ISSN 2395-1621

INGENIOUS WATERING SYSTEM FOR TERRACE PLANTATION

Yash Lunkad, Gautam Lunkad, Tarun Lodha, Siddhi Lanke,

Priyanka Lokhande, Prof.(Dr). Sachin S. Sawant

yash.lunkad19@vit.edu, gautam.lunkad19@vit.edu, tarun.lodha19@vit.edu, siddhi.lanke19@vit.edu, priyanka.lokhande19@vit.edu, sachin.sawant@vit.edu

Professor, Department of Engineering Sciences and Humanities

Department of Engineering Sciences and Humanities Vishwakarma Institute of Technology, Pune-411037

ABSTRACT

Watering the plants meticulously as per the need is the key for proper growth and hence yields of any crop or plant. In view of terrace gardening or plantation , the present project provides an Arduino based smart watering system capable of monitoring soil moisture level and accordingly supply the water. This makes the watering process in an optimized and controlled manner. For monitoring and sensing purpose various sensors are used such as soil moisture sensor, light sensor, rain sensor, temperature sensor. Arduino Atmega 2560 is suitably programmed to respond sensors and operate appropriately. The information the process of watering is updated to user through a mobile application using HC05 Bluetooth Module.

Keywords— Arduino Atmega 2560, HC05 Bluetooth Module, Soil Moisture Sensor, Solenoid Valve, Temperature Sensor

ARTICLE INFO

Article History

Received: 8th March 2020

Received in revised form :

8th March 2020

Accepted: 10th March 2020

Published online :

11th March 2020

I. INTRODUCTION

In today's world it is rare to get good quality and fresh vegetables and flowers. The solution for this is Terrace Plantation, in which we can utilise the open space in our houses to plant some vegetables. Excessive use of fertilizers is being used in cultivation of vegetables to get maximum yield but these are harmful to our health. While doing Terrace plantation, the major issue is to give optimum amount of water to the plants. Both more and less quantity of water can affect plants. It is need of the hour to bring an automation to supply optimum and precise amount of water to the plants. This also help us use water in an effective way. In the field of agriculture also, it is required to provide sufficient of water to the plants to get good yield. Agriculture is the backbone of our country and to increase the yield from it is very essential. [1][2][3][4]

This project makes use of various sensors like soil moisture sensor, rain sensor, temperature sensor and light sensor. The input is received by the Arduino Atmega2560 and data is sent to the user's app by HC05 Bluetooth module. If the value of soil moisture is more than the required then the solenoid valve will be turned off. If the valve of soil moisture sensor is less than required then the solenoid valve will be turned on. It will also check the optimum temperature and light conditions and then decide if conditions are good to supply water to the field. Rain sensor is also provided, if it's raining then if will stop the supply of water.

II. LITERATURE REVIEW

Bobby Singla. et. al.[1] reported a paper where soil moisture sensor and DTH11 temperature sensor was used .All the information was sent to farmer's mobile using Wi-Fi Relay module and Arduino Uno R3.

Chandan Sahu. et al[2] reported a paper in 2015 where water motor was controlled automatically using data from soil moisture sensor and finally send message to user mobile and g-mail account using raspberry-Pi and Wireless sensor network.

Pavankumar Naik. et al[3] reported a paper in 2017 which uses Iot . The various parameters like soil moisture value , temperature and humidity were displayed on android application . The motor was turned ON/OFF depending on value of sensor.

P. Banumathi. et al[4] reported a paper which uses Arduino and GSM module to send data about the soil

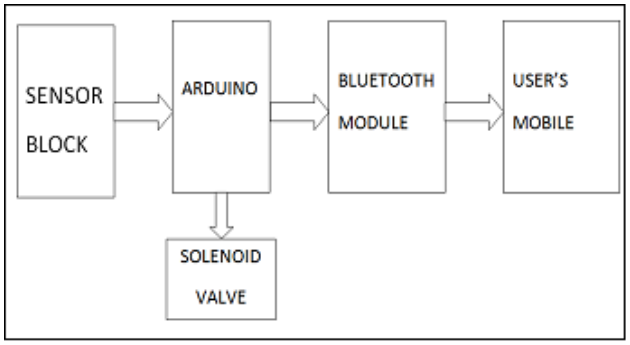
moisture to the user and control the motor accordingly to the value of soil moisture sensor.

A.Sumalatha et al[5]reported a paper in 2017 which used soil moisture sensor. The motor pump was powered using solar energy and it was a GSM based irrigation.

Karan kansara et al[6] reported a paper in 2015 which states an automatic irrigation system.

III. METHODOLOGY/EXPERIMENTAL

BLOCK DIAGRAM



The block diagram as shown contains the sensor block, arduino, Bluetooth module, user's mobile.

The sensor block consists of
1. Soil Moisture Sensor
2. Temperature sensor
3. Rain sensor
4. Light sensor

The arduino block collects the data from the sensor block and is sent on the user's mobile with the help of the Bluetooth module.
The solenoid valve will be connected to arduino and will control the flow of water.

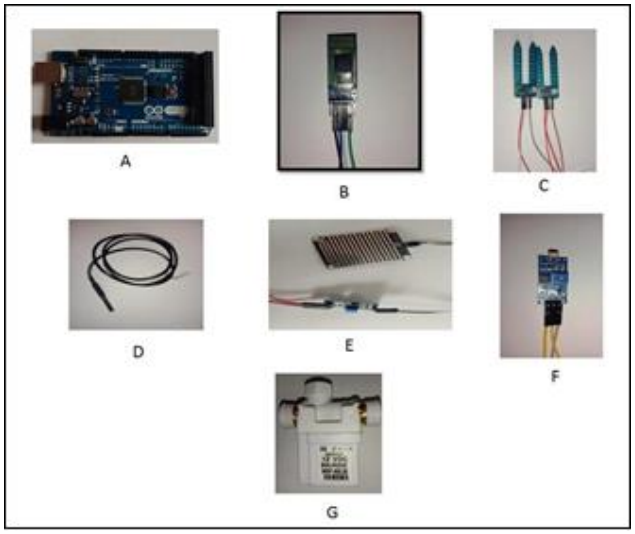
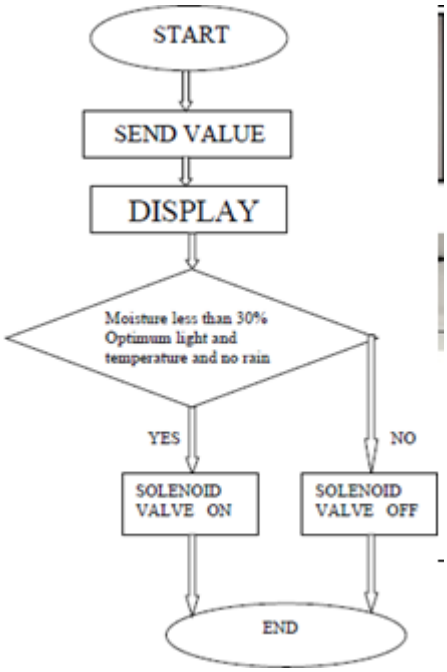


Fig 1.A: Arduino Atmega2560 Fig 1.B:HC05 Bluetooth Module Fig 1.C: Soil Moisture Sensor Fig 1.D: Temperature Sensor Fig 1.E: Rain Sensor Fig 1.F: Light Sensor Fig 1.G: Solenoid Valve

IV. ALGORITHM

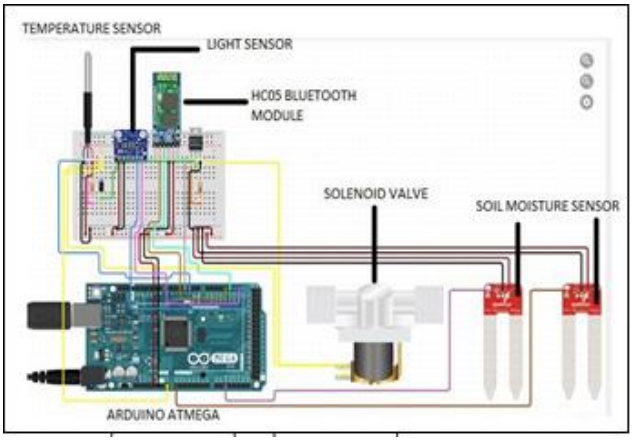
The steps that the system undergoes:
Step 1: Soil moisture sensor senses the moisture level of the soil (less than or more than). Temperature sensor, rain sensor and light sensor senses the value and returns the valve to Bluetooth module.
Step 2: If the moisture sensed value is greater than the fixed threshold value than no need to switch on the motor.
Step 3: If the Moisture level is less than the threshold value, then the solenoid valve is switch-on automatically.
Step 4: Once moisture level comes equal to the threshold value, it moves to its initial state (switch-off the solenoid valve).
Step 5: If it is raining or temperature is not optimum for supplying water then also solenoid valve will be turned off.
Step 6: End the process.

Flow Chart:

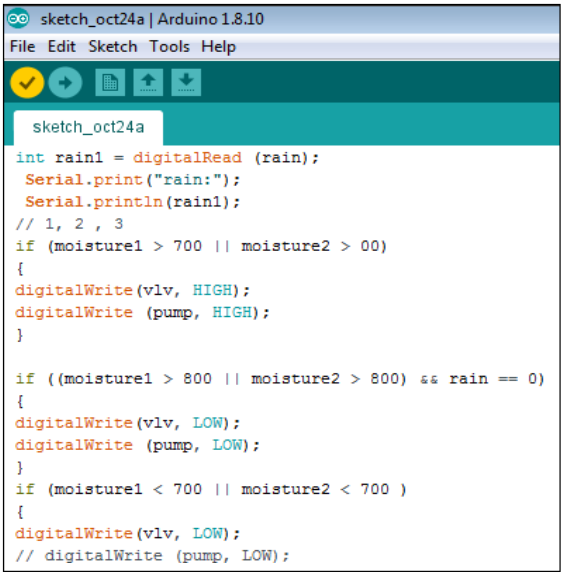


V. CIRCUIT DIAGRAM

The circuit diagram is designed using Circuit.io



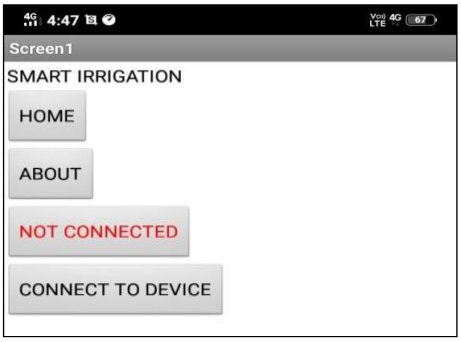
Characterization/Pseudo Code/Testing



SOFTWARE USED:

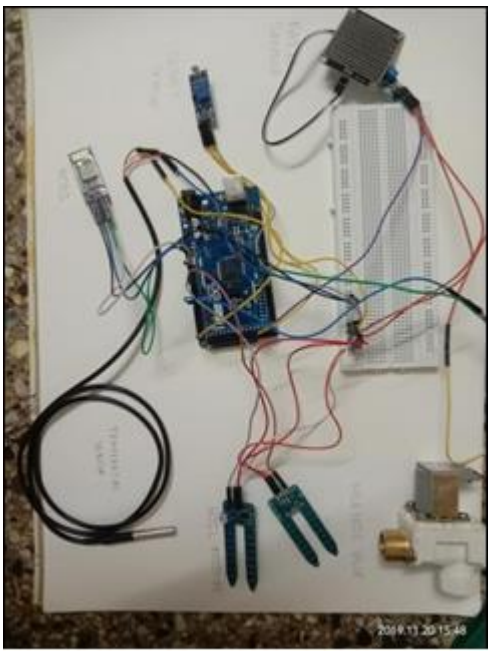
1. ARDUINO IDE 1.8.10[7]
2. MIT APP INVENTOR 2 [11]

The app to be used for viewing the data



VI. RESULTS AND DISCUSSIONS

The proposed system will be

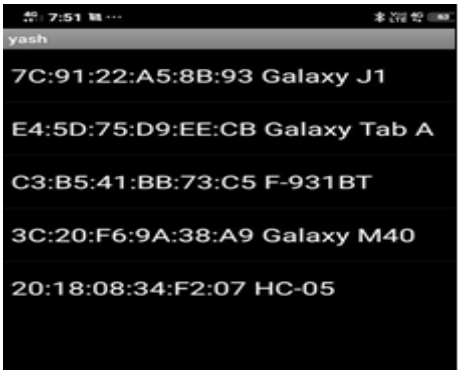


TEST:

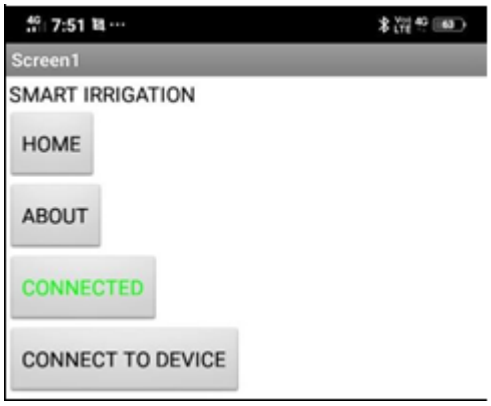
1. Connect the Bluetooth module to the mobile application.
2. Check if the app is optimized and is receiving values from Sensor .
3. The values displayed should:
1. Soil Moisture Value
2. Temperature
3. Light Sensor
4. Rain Sensor
4. The solenoid valve should be off if the moisture value is less than 700.
5. The solenoid valve should be on if the moisture value is more than 700.
6. Water is supplied only if temperature is more than 20 degrees.
7. If it is raining water supply should stop.

RESULTS:

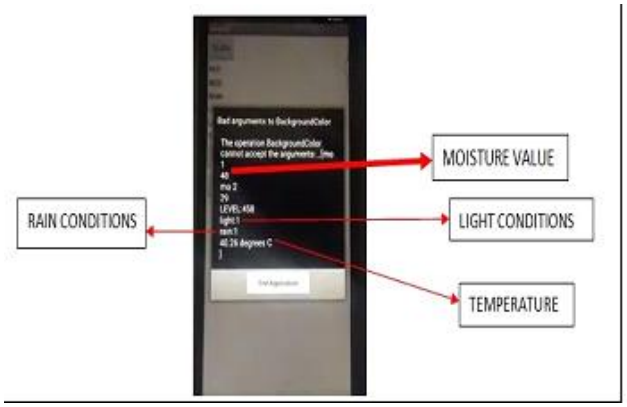
1 .When app is opened it shows list of all the Bluetooth device.



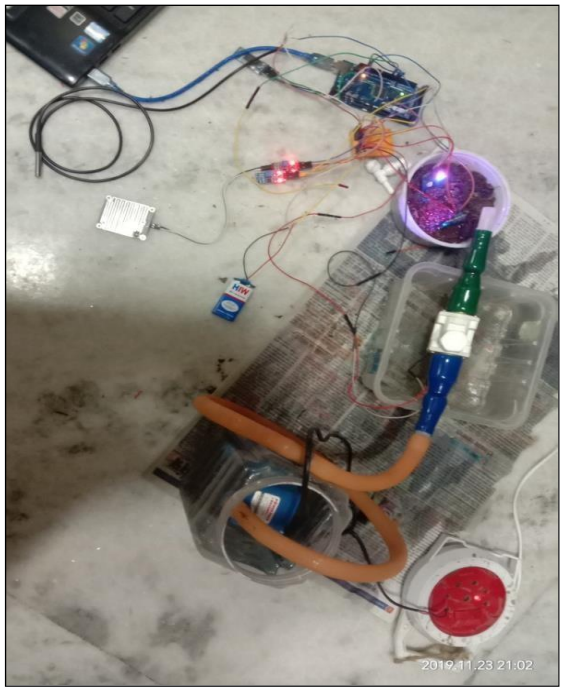
2. When clicked on HC05 it shows connected



3. Value from sensor displayed



4. Value from soil moisture sensor is less than 700 so solenoid valve will remain off.



VII. LIMITATIONS

The proposed project will be suitable for small area like terrace garden , small gardens at home. The motor cannot be controlled using the android application.

VIII. FUTURE SCOPE

This project can be made useful for a big land and can be optimized for controlling two or more crops at a time. The motor pump could also be controlled using the application. This system could be optimized to check the nutrient valve of the soil and the valve required by the plant

IX. CONCLUSION

In this paper, we present an Ingenious Watering System for Terrace Plantation which calculates the moisture content of the soil and controls the solenoid valve accordingly. This helps in preventing the plants from getting more water than required and supply right quantity of water to the plants.

X. ACKNOWLEDGMENT

We would like to thank our honorable Director Prof. (Dr.) R.M Jalnekar, Vishwakarma Institute Of Technology and HOD Prof.(Dr.) C.M Mahajan for sharing their pearls of wisdom and guiding us. We would like to express our gratitude to our guide Dr. Sachin S. Sawant for helping us in completing this project.

REFERENCES

[1] Bobby Singla, Satish Mishra, Abhishek Singh, Shashan Yadav-“A study on smart irrigation system using IOT” Published in International Journal of Advance Research, Ideas and Innovations in Technology.

[2] Chandan K. Sahu, PramitteBehra-“ A low cost smart irrigation control system”-Published in International Conference On Electronics and Communication in 2015.

[3] PavankumarNaik, Arum Kumbi, Vishwanath Hiregoudar, Chaitra N K, Pvitra H K, Sushma B S, Sushmita J H, Praveen Kuntanahal- “Arduino based automatic irrigation system using IOT” Published in International Journal Of Scientific Research in Computer Science , Engineering and Information Technology 2017 Volume-2, Issue 3.

[4] Dr. P. Banumathi, D. Saravanan, M. Sathiyapriya, V. Saranya-“An android based automatic irrigation system using Bayesian network with sms and voice alert” Published in International Journal Of Scientific Research in Computer Science , Engineering and Information Technology 2017 Volume-2, Issue 3

[5] K ASumalatha, G Eswar Kumar-“Energy efficient solar powered automatic irrigation system” Published in International Journal Of Engineering and Management Research Volume-7, Issue-3,2017 .

[6] KaranKansar, Vishal Zaweri-“Sensor based automatic irrigation system using IOT” Published inInternational Journal Of Computer Science and Information Technology.Volume-6, 2015.

[7] www.arduino.cc.

[8] Book “Getting started with arduino a beginners guide” by Brad Kendall

[9] H.N Kamalaskar, Dr.P.HZope-“Survey of smart irrigation system “ Published in International Journal of Engineering Sciences & Research Technology issn:2277-9655.

[10] Archana and Priya –“Design and implementation of automatic plant watering system” Published in International Journal Of Advanced Engineering and Global Technology ,vol-4,Issue-01,Jan 2016.

[11] MIT App Inventor-2.

[12] Venkata Naga, RohitGunturi-“Micro controller based automatic plant irrigation system”-Published in International Journal Of Advancements In Research And Technology, vol-2,issue-4, April-2013.

