BANNARI AMMAN
INSTITUTE OF TECHNOLOGY
Stay Ahead

SMART IRRIGATION USING AI

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Abstract

- As Water supply is becoming scarce in today's world it becomes extremely important to conserve and use water efficiently and effectively. Keeping this essential factor in mind, this projects concentrates on the principal factor of making the optimum usage of the available water. It helps by automatically controlling the water flow for the required crops by measuring their moisture level , humidity and temperature which are being intimated to the user by a mobile app. This system also helps us to conserve time and by making ideal usage of water. It's not only applicable for farms but also in parks and lawns.

- A microcontroller (NodeMCU) is taken and is programmed in such a way that it monitors the sensors usage .Temperature , Rain and Humidity sensors are put into use for obtaining the respective data’s. Then soil moisture level , humidity and temperature are being monitored and taken into account. Every hour the measured values are being averaged and are compared to the previous values for further processes. The model is trained in such a way that it analyzes the previous readings and acts accordingly. If the measured values seems to exceed the threshold values the sufficient amount of water is put into use.The user gets the information of the sensor values for desired time and for every hour the action carried by the model is intimated to the user. In this regard , water is being used effectively and crop’s requirement is fulfilled. This helps us in getting the desired yield and fulfilling the objective of conserving water .

Problem Statement Addressed

Though people are suffering due to water scarcity , there ain’t a proper system for monitoring water usage. It becomes important to conserve water which results in further environmental usage. Mainly the irrigation work done by farmers require more precision which results in proper yield.

Existing Solution to the Problem Addressed

There are system's which regulates water flow if the temperature exceeds the threshold value or when the field lacks water which are sensed using respective sensors.

Proposed Solution to the Problem Addressed

1)This project deals with making an optimum usage of available water source .

2)By using the temperature sensor and raindrop sensor the temperature,humidity and moisture levels of the field are calculated and noted for every 5 minutes.

3)All the programmable works are being done and the Node MCU plays a major role,here it is used for the interfacing purpose.

4)The obtained sensor values are tabulated in a google sheet which are used for further calculations.

5)The model is developed in such a way that it analyzes the present condition(values) with that of previous ones and works accordingly.

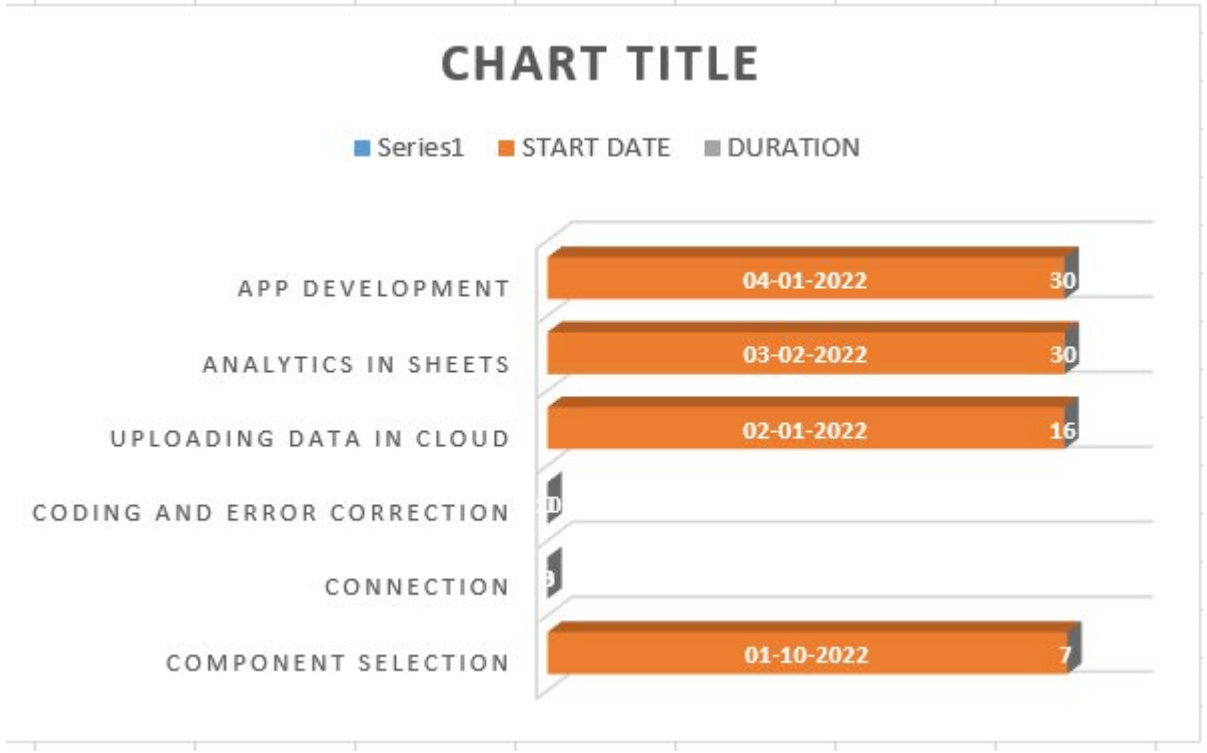
6) For every hour the respective values are clustered and calculated.

7) Then they are compared with their respective threshold values(they may change according to the soil and crop) and the system decides on whether the water flow is needed or not .

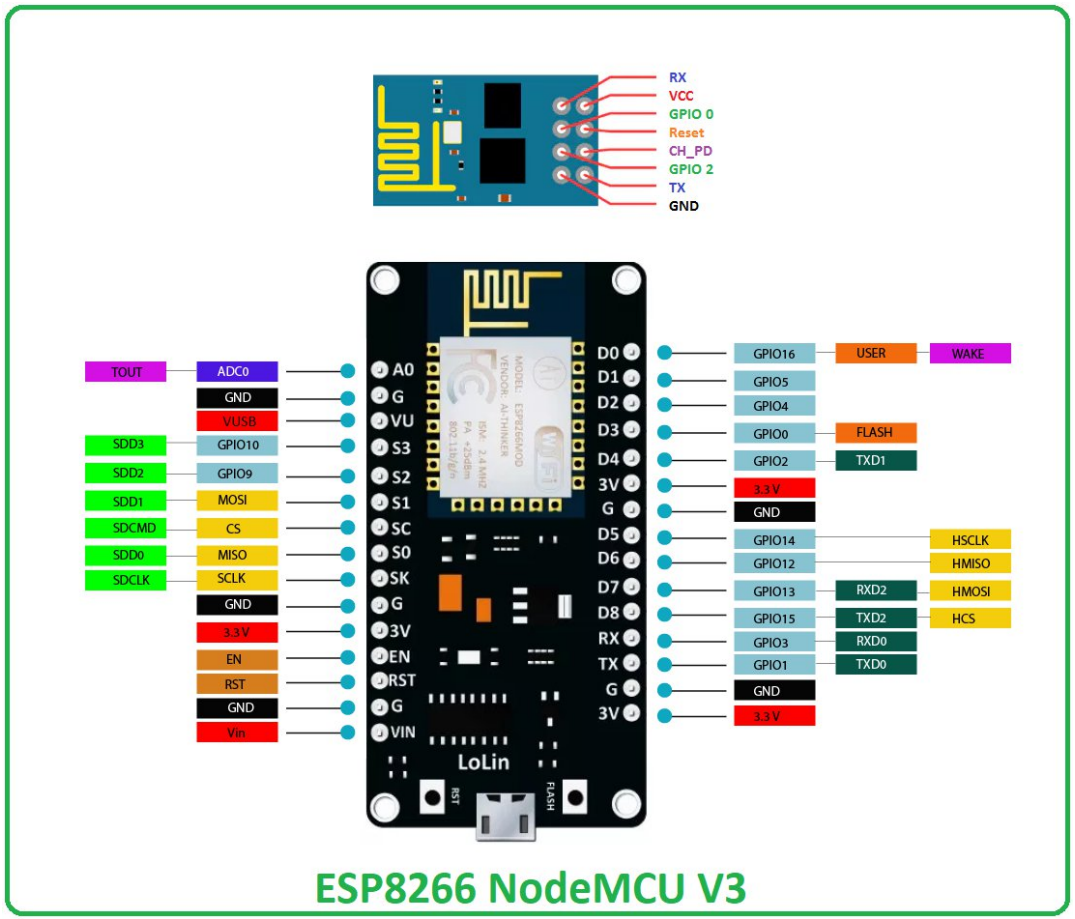
8)The values are intimated to the user by a mobile app. The user may know the stats and working of model by using it.

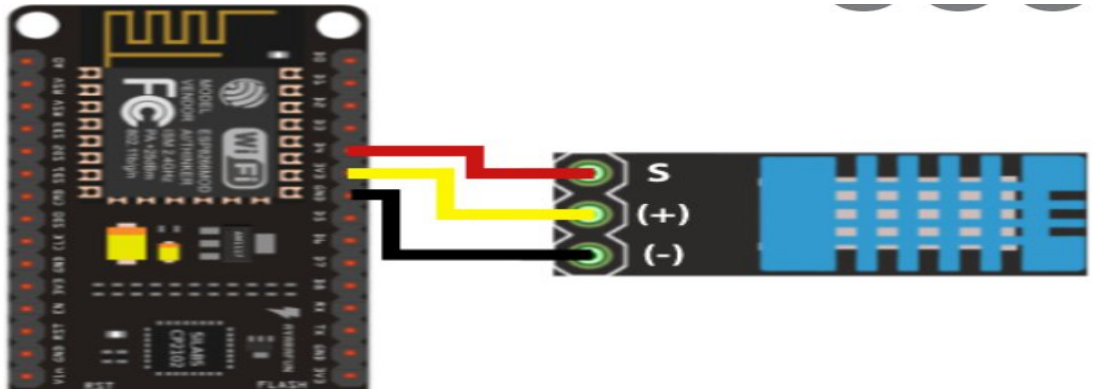
9)The app is developed using MIT App Inventor and is made into use. It’s user friendly and is apt for this model. In this way the main objective of **precised** water flow is obtained.

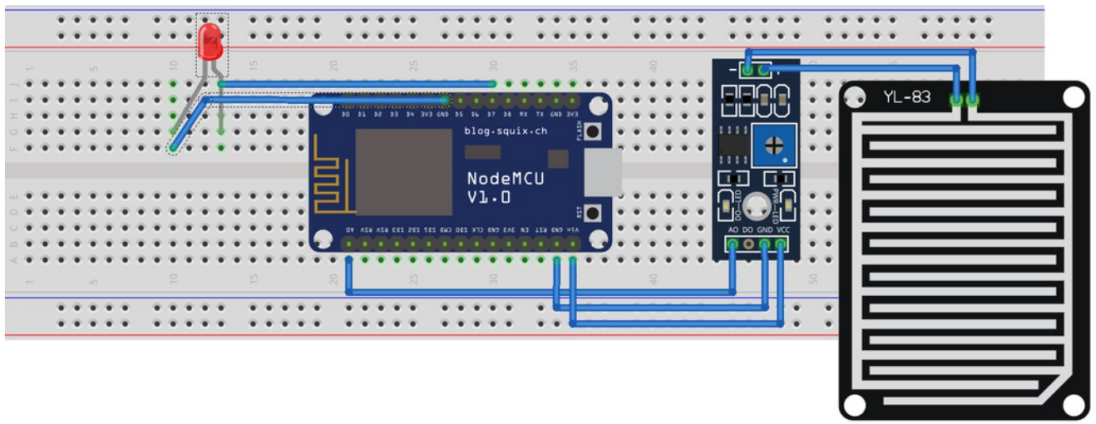
Project Work Plan



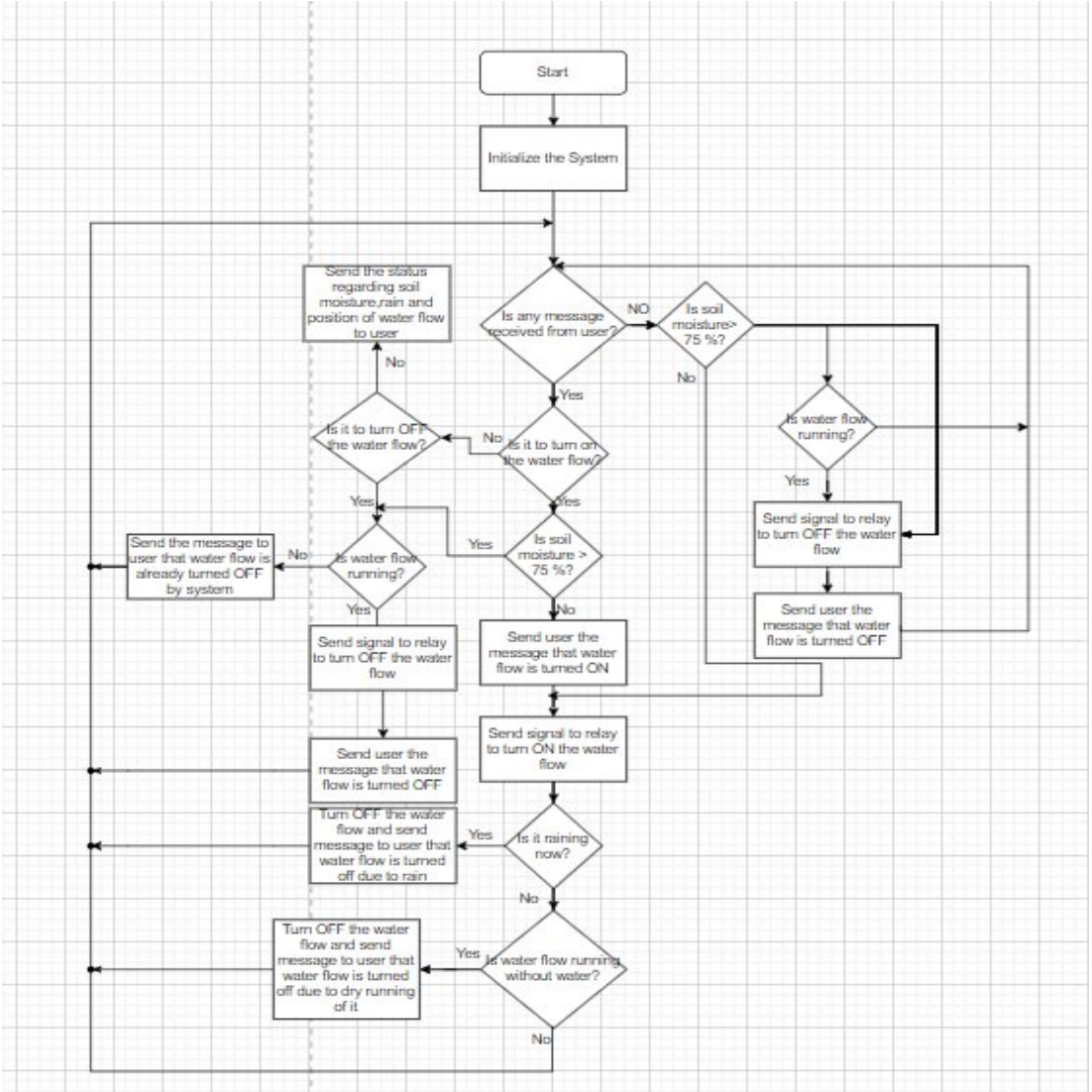
Block Diagram and/or Circuit Diagram







Flow Chart


Start
Initialize the System
Send the status regarding soil moisture,rain and position of water flow to user
Is any message received from user?
NO
Is soil moisture> 75 %?
No
Yes
Is it to turn OFF the water flow?
No
Is it to turn on the water flow?
Is water flow running?
Yes
Yes
Yes
Send signal to relay to turn OFF the water flow
Send the message to user that water flow is already turned OFF by system
No
Is water flow running?
Yes
Is soil moisture > 75 %?
Send user the message that water flow is turned OFF
Yes
No
Send signal to relay to turn OFF the water flow
Send user the message that water flow is turned ON
Send signal to relay to turn ON the water flow
Send user the message that water flow is turned OFF
Turn OFF the water flow and send message to user that water flow is turned off due to rain
Yes
Is it raining now?
No
Turn OFF the water flow and send message to user that water flow is turned off due to dry running of it
Yes
Is water flow running without water?
No

Effective utilization of the Modern Tool & Cloud

Google sheets is put into use for analytic part. Since it’s an open source and is suitable for doing analytics it’s used here. It can be used to store the values and is user friendly too,thereby it finds it’s application here .

MIT App Inventor is a portal to create apps.We have used it to create an user friendly app which enables to send the values to the user. The performance graph and working status can also be viewed by the user.

Technology stack & use case

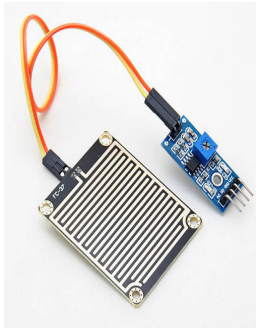
AGRICULTURE LAND

→

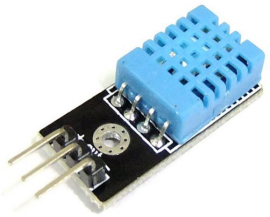
NODE MCU

→

↘



RAINDROP SENSOR



TEMPERATURE SENSOR

↓

Google Sheets

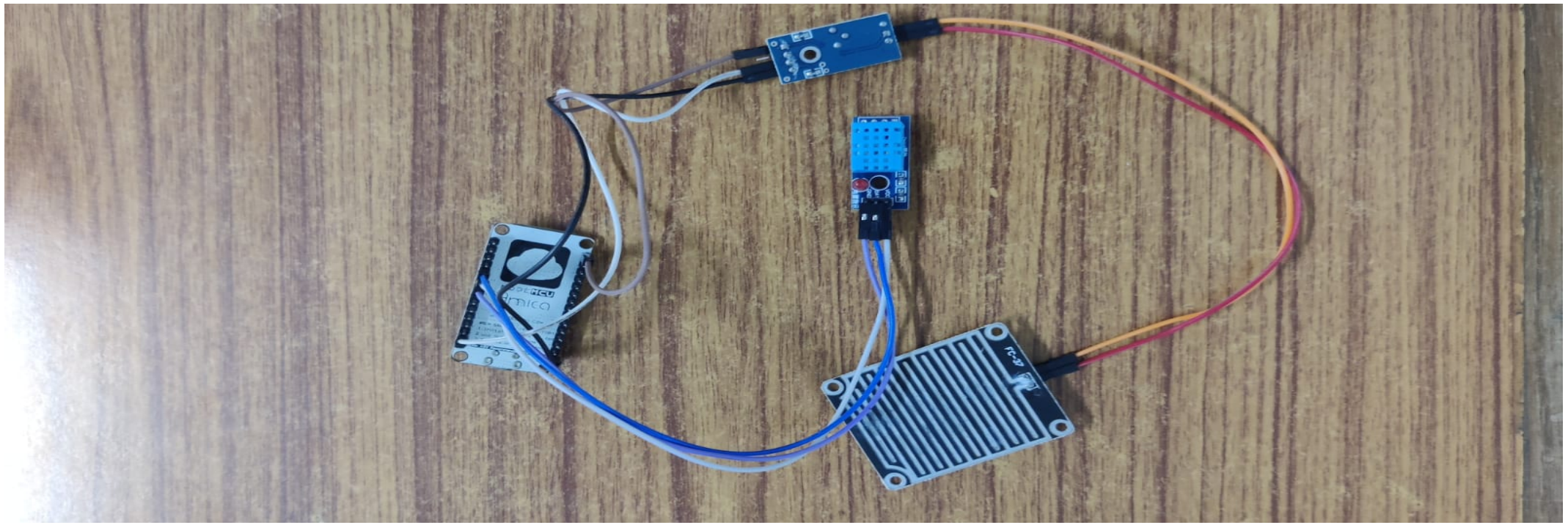
GOOGLE SHEETS(VALUES STORED)

↓

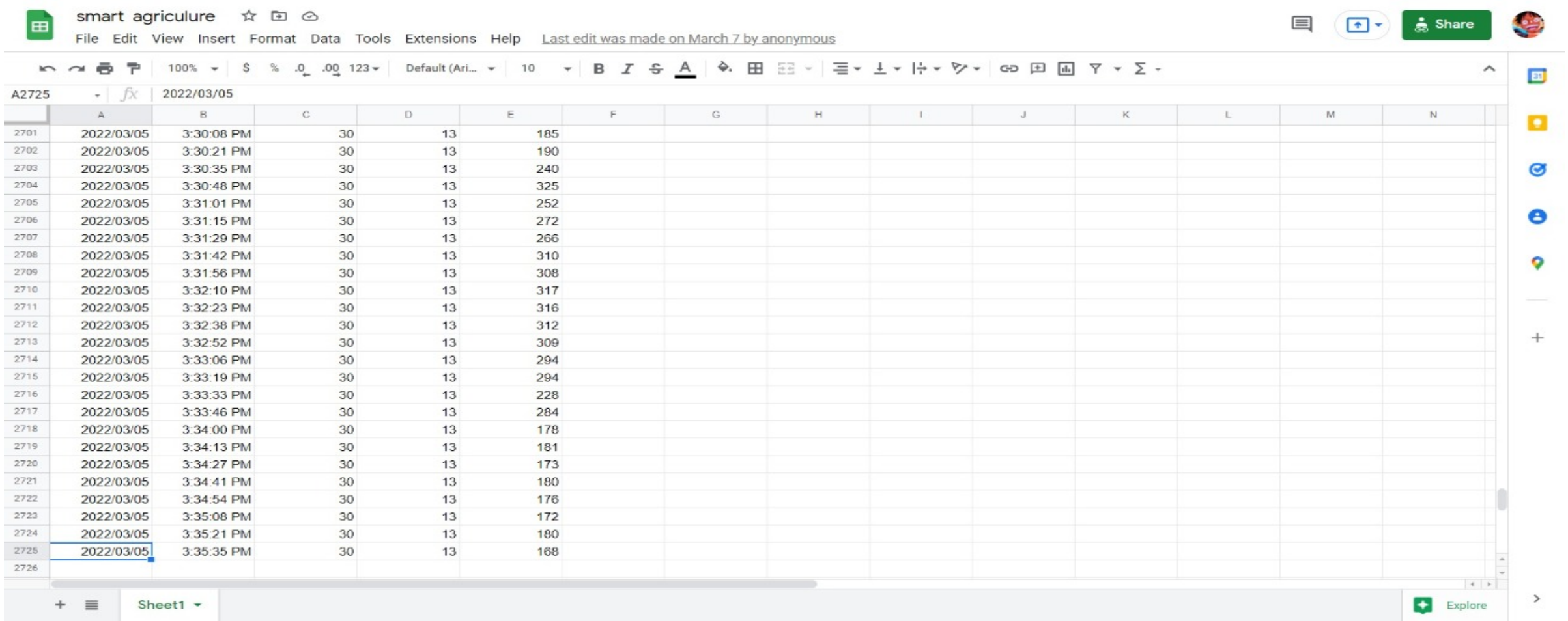
AI WITH APP INVENTOR

APPLICATION FOR USERS

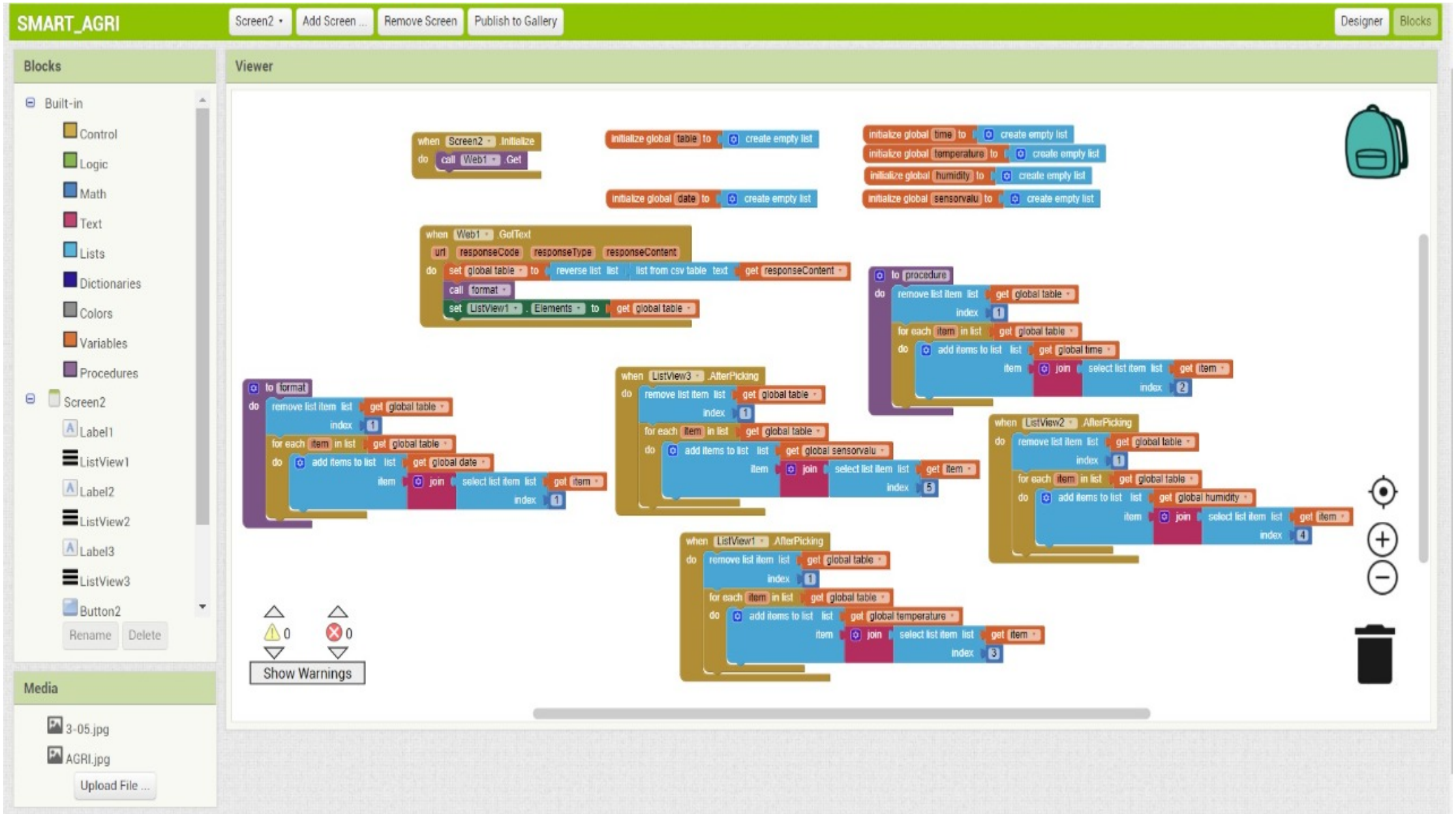
Prototype & Sample Output



Analysis of Results & Discussions



	A	B	C	D	E
2701	2022/03/05	3:30:08 PM	30	13	185
2702	2022/03/05	3:30:21 PM	30	13	190
2703	2022/03/05	3:30:35 PM	30	13	240
2704	2022/03/05	3:30:48 PM	30	13	325
2705	2022/03/05	3:31:01 PM	30	13	252
2706	2022/03/05	3:31:15 PM	30	13	272
2707	2022/03/05	3:31:29 PM	30	13	266
2708	2022/03/05	3:31:42 PM	30	13	310
2709	2022/03/05	3:31:56 PM	30	13	308
2710	2022/03/05	3:32:10 PM	30	13	317
2711	2022/03/05	3:32:23 PM	30	13	316
2712	2022/03/05	3:32:38 PM	30	13	312
2713	2022/03/05	3:32:52 PM	30	13	309
2714	2022/03/05	3:33:06 PM	30	13	294
2715	2022/03/05	3:33:19 PM	30	13	294
2716	2022/03/05	3:33:33 PM	30	13	228
2717	2022/03/05	3:33:46 PM	30	13	284
2718	2022/03/05	3:34:00 PM	30	13	178
2719	2022/03/05	3:34:13 PM	30	13	181
2720	2022/03/05	3:34:27 PM	30	13	173
2721	2022/03/05	3:34:41 PM	30	13	180
2722	2022/03/05	3:34:54 PM	30	13	176
2723	2022/03/05	3:35:08 PM	30	13	172
2724	2022/03/05	3:35:21 PM	30	13	180
2725	2022/03/05	3:35:35 PM	30	13	168
2726					

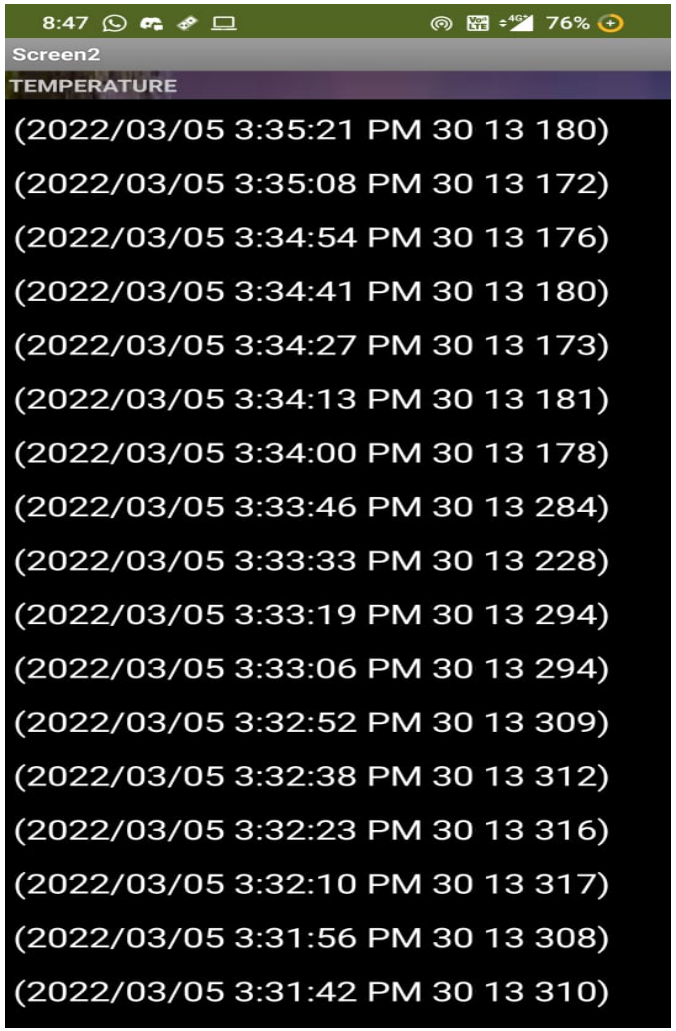

SMART_AGRI
Screen2
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen2
Label1
ListView1
Label2
ListView2
Label3
ListView3
Button2
Rename
Delete
Media
3-05.jpg
AGRI.jpg
Upload File ...
Viewer
when Screen2 .Initialize
do call Web1 .Get
initialize global table to create empty list
initialize global date to create empty list
initialize global time to create empty list
initialize global temperature to create empty list
initialize global humidity to create empty list
initialize global sensorvalu to create empty list
when Web1 .GotText
url responseCode responseType responseContent
do set global table to reverse list list list from csv table text get responseContent
call format
set ListView1 . Elements to get global table
to procedure
do remove list item list get global table
index 1
for each item in list get global table
do add items to list list get global time
item join select list item list get item
index 2
to format
do remove list item list get global table
index 1
for each item in list get global table
do add items to list list get global date
item join select list item list get item
index 1
when ListView3 .AfterPicking
do remove list item list get global table
index 1
for each item in list get global table
do add items to list list get global sensorvalu
item join select list item list get item
index 5
when ListView2 .AfterPicking
do remove list item list get global table
index 1
for each item in list get global table
do add items to list list get global humidity
item join select list item list get item
index 4
when ListView1 .AfterPicking
do remove list item list get global table
index 1
for each item in list get global table
do add items to list list get global temperature
item join select list item list get item
index 3
0
0
Show Warnings

Cost Benefit Analysis (List of Components / Service Used)

(Budget)

S.No	Component Name	Specification (IC number or Range or Value)	Unit Cost	Total Cost(INR)
1	Raindrop sensor		1	105
2	Temperature sensor		1	196
3	Node MCU		1	300

Working video Link (If available)



Reference

- https://www.amazon.in/Irrigation-Water-Power-Engineering-Punmia/dp/8131807630/ref=asc_df_8131807630/?tag=googleshopdes-21&linkCode=df0&hvadid=396989291412&hvpos=&hvnetw=g&hvrand=12606517211238016750&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9299479&hvtargid=pla-406644472455&psc=1&ext_vrnc=hi