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Automatic Irrigation System using Arduino

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Abstract

Now a days its a challenge to improve development of plant in respect of its growth and to reduce costs which leads to an innovative idea of using an automated irrigation system which will further help in better management of water and human resources .An automated irrigation system have been developed using sensors technology with Arduino to efficiently utilize water for irrigation purpose. The system has soil moisture sensor inserted into the soil of the plants and a water level sensor placed in a water container from where water will be pumped to plants for irrigation.

Keywords: Soil moisture sensors , Submersible mini water pump

1. Introduction

85% of worldwide available water resources is used inagriculture and this percentage will not decrease keeping inmind the rate of population growth and hence leading to high demand of food [12]. Its high time to create and implement new methodologies using smart technologies for sustainable agriculture . In this electronics era, a smarter approach of leading a life should be carried out and thus we have made “Automated Plant Irrigation System” for smarter irrigation. Automated Irrigation System will regulate water flow in soil without much human intervention, while maintaining moisture of the plants. This project automatically turns ON or OFF by detecting the water content in the soil. An automated irrigation system will not only minimize the

excess wastage of water but also imply reduction of labour and other overheads. This project is a mini model for gardening purpose at home which contains two modules- one for measuring soil moisture content in soil and the other for detecting water level in tank. This paper highlights the working of the existing technologies such as Arduino, Sensors and so on. This paper is organized as follows - Section II summarizes the literature review on the existing systems. Section III describes the framework applied on this project. Finally, Section IV describes the working/methodology of the project, Section V represents implementation details of this project, in Section VI results of an experiment have been discussed, Section VII presents conclusion and future scope and at last is thereference papers.

1.1. Irrigation System

Researchers in the field of Agriculture have been trying to reduce the water wastage amount used for irrigation of plants, therefore different technologies can be used to make this possible which has been highlighted by many researchers. Some of such researches in agriculture field are summarized below. In [1] author has discussed the benefits of using wireless sensor technologies and standards for wireless communications applied on wireless sensors in agriculture field over traditional mechanisms of irrigation by analyzing the market growth. In [2] author has described a wireless sensor network implementation for low data rate applications in agriculture by using wireless stations that work on solar power and the moisture is sensed using dual-probe heat-pulse method. In[5]author has designed an irrigation system which is site specific in which irrigation machine is electronically controlled by a program which updates the geographic location of sprinklers from a GPS and communicate that wirelessly to base station. In [10]author has developed a project Carnegie Mellon

University for plant nursery by creating a sensor/actuator network and a web based GUI to view the real-time data collected. In [11]author has mentioned remote monitoring systems which uses various wireless protocols introduced by different researchers to improve agricultural yield and, additionally, author has proposed a model for agricultural monitoring with wireless protocol International Conference on Intelligent Computing and Control System implemented using field programmable gate array which facilitates the system with re-configurability and reprogrammability according to different environmental

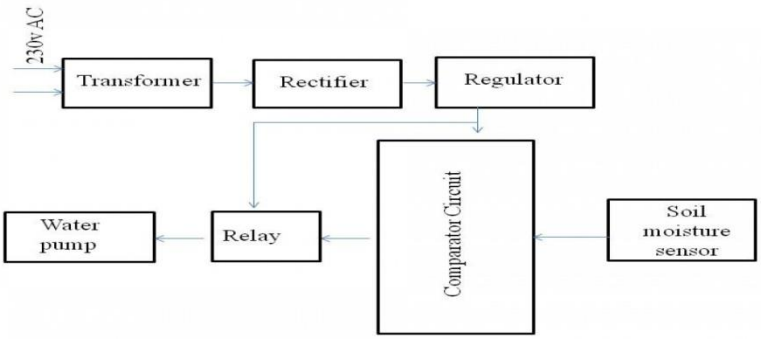

Figure. 1. Block diagram of the proposed AIS

1.2 Study on Soil moisture sensor

Soil moisture sensor is connected to arduino UNO board through jumper wires and bread board, connections have been provided in this section only. Soil moisture sensor will sense the dankness of soil and through WSN the data will be transferred to actuators to act upon that data. A threshold value has been set, both minimum and maximum, so that whenever the measured value crosses the predefined threshold value the motor will be switched on/off automatically .A 5V motor pump has been used for this project .

2. Technical analysis

Physical layer in the below framework includes soil moisture sensor which collects data by detecting environmental conditions, in this case its moisture of soil and send the information to the microcontroller where the actual processing of that information will take place to convert it into a meaningful data and this processing comes under decision making layer where the program logic takes its role. Sensor only collects information but does not take any action in revert to that information and that is done by actuator. Therefore sensor sends control signals to actuator after collecting information for moving or controlling a mechanism or system. When actuator receives these signals then it turn on/off motor. This conceptual division of this project comes under control layer. For creating a communication interface for the end user and for providing end user services an application can be created to view what the system is doing on daily basis and this can be a small extension that can be added to this project for future reference. To store and retrieve data generated by this system an open source IoT application and API is used known as "ThingSpeak" . In this user can create location tracking applications, sensor logging applications and a social network of various things with their status updatePopulace is steadily expanding and, as a result, our collective assets are increasingly depleting. As an individual, it is our duty to support and save our everyday properties and innovative technology [4], In the modem day, water deficits are the concept of obfuscation. The horticultural region sprouts rapidly and thus a great deal of water is required for the water system. Owing to water logging, a massive measure of water is superfluously squandered when flooding the fields. As the growth of the harvest is also halted, passable amounts of

water are not provided to the crop. Therefore, an automated plant irrigation system would help save a lot of water and protect the crop's robust growth.. This would also eliminate the need for field staff and save a great deal of time as well. As a watchman for seeds, the normal electrified barrier has been beneficial. Nonetheless, there are a few difficulties with this system, for example, it does not say the voltage that decreases at times In addition, the fence owners need to monitor the voltage, but without getting there they can't know it. An electrified barrier The board system we establish remote correspondence employments, and it empowers the owners to know the voltage and state of the electrified barrier and safely screen it from distant places.. In a precipitous spot, it portrays an expressive analysis and offers a way to deal with a few problems. An electrified barrier system has been built using remote organizational creativity. A few onlookers and a showcase comprise the system, the ranchers will calculate voltage at the fence and have the opportunity to display it. The audiences compare the voltage to the showcase with the direction of the voltage break. The presentation explains the details gathered and the owners can appreciate the state of the electric fence. System Overview On Irrigation For the construction of a water system structure that turns submarine siphons on or off by using transfers to conduct this operation to detect the dampness content of the dirt, the programmed water system framework for the detection of soil dampness project is planned. The key leeway to use this structure of the water system is to minimize human obstruction and guarantee an effective water system. With the aid of a capacitor, an extension rectifier circuit and a voltage controller, the Microcontroller goes around as a major square of the whole enterprise, and a force supply block is used to give 5 V force to the whole circuit. The 8051 microcontroller is adjusted such that the information signal is received from the sensing material consisting of a comparator to consider the shifting dampness states in

the soil. The OP-AMP used as a comparator is used as an interface between the substance sensed and the microcontroller to transfer the soil dampness conditions, viz. wetness, dryness, dryness , When the microcontroller obtains the information from the detecting material, it analyzes the data as changed as it was, producing yield flags and promulgating the transfers to ran the submarine siphon. The detection plan is achieved with the aid of two reinforced metallic bars that are inserted at some distance in the agricultural sector. As shown by the dirt dampness material, the requisite connections from these metallic bars are interfaced with the control unit to control the siphon's activities.

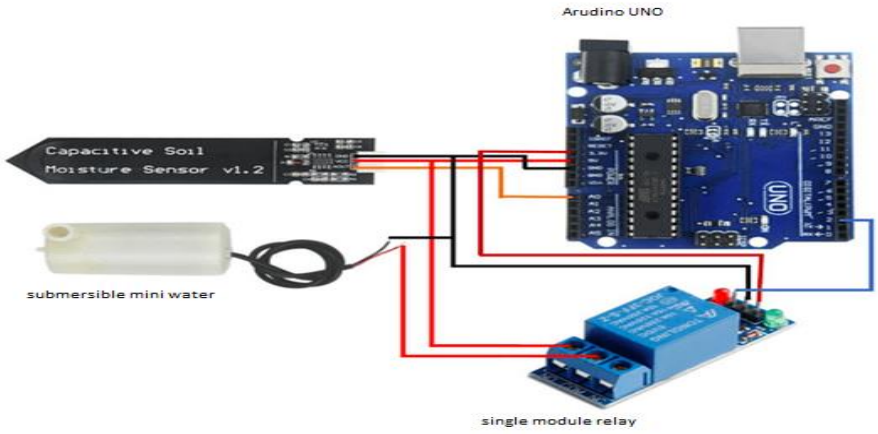

Figure. 2. Schematic of system

3. Electronic schematic

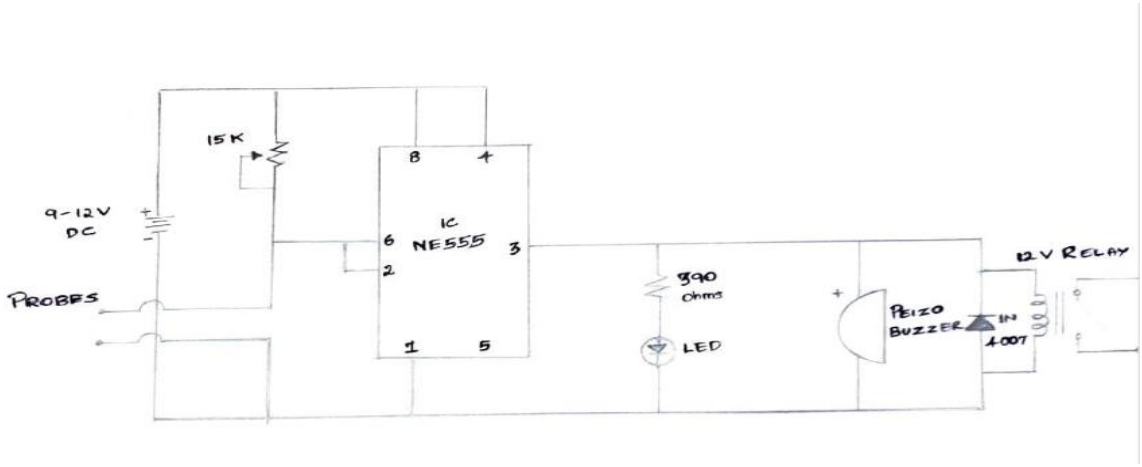

Figure. 3. circuit diagram

4. Hardware Prototype

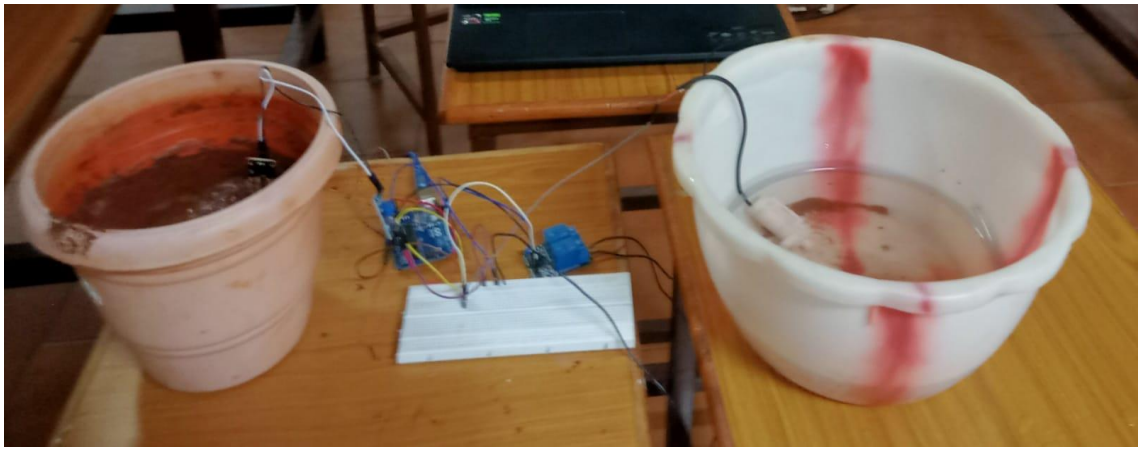

Figure. 4. Overall Hardware setup of the proposed AIS.

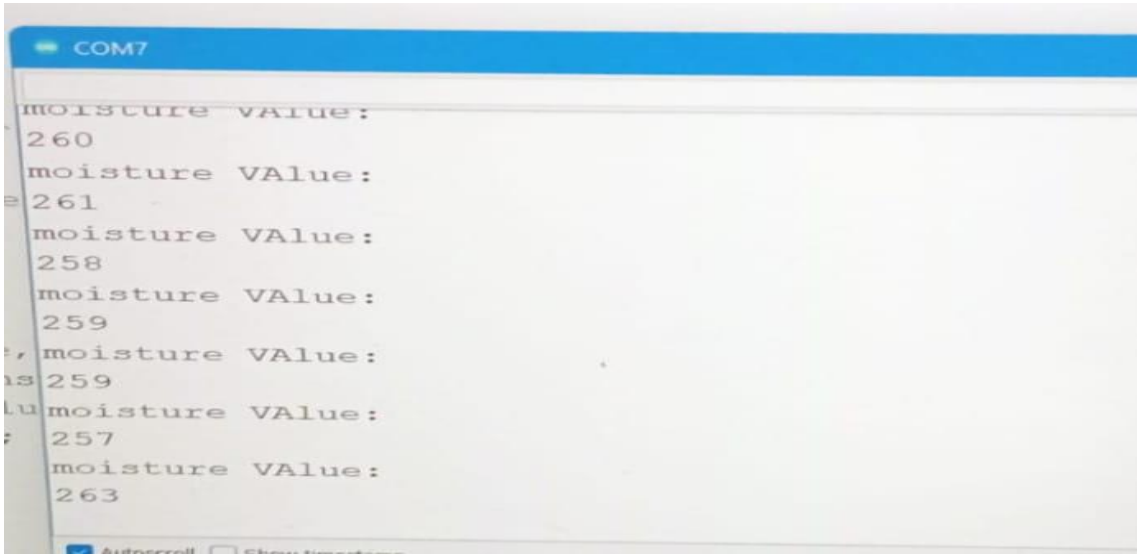

Figure.5. Measured sensor readings on the serial monitor

5. Conclusion

An automated irrigation system is developed which is effective enough to optimise utilization of water and other resources. This system helps in irrigation in areas with low water level and leads to sustainability. This system is very volatile and low maintenance and could be adjusted according to various types of crops without much

human efforts. Different modules in terms of utility of project that is green house or open field can be developed and implemented using similar techniques. Other than cost reduction this project helps to save the vital element of life that is water. In future this project can be extended to bigger level of agriculture as this project is only limited to farming at home. GSM/GPRS module can be extended in this project to send text messages to the owner of its garden about water motor pump status

REFERENCES

[1] Ning Wanga, Naiqian Zhangb, Maohua Wangc, "Wirelesssensors in agriculture and food industry—Recent development and future perspective" , science direct, 2006.

[2] Raul Morais, A. Valente, and C. Serôdio, "A Wireless Sensor Network for Smart Irrigation and Environmental Monitoring: A Position Article" , EFITA , 2005.

[3] [3] Y Kims, R.G. Evans, "Software design for wireless sensor based sitespecific irrigation ", Elsevier, 2009.

[4] Dan Teibel Pat Bowen, "Results from an Agricultural Wireless Sensor Network", IEEE, 2004.

[5] Yunseop (James) Kim, Member, IEEE, Robert G. Evans, and William M. Iversen, "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network" , IEEE, 2008.

[6] Aqeel-ur-Rehman, and Zubair A. Shaikh, "Towards Design of ContextAware Sensor Grid Framework for Agriculture", 2008.

[7] Qiang Fu, Zhenxiang Xing, Yongsheng Ma, "Applying Multivariate AutoRegression Model to Forecast the Water Requirement of Well Irrigation Rice in Sanjiang Plain ", 2004.

[8] Narayut Putjaikal, Sasimanee Phusael, Anupong Chen-Iml, Dr.Phond Phunchongharnl, and Dr Khajonpong Akkarajitsakup, "A Control System in an Intelligent Farming by using Arduino Technology ", IEEE, 2016.

[9] Aqeel-ur-rehman, Abu Zafar Abbasi, Noman Islam, Zubair Ahmed Shaikh, "A review of wireless sensors and network application in agriculture", Science Direct, 2011.

[10] Sanjiv Singh, "Integrated Wireless Sensor/Actuator Networks in an Agricultural Application", 2004.

[11] Akash Jain, Suraj Kudre, Mahesh Giri, "A review on smart sensors based monitoring system for agriculture ", IJESR, 2014.

[12] B. shylaja, B. srinivas, " Design and implementation of agricultural automation through wireless network and GPRS", IJPRES, 2016