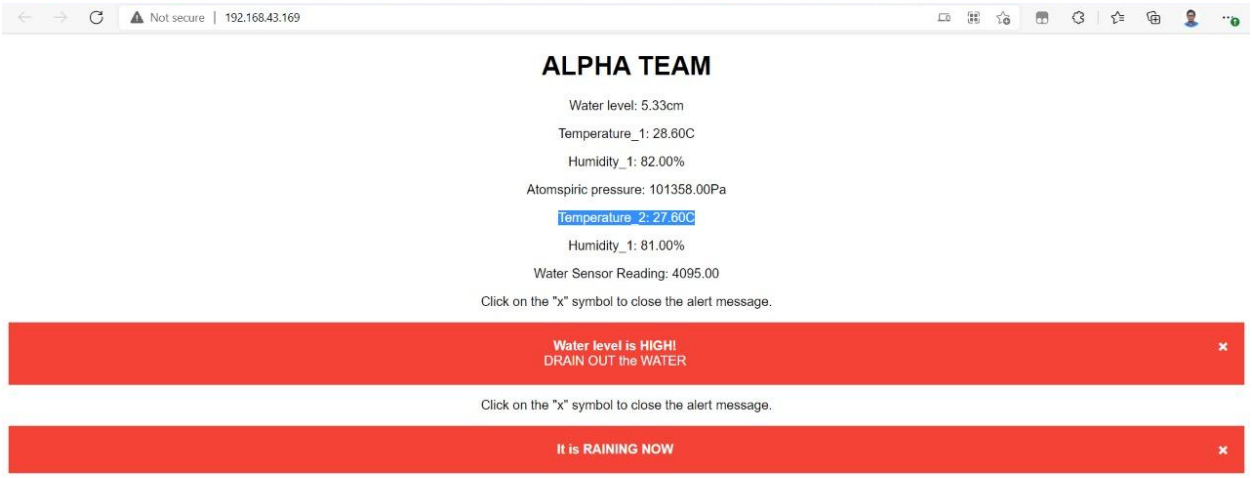
> Uploading to onem2m:

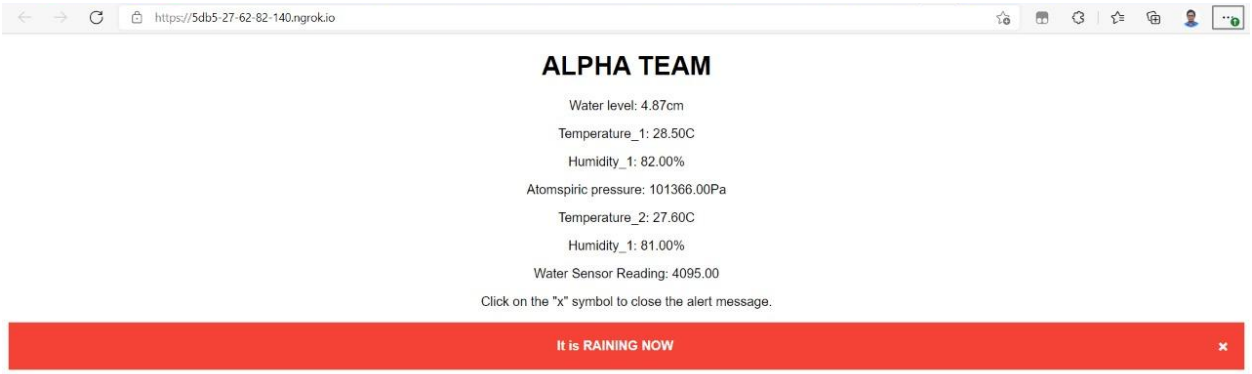
We ran a python code to create a resource tree on the onem2m server hosted by us. We created resources in our tree by sending post requests to the parent resource. Post request requires header and payload. Each type has a different header and payload. AE, CNT and CIN have their respective headers and payload. We created an AE named “iot_project” which has 8 CNT containers named “echo_distance”, “temperature_1”, “temperature_2”, “humidity_1”, “humidity_2”, “pressure”, “water_sensor” and “DAY_HOUR”. We uploaded a code in ESP32 that will update the CNT’s on onem2m server with current values(CIN- Content instance). Then we made graphs using a python script. We send get requests to our onem2m resource tree from a python script to get the data Content instances and with the help of these data content instances, we created our graph.


Project
01:10:30
01:11:00
01:11:30
01:12:00
01:12:30
01:13:00
01:13:30
01:14:00
01:14:30
01:15:00


127.0.0.1:8080/webpage/welcome/index.html?context=/~&cseId=in-cse
Logout
OM2M CSE Resource Tree
http://127.0.0.1:8080/~/in-cse/CAE114882945
in-name
acp_admin
SDT_Home_Monitoring_Application_ACP
ACP_Device_Admin_1638171766301
SDT_Home_Monitoring_Application
SDT_IPE
iot_project
pressure
water_sensor
humidity_2
echo_distance
temperature_1
temperature_2
DAY_HOUR
humidity_1
OM2M
Connecting things
Attribute
Value
rn
iot_project
ty
2
ri
/in-cse/CAE114882945
pi
/in-cse
ct
20211202T232848
lt
20211202T232848
acpi
AccessControlPolicyIDs
/in-cse/acp-441193352
et
20221202T232848
api
Application ID
aei
CAE114882945
rr
false

> Our Website:


Not secure | 192.168.43.169
ALPHA TEAM
Water level: 5.33cm
Temperature_1: 28.60C
Humidity_1: 82.00%
Atomspiric pressure: 101358.00Pa
Temperature_2: 27.60C
Humidity_1: 81.00%
Water Sensor Reading: 4095.00
Click on the "x" symbol to close the alert message.
Water level is HIGH!
DRAIN OUT the WATER
Click on the "x" symbol to close the alert message.
It is RAINING NOW


https://5db5-27-62-82-140.ngrok.io
ALPHA TEAM
Water level: 4.87cm
Temperature_1: 28.50C
Humidity_1: 82.00%
Atomspiric pressure: 101366.00Pa
Temperature_2: 27.60C
Humidity_1: 81.00%
Water Sensor Reading: 4095.00
Click on the "x" symbol to close the alert message.
It is RAINING NOW

> Data Analytics:

We basically did predictive data analytics as we are storing our data on cloud and based on that farmers can predict the conditions for future and grow a suitable crop. Large amounts of data like this will surely help farmers increase their yield and profit.

> Data Analysis:

We basically did quantitative analysis as we have made a website that shows all the current values of temperature, humidity, water level and atmospheric pressure. Our project aids farmers in keeping optimum water level and gives a warning message if water level exceeds the threshold. This website will also pop a warning message for farmers if it's raining so that farmers can take appropriate action when it's raining.

Below we have given some charts which will help farmers to do optimum irrigation and can also predict the conditions for next season based on values collected by our project.

Stage-wise water requirement for paddy

Stages of growth	Water requirement (mm)	Precentage of total water requirement
Nursery	40	3.22
Main field preparation	200	16.12
Planting to panicle initiation	458	37.00
Panicle initiation to flowering	417	33.66
Flowering to maturity	125	10.00

Operation wise water requirement of paddy :

Operation	Water requirement (mm)
Nursery	40
Land preparation	200
Field irrigation	1000
Total	1240

Scheduling of irrigation for paddy

Short duration variety			Medium duration variety			Long duration variety		
Days	No. of irrigation	Water level (cm)	Days	No. of irrigation	Water level (cm)	Days	No. of irrigation	Water level (cm)
1-25	5-7	2-3	1-30	5-7	2-3	1-35	6-8	2-3
25	-	Thin film of water	30	-	Thin film of water	35	-	Thin film of water
28	-	Life irrigation	33	-	Life irrigation	38	-	Life irrigation
29-50	6	2-5	34-65	6-8	2-5	39-90 or 95	12-15	2-5
51-70	5-6	2-5	66-95	8-10	2-5	96-125	7-9	2-5
71-105	5-6	2-5	96-125	6-8	2-5	126-150	5-6	2-5