AUTOMATIC IRRIGATION AND ALERTING SYSTEM USING ARDUINO UNO

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Abstract: India is an agriculture based country. Our ancient people completely depended on the agricultural harvesting. Agriculture is a source of livelihood of majority Indians and has great impact on the economy of the country. In dry areas or in case of inadequate rainfall, irrigation becomes difficult [4]. So, it needs to be automated system for proper yielding and handling remotely for farmer's safety. Increasing energy costs and decreasing water supplies point out the need for better water management. Irrigation management is a complex decision making process to determine when and how much water is apply to a growing crop to meet specific management objectives [9]. If the farmer is far from the agricultural land he/she will not be noticed of current conditions. So, efficient water management plays an important role in the irrigated agricultural cropping systems and therefore an alerting system is proposed in this paper.

Keywords: **ARDUINO MICROCONTROLLER, SENSORS, LCD DISPLAY, GSM MODULE**

1. INTRODUCTION

Water system is the fake utilization of water to the land or soil. It is utilized to aid the developing of horticultural products, support of scenes, and re vegetation of irritated soils in dry zones and amid times of deficient precipitation. At the point when a zone goes ahead, the water courses through the horizontal lines and eventually winds up at the water system producer (dribble) or sprinkler heads. Numerous sprinklers have pipe string gulfs on the base of them which enables a fitting and the pipe to be joined to them. The sprinklers are generally introduced with the highest point of the head flush with the ground surface [4]. At the point when the water is pressurized, the take will fly up off of the ground and water the covered region until the point when the valve shuts and close off that zone. Once there is no more water weight in the horizontal line, the sprinkler head will withdraw once more into the ground. Producers are for the most part laid on the dirt surface or covered a couple of creeps to diminish vanishing misfortunes. Sound plants can happen a great deal of water, bringing about an expression in the dampness of the nursery air.

A high relative mugginess (over 80-85%) ought to be kept away from on the grounds that it can build the rate of malady and diminish plant transpiration. Adequate venting or progressive warming and venting can forestall buildup on plants surfaces and the nursery structure [5]. The utilization of cooling frameworks amid the hotter summer months expands the nursery air mugginess. Amid periods with warm and sticky outside conditions, stickiness control inside the nursery can be a test. Nurseries situated in dry, desert conditions advantage air, bringing about critical temperature drops. Since the relative mugginess alone does not reveal to us anything about the outright water holding limit of air, an alternate estimation is at some point used to depict the total dampness status of the dirt [10]. The vapor weight shortfall is a measure of the distinction between the measure of dampness the air contains at a given minute and the measure of dampness it can hold at that temperature when the air would be soaked. Weight deficiency estimation can disclose to us how simple it is for plants to unfold: higher qualities animate transpiration (yet too high can cause shrinking), and lower esteems repress transpiration and can prompt buildup on leaf and nursery surfaces. In the mid twentieth century, the appearance of diesel and electric engines prompted frameworks that could pump groundwater out of significant aquifers quicker than waste bowls could refill them. This can prompt perpetual loss of aquifer limit, diminished water quality, ground subsidence, and different issues. Aside from every one of these issues and disappointments, there has been an extensive advancement in the techniques to perform water system with the assistance of innovation. The use of innovation [15] in the regions of water system has ended up being of extraordinary help as they convey proficiency and precision.

2. SYSTEM DESCRIPTION

Square graph of the framework is as in Fig. 1. This framework work by detecting the dampness substance of the dirt and choose regardless of whether the pump has work or not and how much water expected to water the plants. Protection of soil shifts with dampness. We are taking this protection as one arm of a voltage divider whose other are comprises of 470 K resistor. According to voltage division run the show,

$$V_m = \frac{R_m}{R_T} V_s \qquad (1)$$

$$V_m = \frac{R_m}{R_1 + R_2} \qquad (2)$$

Where,

V_m - voltage across the m^{th} resistor
R_m - resistance across which the voltage is to be determined
R_T - total resistance
R_1 - resistance of soil
R_2 - 470KΩ
V_s - applied voltage

So the voltage across the probe varies with moisture [2]. This voltage is read via at the A0 pin of arduino. The analog value is converted by internal ADC of Arduino and we will get a reading in between 0 and 1023. The value of 0 is for fully wet condition and the value of 1023 for fully dry condition. The program continuosly compares the read with set reference value here the value we set while programming IS 400. When the read value goes above 400, pump will automatically turn on by making the given pin high. We can vary this value according to the quantity of water needed for the soil for cultivation .this high value that is being read will switch on transistor and the current will start flowing through the relay coil and this in turn switches off transistor and relay and pump gets switched off.

3. SYSTEM DETAILS

The block diagram of this automatic plant irrigation system comprises three main components namely a microcontroller, a motor-driver circuit and a sensor circuit. When the sensor circuit senses the condition of soil, It compares it with the reference voltage 5v [10]. When soil condition is less than the reference voltage ,i.e.,5v, then the soil is considered as dry and instantly the sensors sends the logic signals 1 to the microcontroller. Then the microcontroller is turn on the motor driver circuit and prompts the motor to pump water to the plants. When the soil condition is greater than the reference voltage, the soil becomes dry. Therfore the sensors sends logic signals 0 to the microcontrollers, this turns off the motor driver circuits and prompts motor to the water pump.

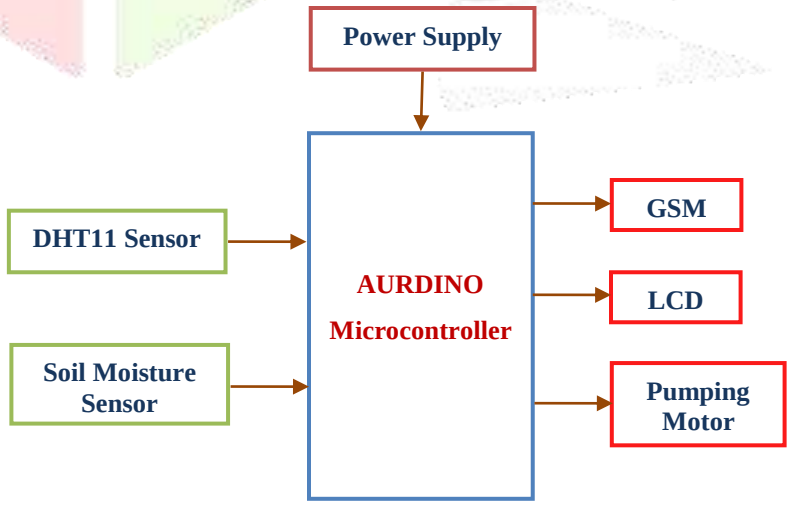


Fig. 1: Block Diagram of Automatic Plant Irrigation System

4. HARDWARE CONSTRUCTION

We did our venture with less segments since it is an exhibition. As the region of water system expands we can utilize more number of humidity sensors and temperature sensors with the goal that it will work as per the climate condition. Protection differs with dampness. As the dirt dampness sensors is simple, an ADC in arduino is utilize to change over into advanced from which it will speak to the protection dry soil will have the most extreme protection and wet soil will have the base protection [4]. In the wake of detecting the esteem it will naturally choose whether the pump must be turned on or killed. The pump will turn on the present goes through the transfer loop and it will get stimulated and turn off as the esteem achieves the limit esteem.

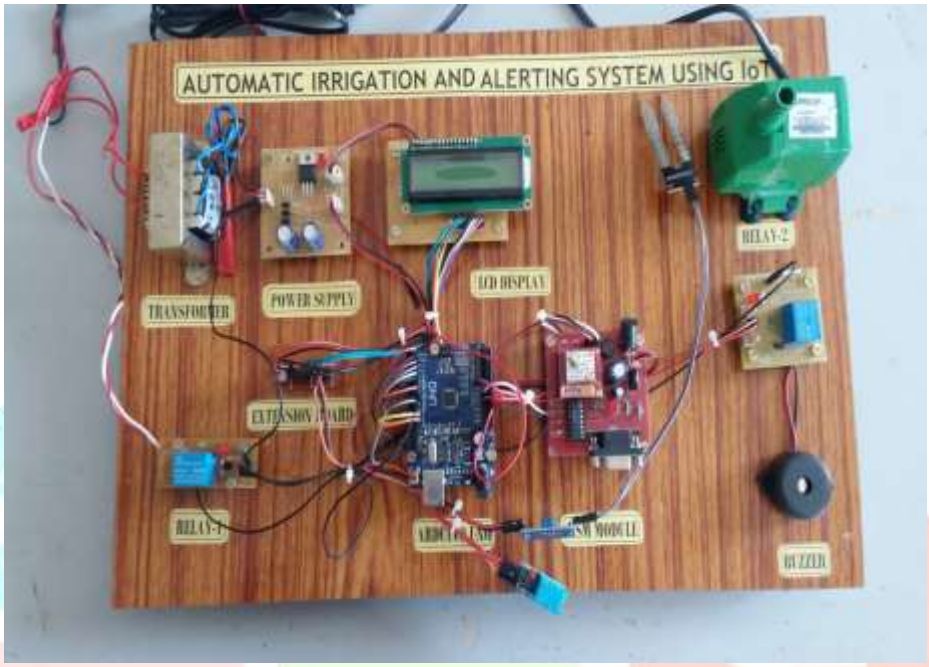


Fig. 2: Hardware setup of automatic irrigation using Arduino UNO

4.1. Sensing Circuit

The sensor utilized here is comprised of two directing metal tests. It comprises of a couple anodes to gauge the protection of soil. Protection of soil fluctuates with dampness [2], so these tests detect the dampness substance of the dirt. Littler the estimation of protection, more noteworthy is the dampness substance of the dirt.

4.2. Pump

A 12v dc engine is utilized with the pump. By initiating the engine driver circuit, the read estimation of the arduino board with the set reference esteem [5], the pump will consequently turn on and kill.

4.3. GSM

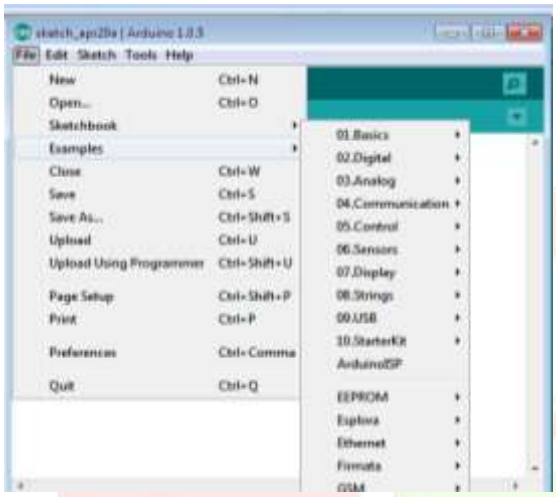
It is a standard set created by the European Telecommunications Standards Institute (ETSI) to portrary conventions for second era (2G) computerized cell systems utilized by cell phones .a modern is a gadget which tweaks and demodulates motions as required to meet the correspondence necessities [10]. It regulates a simple transporter flag to encode computerized info, and further more demodulates such a bearer flag to interpret the transmitted data.

4.4 ARDUINO Micro Controller

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs-light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. We can tell our board what to do by sending a set of instructions to the microcontroller [10] on the board. To do so we use the Arduino programming language (based on wiring), and the Arduino software (IDE), based on processing .

5. SOFTWARE IMPLEMENTATION

Arduino is the world's leading open –source hard ware and software ecosystem. The company offers a range of software tools, hardware platforms and documentation enabling almost anybody to be creative with technology. Arduino is a popular tool for IoT product development as well as one of the most successful tools for STEM/STEAM education. Hundreds of thousands of designers, engineers, developers and makers around the world are using Arduino to innovate in music, games, toys, smart homes, forming, autonomous vehicles, and more. Originally started as a research project by Massimo Banzi, David Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis at the interaction design institute of Ivrea in the early 2000s, it builds upon the processing project, a language for learning how to code within the context of the visual arts developed by Casey Reas and Ben Fry as well as thesis project by Hernando Barragan about the wiring board. The first Arduino board was introduced in 2005 to help design students- who had no previous experience in electronics or microcontroller programming- to create working prototype connecting the physical world to the digital world. Since then it has become the most popular electronic prototyping tool used by engineers and large corporations.



After Entering the Sample Code in the file, it would look like this

Before Connecting we have to select which Board is used by the user, Basically UNO. By selecting TOOLS→Board→ARDUINO UNO

6. RESULT

This miniature model of automatic plant irrigation is being tested in two different soils. One soil is wet and other is dry. Only in the dry condition the pump will start working, since the requirement of water is more for that soil for the proper growth of the crops and in the wet soil the pump won't work since the soil does not need any water due to presence of water in it. Hence this project will conserve water during irrigation.

7. CONCLUSION

The small scale water system device done wind up plainly resolved to be reasonable and fetched capable for enhancing water valuable assets for rural creation. This water system framework lets in development in area with water shortage subsequently improving maintainability. The miniaturized scale water system framework created demonstrates that the utilization of water might be dwindled for a given measure of crisp biomass generation. The utilization of sun control on this water system gadget is correlated and obviously imperative for natural plants and other farming stock which can be geologically insolated, which the interest in electric vitality supply could be exorbitant. The water system might be changed in accordance with a spread of particular product craves and requires least upkeep. The particular setup of the smaller scale water system machine lets in it to be scaled up for bigger nurseries or open fields. Likewise, unique projects which incorporate temperature observing in compost assembling might the effortlessly done.

8. REFERENCES

[1] I. Bennis, H. Fouchal, O. Zytoune, D. Aboutajdine, “Drip Irrigation System using Wireless Sensor Networks Proceedings of the Federated Conference on Computer Science and Information Systems, ACSIS, Vol. 5, 2015.

[2] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara, “Automated Irrigation System Using a Wireless Sensor Network and GPRS Module,” IEEE Transactions on Instrumentation and Measurement, vol. 63, no. 1, January 2014.

[3] Sangamesh Malge, Kalyani Bhole, “Novel, Low cost Remotely operated smart Irrigation system" 2015 International Conference on Industrial Instrumentation and Control (ICIC) College of Engineering Pune, India. May 28-30, 2015.

[4] Nikhil Agrawal, Smita Singhal, “Smart Drip Irrigation System using Raspberry pi and Arduino” International Conference on Computing, Communication and Automation (ICCCA2015)

[5] Pravina B. Chikankar, Deepak Mehetre, Soumitra Das, “An Automatic Irrigation System using ZigBee in Wireless Sensor Network,” 2015 International Conference on Pervasive Computing (ICPC).

[6] Sneha Angal “Raspberry pi and Arduino Based Automated Irrigation System” International Journal of Science and Research (IJSR) Volume 5 Issue 7, July 2016

[7] Bhagyashree K.Chate , Prof.J.G.Rana , “Smart irrigation system using Raspberry pi “International Research Journal of Engineering and Technology (IRJET), 2016

[8] Suprabha Jadhav1, Shailesh Hambarde,” Android based Automated Irrigation System using Raspberry Pi”, International Journal of Science and Research (IJSR), Volume 5 Issue 6, June 2016

[9] Nikhil Agrawal , Smita Singhal “Smart Drip Irrigation System using Raspberry pi and Arduino” International Conference on Computing, Communication and Automation (ICCCA2015)

[10] Gajjala Ashok, Gogada Rajasekar, “ Smart Drip Irrigation System using Raspberry Pi and Arduino” International Journal of Scientific Engineering and Technology for Technology,2016

[11] HemaN., Krishna Kant, “Local Weather Interpolation Using Remote AWSData with Error Corrections Using Sparse WSN forAutomated Irrigation for Indian Farming”, 978-1- 4799-5173-4/14/$31.00 ©2014 IEEE.

[12] A. R. AI-Ali, Murad Qasaimeh, Mamoun AI-Mardinia, Suresh Radder and I. A. Zualkernan, “ZigBee-Based Irrigation System for Home Gardens” Department of Computer Science and Engineering, American University of Sharjah, UAE 978-1-4799-6532- 8/15/$31.00 ©20 15 IEEE

[13] G. Nisha , J.Megala, Velammal institute a/technology ,Chennai,India, “Wireless sensor network based automated irrigation and crop field monitoring system”, 2014 Sixth International Conference on Advanced Computing (ICoAC) 978-1-4 799-8159- 5114/$31.00©20 14 IEEE

[14] Zhiyong Lai, Yongli Dai, “An Irrigation Control System Based On An FPGA” 2012 Second International Conference on Instrumentation & Measurement, Computer, Communication and Control.

[15] Mahir Dursun and Semih Ozden, “A wireless application of drip irrigation automation supported by soil moisture sensors” Scientific Research and Essays Vol. 6(7), pp. 1573-1582, 4 April, 2011.