IJCSE International Journal of Computer Sciences and Engineering Open Access
Survey Paper Vol.-7, Special Issue-18, May 2019 E-ISSN: 2347-2693

Real Time Monitoring of Soil Moisture for Automatic Plant Watering System

Soham Datta[1*], Amrita Saha[2], Debabrata Paul[3], Roni Jana[4], Amartya Roy[5]

[1,2,3,4,5]Department of Electrical Engineering, Pailan Technical Campus, Kolkata, WB, India

Corresponding Author: soham.datta1998@gmail.com, Tel.: +91 8017987804

Available online at: www.ijcseonline.org

***Abstract*—** Planting trees is a great thing. But sometimes it becomes quite difficult for us to supply them water in the right time so when we are outside home then to keep them alive. So to solve this kind of situation, we have developed a model which can water trees by itself from water reservoir. In this paper we have implemented soil moisture sensor which can detects the humidity level of the soil. Here we have used Arduino Uno in which ATmega328P microcontroller controls the whole system. In this paper the soil moisture sensor will detect the moisture level of a particular area and whether there is any need of water or not. Depending on the soil moisture sensor signal, the Arduino Board command the pump to water the soil still not it reaches to its desired moisture level. After that it will be de-activated again by the command of Arduino Uno. Here to control the signal of activation of the mini water pump we use D.H. Motor Driver Board. So here the construction will help people to water their garden in the case when they are outside home.

***Keywords*—**Monitoring, Soil Moisture, Microcontroller

I. INTRODUCTION

In our fast paced world human beings required everything to be automated. Our life style demands everything to be remote controlled. During this summer time, most people are too lazy to water the potted plants on their rooftop gardens every day. So this system will help a lot to those people who do have external work, it will help them to take care of their plants to water them at the right time in case of their absence in home. This paper is based on a plant watering system which is a model of controlling watering facilities to help millions of people. This model uses a microcontroller based sensor technology for a smart switching system. The model shows the basic mechanism of water pump using sensors by sensing the moisture level present in the soil.

So to reduce this kind of problems and situations we have developed a model which shows the basic switching mechanism of water pump using sensors from the soil by sensing the moisture level present in the soil and to display the real time value in the LCD display [1] [2] [3].

II. PROPOSED MONITORING SCHEME

In this particular model the soil moisture is connected directly to the microcontroller. The soil moisture sensor is placed in the soil to sense the moisture level in the soil. Sensing the soil moisture level of the soil the soil moisture sensor gives an input to the microcontroller.

Then the microcontroller after receiving the soil moisture value from the soil moisture sensor detects the soil moisture value to the coding given to it, the microcontroller board gives an input command to the motor driver board. The command will vary depending on the value of the soil moisture value, if the soil moisture value is below the desired level then the microcontroller will command the motor driver board to run the motor, and if the value of the soil moisture is above the desired level then the microcontroller will command the motor driver board to keep the pump stationary.

The motor driver board is used to run the mini submersible water pump in different conditions. The motor driver board works depending on the given command of the microcontroller. The motor driver board detects that when to run the mini water pump.

The mini submersible water pump performs the ultimate job. It will provide the water from the water source to the potted plants, where there is a requirement of water. This is the full system of the module starting from the soil moisture sensor to the water pump.

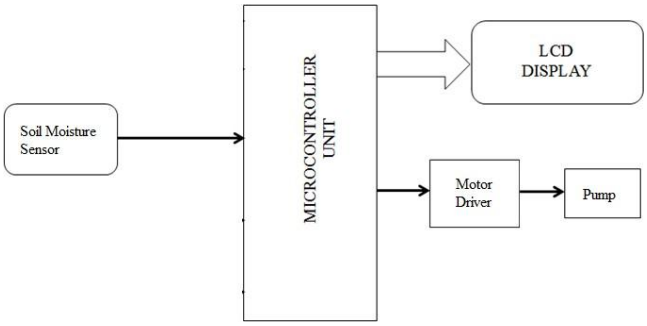

Figure 1. Block Diagram of the Propsed Scheme

III. DEVOLOPED MONITORY SYSTEM

A. Circuit Descriptions

- Microcontroller Board (Arduino Uno Board): Here in the particular paper we have used microcontroller Arduino Uno. The microcontroller board is used as a controller of the project. The Arduino Uno Board we have used here for its simple construction & it is user friendly. The Arduino Uno Board can perform in analog & digital both the process of input and output. In this paper the arduino microcontroller does perform on the basis of given instruction by the soil moisture sensor. The microcontroller board read the input value from the soil moisture sensor and then as a output it gives a command to the motor driver board depending on the sensing value of the soil moisture sensor that wheather to turn on the pump or not.

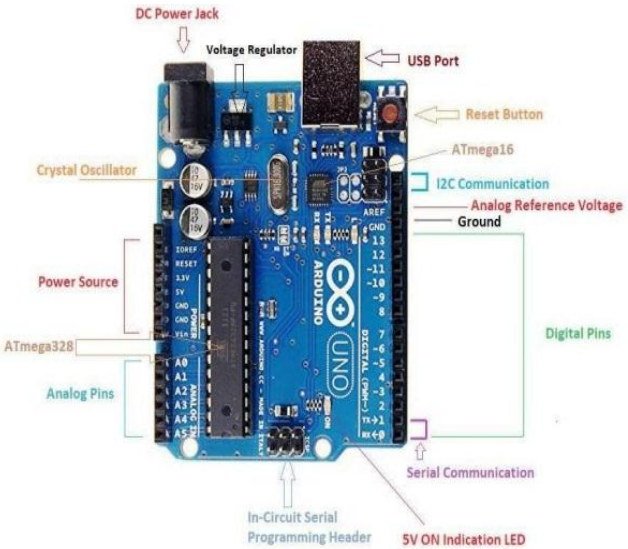

Figure 2. Arduino Uno

- Sensor (Soil Moisture Sensor): Here, for this particular paper we have used soil moisture sensor.

The soil moisture sensor used to sense the moisture level of the soil & it informs that to the microcontroller. In this paper we have used soil moisture sensor because it is easily available in the market. By basis of the value of the moisture level microcontroller detects in which plant we need to be watered.

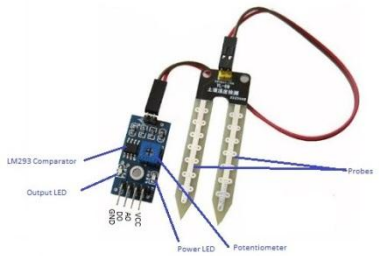

Figure 3. Soil Moisture Sensor

- D. H. Motor Driver Board: The D. H. Motor Driver Board drives the motor by providing suitable range of current and voltage. The motor driver board consists of an IC L298N. Here in the paper we are using the motor driver board to run the water pump depending on the command send from the microcontroller to provide water to the plants. We connect a battery of 9 volt with this driver board to run the mini water pump.

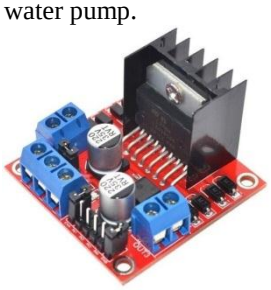

Figure 4. Motor Driver

- Mini Water Pump: Here we are using a mini water pump which runs at 5 volt DC. The submersible water pump draws water from the water source. The mini water pump is connected to a pipe it provides water to the plants. The mini submersible water pump runs on the given conditions from the microcontroller. If the value of the of moisture level is below desired level which is below 25% then the pump will start rotating otherwise if the value is above 25% then the pump will remain in stationary condition (Field and laboratory).

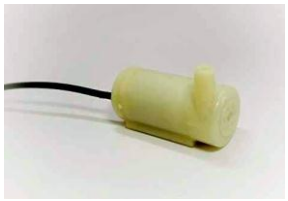

Figure 5. Pump

- LCD Display: Display the moisture value in this area.

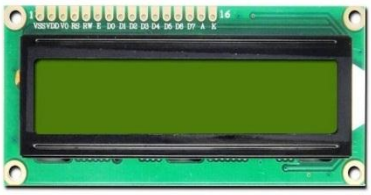

Figure 6. LCD Display (16x2)

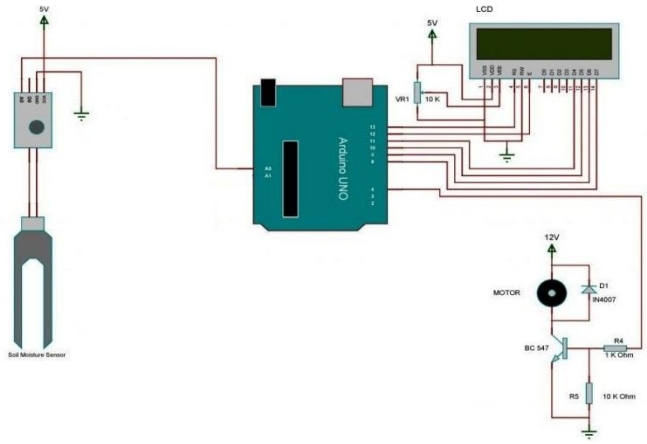

Figure 7. Circuit diagram of monitoring system Figure 6 shows the circuit diagram of monitoring system.

B. Decision making condition:

Every system has its own nature. The boundary condition as follows,

Table 1. System Boundary Condition

The Soil Moisture Value	*It Is Below 25%*	*It Is Above 25%*	*Rotation Of Pump*
15%	1 (YES)	0 (NO)	1 (YES)
85%	0 (NO)	1 (YES)	0 (NO)

In the above table we can see that there are two conditions:

- When the soil moisture value of the soil is sensing by the soil moisture sensor is below 25% then the microcontroller will command the water pump to start rotation and to water the dry soil.
- When the soil moisture value of the soil is sensing by the soil moisture sensor is above 25% then also the microcontroller will check the value and will command the mini water pump to maintain the stationary condition.

C. Flow chart of the monitiorng system

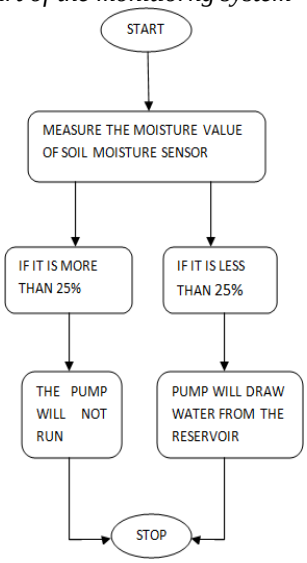

Figure 8. Flow chart of the system

D. Developed System:

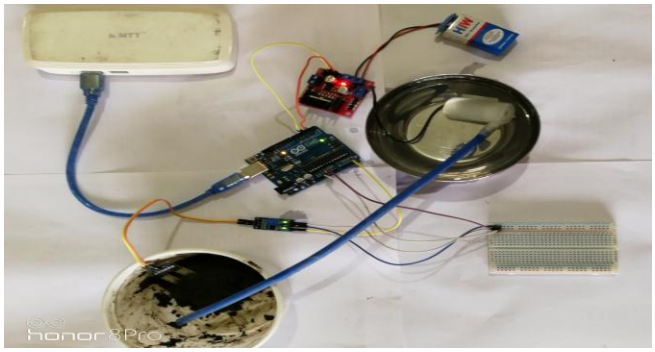

Figure 9. Developed System

IV. EVALUATION OF THE PROPOSED SCHEME

At the first step the soil moisture sensor measure the moisture value of soil. The sensor will provide an input to the microcontroller. Now if the value send by the sensor is above 25%, then the microcontroller will send a command to the pump, as a result the pump will not run. Again if the value send by the sensor is below 25% in that case the microcontroller will command the pump to run and to draw water from reservoir.

V. CONCLUSION AND FUTURE SCOPE

In this particular paper we have successfully established and tested the whole system. In the paper we have discussed about every different part we have used in this system & also we have presented a whole plan about this paper by a flowchart. In this paper the soil moisture sensor sense the moisture level of the soil & depending on the value the microcontroller will instruct the pump to flow the water. The pump will supply the water to the plants. When the moisture value will be at desired level the pump will be turned off by itself. Thus we have tested all the described steps.

Here we are using a LCD display which will display the moisture value of the soil. This project for the implementation in a large scale we can provide more than one sensor & more than one LCD display, to display & to sense moisture level of a large area. We also can use a relay in the project to run the water pump. Here we can control the system by our mobile phone also by using a Bluetooth module.

ACKNOWLEDGMENT

Thanks to the Department of Electrical Engineering, Pailan Technical Campus. Special thanks to Prof. (Dr.) Nirmalendu Chatterjee, Ex Professor of Electrical Engineering Department, Jadavpur University, Kolkata-32 & Prof. (Dr.) Biswanath Roy, Professor of Electrical Engineering Department, Jadavpur University, Kolkata-32

We have done this project on the final semester of our diploma career. I am very thankful to my classmates and teachers, without them we could not have written this paper.

REFERENCES

[1] S. V. Devika, SK. Khamuruddeen et aI., "Arduino based automated plant watering system" in International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 10, October 2014.
[2] Jonathan Gana Kolo, "Design and Construction of an Automatic Power Changeover Switch" in AU Journal of Technology, 11(2): (Oct. 2007).
[3] S. Darshna et aI., "Smart Irrigation System" in IOSR Journal of Electronics and Communication Engineering (IOSR JECE), Volume 10, Issue 3, Ver. II (May -Jun.2015).
[4] Jesper Sandberg and Thomas Kockholm, "iPlant: Inteligent Plant System", in SPCL-2012 - Report.
[5] Vinay Bakale and SiddheshTolakar,"Wireless Automatic Plant Irrigation System", International Journal on Recent Technologies in Mechanical and Electrical Engineering.
[6] Sanju kumar, and R.V. Krishnaiah, "Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose". International Journal of VLSI and Embedded Systems- IJVES, Vol 04, Article 09149; September 2013, pp 599-603.

Authors Profile

Mr. Soham Datta, Final year students of Department of Electrical Engineering, Pailan Technical Campus, Kolkata – 700104.

Ms. Amrita Saha, Final year students of Department of Electrical Engineering, Pailan Technical Campus, Kolkata – 700104.

Mr. Debabrata Paul, Final year students of Department of Electrical Engineering, Pailan Technical Campus, Kolkata – 700104.

Mr. Roni Jana, Final year students of Department of Electrical Engineering, Pailan Technical Campus, Kolkata – 700104.

Mr. Amartya Roy, B.Tech (WBUT), M.Tech (Jadavpur University), Working as an Assistant Professor from Department of Electrical Engineering, Pailan Technical Campus, Kolkata - 104. He has published more than 5 research papers in reputed international journals. His main research work focuses on condition monitoring system, illumination engineering He has 7 years of teaching experience and 2 years of Industry Experience.

