INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

IJARIIT

ISSN: 2454-132X
Impact factor: 4.295
(Volume 5, Issue 2)
Available online at: www.ijariit.com

Smart irrigation using IoT

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ABSTRACT

Smart Irrigation can transform agricultural discipline from being manual and static to automatic and dynamic resulting in higher production with lesser human intervention. This model maintains the desired soil moisture level in the soil and sends the data to Arduino. The Arduino acts as a control unit. Based on the sensed values, water will be supplied to the plant which can help us to avoid over-irrigation and under irrigation. Water sensor is used to sense the amount of water still available in the tank. Information from the two soil moisture sensors will be regularly updated to the web page using WIFI module and message alert will be sent to the user. Sensor values are uploaded to the thingspeak channel to generate graphs for analysis, the same can be viewed in-app and motor can be controlled. Real-time data can be viewed in thingspeak cloud.

Keywords— *Automation, Two soil sensors, Wi-Fi, Real-time data*

1. INTRODUCTION

The current population of India is 1.35 billion and the percentage of increase in population is 1.2% annually. So, there is a need in the development of the agricultural field to overcome food problems. The main aim/purpose of this project is to provide an automated irrigation system thereby saving time, power, water and money of the farmer. In this automated system, human involvement can be minimized. This system detects humidity and moisture in the soil. When the soil becomes dry, values will be sent to Arduino, Arduino uploads these values to the cloud and a message will be sent to user mobile. When the values of moisture and humidity in the soil are below the threshold or given value then this system automatically pumps water to plants for some time, without the involvement of human.

2. LITERATURE SURVEY

2.1 Types of Irrigation Systems

2.1.1 Conventional Irrigation System: It is manually operated. Irrigation scheme is based on real-time weather & soil conditions observed manually. Watering schedule is driven by a heuristic based on the experience of the farmer. In this type there are three methods:

- **(a) Sprinkle System:** Sprinkle system is very similar to rainfall. It covers a large system. Water is allowed to pass through pipes and in between intervals of pipe, a sprinkler is connected which spreads the water to plants. By this technique, a large area will be watered.
- **(b) Drip System:** In this type of system, to a large pipe many small sub-pipes are connected. The large pipe is connected to the nozzle. Whenever plants required water, the nozzle is turned on and sub-pipes spread the water to roots of the plants. In this method, all plants should be in order, so that water can be spread to roots without any complex work.
- **(c) Channel System:** Channel system uses canals to pump water. This is a very low-cost method and has many advantages. From rivers, canals will be constructed and from canals with pumps water is planted to plants. But in this method, the river should be there for a village.

2.1.2 Automated Irrigation System: - It is autonomous. Irrigation scheme is pre-planned. Historical weather & soil data used as an input parameter. Usually, time Triggered. But these types have limitations:

(a) Constant vigilance of the farmer is required
(b) A large number of workers are required to monitor the system
(c) Wastage of huge amount of water and electricity
(d) The automated system does not depend on temperature conditions
(e) A farmer cannot find moisture content in the soil, so he cannot decide to water plants

3. PROPOSED SYSTEM

To overcome the limitations and challenges of the conventional and automated irrigation system, we use the Internet of Things (IoT).

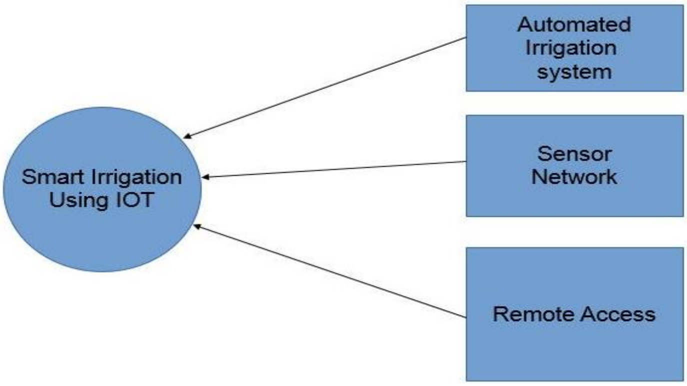

Fig. 1: Block diagram of the proposed system

3.1 Architecture

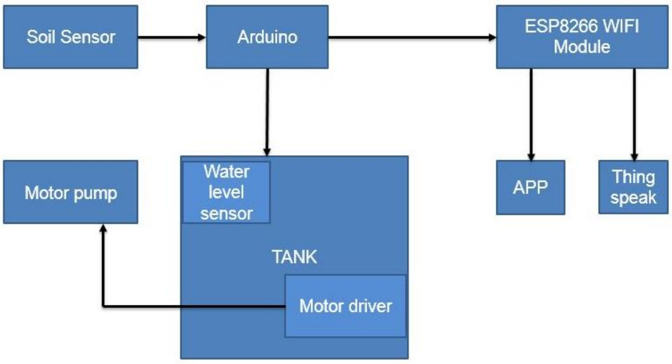

Fig. 2: Architecture of the proposed system

Soil sensors are used to record the soil moisture content of soil at all the time, the sensed values are sent to Arduino. Arduino is a microcontroller that acts as a brain to the entire system. If the moisture content in the soil is below the set threshold value, then the water pump automatically switches "ON" to irrigate the soil. The Arduino also logs the soil moisture and water usage data to thingspeak cloud, that is setup using ESP8266 WIFI module. The same data is also acquired and displayed in the Android app through the internet.

3.2 Principle used in this system

In liquids, current flows due to movement of charged particles (ions), these ions are formed when a voltage is applied to ionic compounds dissolved in water. As a result of this, they increase the conductivity of water. If ions are increased then moisture content in the soil increases, which in turn increases the electrical conductivity of the soil. If conductivity increases resistance decrease. As per Ohms law (V=IR), resistance is directly proportional to voltage, if the voltage is less than the conductivity of water is more, more the conductivity the wet soil is.

So, Wet soil -> Lower output voltage

And Dry soil -> Higher output voltage

4. COMPONENTS

4.1 Arduino

Arduino is open source hardware and software development platform. It is used in IoT applications like wearables, 3D printing, etc. code is easily and freely available. It gives the user the flexibility to adapt and develop the design for their own project.

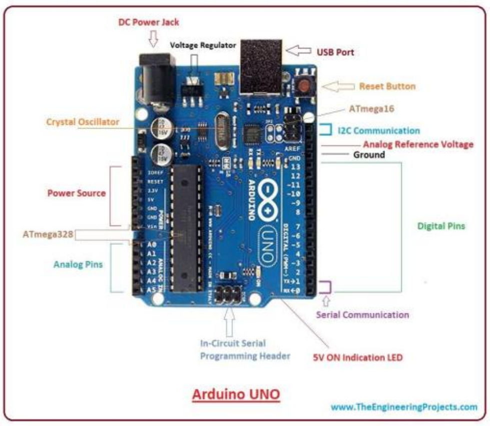

Fig. 3: Arduino

4.2 ESP8266 (Wi-Fi Module)

ESP8266 is a low-cost Wi-Fi module. It has dual functionality, it can carry and drive the entire application and can control other micro-controller units. It's working power range is 3.0 to 3.6 volts. It has a built-in TCP/IP stack.

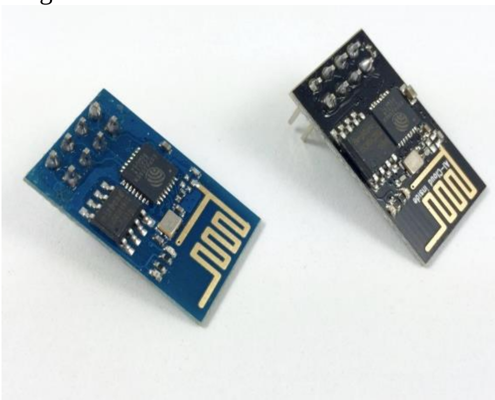

Fig. 4: Wi-Fi module

4.3 Soil Moisture Sensor

YL-69:

- It is used to measure water content in the soil.
- Current will be passed to electrodes to get to know about the soil condition.

LM-393:

- When the soil is wet then the output voltage decreases.
- When the soil is Dry then output voltage increases.

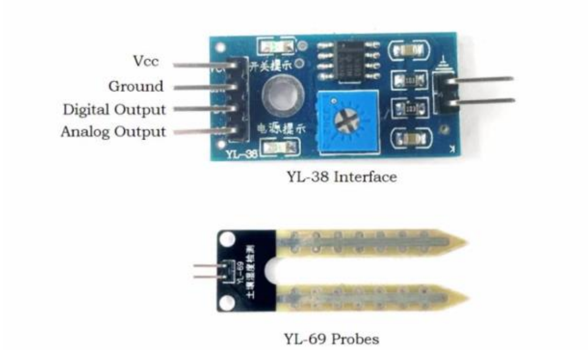

Fig. 5: a Soil moisture sensor

4.4 Motor Driver Board

A motor converts electrical energy to mechanical energy which requires high power. The microcontroller cannot provide such high power, so the motor driver board acts as an interface between microcontroller and motor. Here we use external source(battery) for power supply to motor.

Fig. 6: Motor Driver Board

4.5 Water sensor

Water sensor used to measure the water level in the container.

Fig. 8: Water Sensor

Table 1: AT Commands

Command	Description
AT+RST	Reset the Module
AT	Test if AT system works correctly
AT+CWMODE	Set AP's info which will be connected by ESP8266
AT+CWJAP	Commands ESP8266 to connect an SSID with the supplied password
AT+CIFSR	Get the local IP address
AT+CIPMUX	Enable multi connections or not

5. RESULTS AND GRAPHS

5.1 Sensor data

Fig. 9: Sensor data graphs

5.2 Pump Status

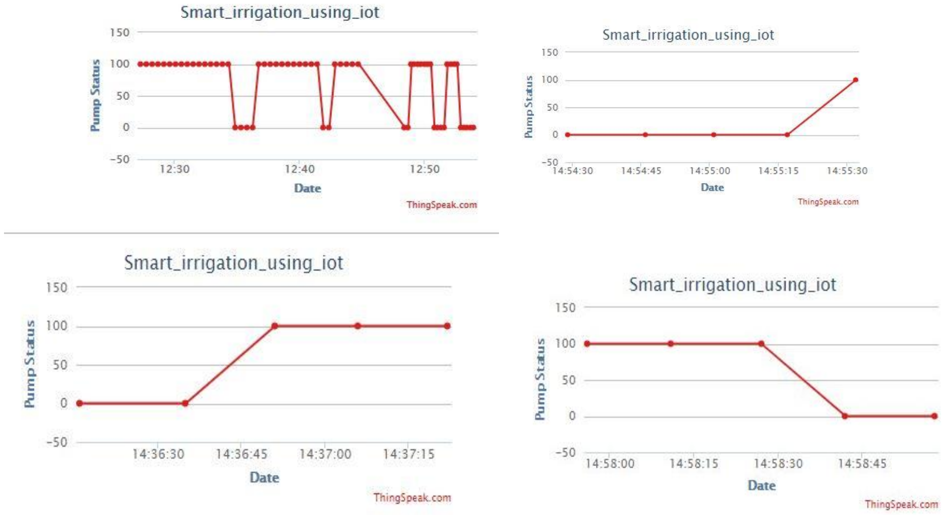

Fig. 10: Pump status graphs

Table 2: Sensor and Pump Status

1	created_at	entry_id	field1	field2
2	2019-02-16 07:06:15 UTC	108	57	0
3	2019-02-16 07:06:44 UTC	109	34	100
4	2019-02-16 07:07:12 UTC	110	34	100
5	2019-02-16 07:07:40 UTC	111	38	100
6	2019-02-16 07:08:09 UTC	112	36	100
7	2019-02-16 07:08:37 UTC	113	33	100
8	2019-02-16 07:09:05 UTC	114	30	100
9	2019-02-16 07:09:34 UTC	115	28	100
10	2019-02-16 07:10:02 UTC	116	26	100
11	2019-02-16 07:10:30 UTC	117	23	100
12	2019-02-16 07:10:58 UTC	118	20	100
13	2019-02-16 07:11:27 UTC	119	17	100
14	2019-02-16 07:11:55 UTC	120	58	0
15	2019-02-16 07:12:23 UTC	121	57	0
16	2019-02-16 07:12:52 UTC	122	49	100
17	2019-02-16 07:13:20 UTC	123	41	100
18	2019-02-16 07:13:48 UTC	124	41	100
19	2019-02-16 07:14:17 UTC	125	41	100
20	2019-02-16 07:14:45 UTC	126	41	100
21	2019-02-16 07:18:25 UTC	127	42	0
22	2019-02-16 07:18:41 UTC	128	43	0
23	2019-02-16 07:18:57 UTC	129	62	100
24	2019-02-16 07:19:12 UTC	130	58	100
25	2019-02-16 07:19:28 UTC	131	57	100
26	2019-02-16 07:19:44 UTC	132	56	100
27	2019-02-16 07:20:00 UTC	133	56	100

21	2019-02-16 07:18:25 UTC	127	42	0
22	2019-02-16 07:18:41 UTC	128	43	0
23	2019-02-16 07:18:57 UTC	129	62	100
24	2019-02-16 07:19:12 UTC	130	58	100
25	2019-02-16 07:19:28 UTC	131	57	100
26	2019-02-16 07:19:44 UTC	132	56	100
27	2019-02-16 07:20:00 UTC	133	56	100
28	2019-02-16 07:20:15 UTC	134	56	100
29	2019-02-16 07:20:31 UTC	135	56	100
30	2019-02-16 07:20:47 UTC	136	25	0
31	2019-02-16 07:21:03 UTC	137	20	0
32	2019-02-16 07:21:18 UTC	138	16	0
33	2019-02-16 07:21:34 UTC	139	14	0
34	2019-02-16 07:21:50 UTC	140	58	100
35	2019-02-16 07:22:06 UTC	141	57	100
36	2019-02-16 07:22:21 UTC	142	56	100
37	2019-02-16 07:22:37 UTC	143	56	100
38	2019-02-16 07:22:53 UTC	144	35	0
39	2019-02-16 07:23:08 UTC	145	34	0
40	2019-02-16 07:23:24 UTC	146	33	0
41	2019-02-16 07:23:40 UTC	147	31	0
42	2019-02-16 07:23:56 UTC	148	30	0
43	2019-02-28 08:55:01 UTC	149	3	0
44	2019-02-28 08:55:25 UTC	150	3	0
45	2019-02-28 08:56:42 UTC	151	3	0
46	2019-02-28 08:57:27 UTC	152	3	100
47	2019-02-28 08:57:55 UTC	153	3	100

6. CONCLUSION

The implemented smart irrigation system is cost effective. The automatic watering system reduces the wastage of water. Real-time update to the cloud helps to view the current water condition in the plant. With this project, it cam is concluded that using IOT in agriculture reduce water wastage and human intervention.

7. REFERENCES

[1] Srishti Rawal, "IOT based Smart Irrigation System", International Journal of Computer Applications (0975 – 8887) Volume 159 – No 8, February 2017.
[2] Marvin T. Batte, "Changing computer use in agriculture: evidence from Ohio", Computers and Electronics in Agriculture, Elsevier science publishers, vol. 47, 1 -13, 2005
[3] Csoto, Magyar, "Information flow in agriculture – through new channels for improved effectiveness", Journal of Agricultural Informatics 1 (2), 25–34, 2010
[4] Jin Shen, Song Jingling, Han Qiuyan and Yang Yan, "A Remote Measurement and Control System for Greenhouse Based on GSM-SMS", Electronic Measurement and Instruments, 2007. ICEMI '07. 8th International Conference.
[5] Indu Gautam and S.R.N Reddy, "Innovative GSM based Remote Controlled Embedded System for Irrigation", International Journal of Computer Applications Vol. 47 – No.13, June 2012.
[6] G. Parameswaran and K. Sivaprasath," Arduino Based Smart Drip Irrigation System Using IOT" presented at International Journal of Engineering Science and Computing (IJESC), May-2016.
[7] Yunseop Kim and Robert G. Evans, "Remote Sensing and Control of an Irrigation System using a Distributed Wireless Sensor Network" presented at IEEE Transactions on Instrumentation and Measurement, Vol- 57, July-2008.
[8] HTTP://WWW.CIRCUITSTODAY.COM/ARDUINO-SOIL-MOISTURE-SENSOR
[9] HTTPS://WWW.INSTRUCTABLES.COM/ID/SMART-IRRIGATION-SYSTEM-USING-IOT/
[10] HTTPS://WWW.ELPROCUS.COM/SMART-IRRIGATION-SYSTEM-USING-IOT/

