Smart Irrigation System Using Arduino and Android

Santhiya. P*
*Assistant Professor,
Department of Computer Science and Engineering,
Paavai Engineering College, Namakkal.

Monisha. J***
***UG Scholar,
Department of Computer Science and Engineering,
Paavai Engineering College, Namakkal

Lakshmitha. G**
**UG Scholar,
Department of Computer Science and Engineering,
Paavai Engineering College, Namakkal

Akshaya. T****
****UG Scholar,
Department of Computer Science and Engineering,
Paavai Engineering College,Namakkal

***Abstract*:- Water is the most important resource for plants. But during summers, most people are too lazy to water the plants every day. To overcome this issue smart irrigation system using arduino and android is used. The existing system uses pc and cloud computing to store the data which is reads by sensors and the drip is controlled. The proposed system is to ON/OFF the drip using bluetooth wherever we go. Using this system reduces data storage devices. The Microcontroller Arduino is used to control this System and Android is connected to controller and it controls the drip. The sensors are to take values from surroundings and store it in a controller. According to this value the drip can be ON/OFF. It is controlled manually and usage of storage device is reduced and no network problem will occur.**

Keywords: Embeddedsystem ,Bluetooth, Androidapp, Sensors, Lcd

I. INTRODUCTION

Agriculture is the important construction of critical food crop. Agriculture is represent as manufacture, dispensation, encouragement and division rural products. Agriculture play a important role in the entire life of a given nation. Agriculture is the spine of financial system of a given country. In this wireless sensor networks, it is a self configuring network of small sensor nodes communicating among themselves using broadcasting signal, and deploy in capacity to logic, observe and realize the purpose world.

The artificial application of water to the land or soil is irrigation. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. The water flow through the on the side lines and endually ends at the irrigation emitter (drip) or sprinkler heads when a zone comes. Many sprinklers have pipe thread inlets on the bottom of them which allow a fitting and the pipe to be attached to them. Once there is no water pressure in the lateral line, the sprinkler head will retract back into the ground. Emitters are usually laid on the soil surface or buried in a few inches to reduce evaporation losses.

The plants can come to light a lot of water, resulting in an increase in the humidity of the greenhouse air. A high relative humidity (above 80-85%) should be avoided because it can increase the incidence of disease and reduce plant transpiration. Sufficient venting or successive heating and venting can prevent the condensation on the plants and the greenhouse structure. The use of cooling systems during the warm summer months increases the greenhouse air humidity. All through periods with warm and humid outdoor conditions, the humidity control inside the greenhouse can be a challenge.

Greenhouses to be found in dry, dessert environments benefit greatly from evaporative cooling systems because large amounts of water can be evaporated into the incoming air, resulting in significant temperature drops. Since the relative humidity alone does not tell us anything about the absolute water holding capacity of air, a different measurement is sometime used to describe the absolute moisture status of the soil. The vapor pressure deficit is a measure of the difference between the amount of moisture the air contains at a given moment and the amount of moisture it can hold at that temperature when the air would be saturated.

The strain discrepancy measurement can tell us how easy it is for plants to transpire: higher values stimulate transpiration (but too high can cause wilting), and lower values inhibit transpiration and can lead to condensation on leaf and greenhouse surfaces.

II. LITERATURE SURVEY

Precision agriculture can be defined as the art and science of using advanced technology to enhance crop production. [1]This paper introduces Wireless sensor network as a major technology that drives the development of precision agriculture. The science and engineering questions associated with precision agriculture center around increasing the efficiency to prosper in a sustainable manner. Increases in agricultural efficiency will stem from networking sensors to elucidate important spatiotemporal patterns and integrating their data streams so as to not only display or record information, but to actuate human and autonomous responses. The concept of precision agriculture has been around for some time now. Blackmore et al., in 1994 defined it as a comprehensive system designed to optimize agricultural production by carefully tailoring soil and crop management to correspond to the unique condition found in each field while maintaining environmental quality. In California, Beckwith et al designed deployed and analyzed output of a large scale implementation of a wireless sensor network in a vineyard .

65 motes with a maximum of 8 hops were deployed in a planned area where no neighbor discovery features were implemented and a table driven protocol was used rather than a self organizing network. Data was recorded every five minutes with a grid of sensor nodes each separated 15m from the other. [2]This paper describes about the Lofar Agro project, that is a study of precision agriculture that focuses on tailored management of a crop. This involves monitoring soil, crop and climate conditions in a field, generalizing the result and providing a decision support system (DSS) for treatments or taking differential action such as real time variation of fertilizer or pesticide application. The objective of this paper is to report the design, construction, and testing of a distributed infield WSN, a remote monitoring control, grid topologies.

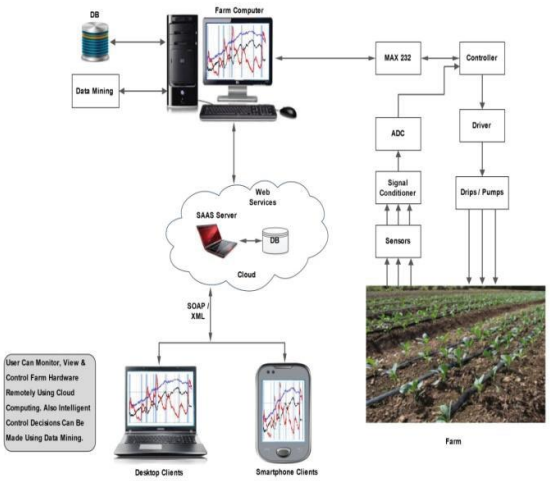
Biomimetic sensors offer huge potential in the development of point-of-care systems and home-diagnostics applications. [3]In this paper Biological relevant molecules in an analyte can bind to a highly specific artificial bio-recognition layer, while this binding event is transduced to a measurable signal. The development of different types of these sensors suited for the detection of a wide range of target molecules is a popular field of research. A commercial biomimetic sensor market is almost nonexistent, though examples can be found of commercially available biosensing devices, e.g. the portable glucose sensor, which is already used for decades by diabetes patients, and digital pregnancy tests. Electrochemical impedance spectroscopy is a popular readout technique commonly used for different types of sensors. Within these sensors the impedimetric changes in the sensor/electrolyte interface upon target molecule binding are usually monitored using bulky and expensive labbased measurement equipment. The home-diagnostics market could benefit greatly from compact, easy-to-use devices that are suited for the readout of a wide range of sensors. Previous research resulted in the development of miniaturized impedimetric measurement equipment incorporating touch-screen technology and numerous communication protocols . Although this device is specifically designed for accurate biosensor readout while maintaining a level of user-friendliness, it is not fine-tuned for home-monitoring applications. Some examples can already be found of smartphones apps used in home diagnostics, e.g. for glucose level sensing and in heart rate monitoring applications. A novel way of impedimetric readout of biomimetic sensors via smartphones and tablet PCs is presented. On-board audio hardware is used for generating and reading signals, minimizing the required external hardware. A custom-made biosensor test strip can be inserted in the system. Small amounts of analyte can be placed on the strip, after which sensor response can be monitored. An app running on the device allows for intuitive control and graphical display of biosensor response. Device performance is verified using passive components and a biosensor example. Molecularly imprinted polymer (MIP) sensors are a commonly used type of biomimetic sensors. The sensors are based on polymers with imprinted nano-cavities that form preferential binding sites for the desired target molecule. Using these sensors as synthetic receptors offers two main benefits in addition to specific recognition. First, MIPs can be synthesized at a rather low cost via established polymerchemical routes. Second, MIPs can be stored for long time scales and maintain their receptor properties in wide ranges of temperature, pH, and ionic strength. These sensors have already been proven to be extremely suited for the detection of various low molecular weight targets such as histamine, L-nicotine and adenine. The newly developed system is demonstrated using a MIP-based histamine sensor.

The greenhouse industry is the fastest growing sector worldwide. [4]In this paper greenhouse separates the crop from the environment, This enables the production of crops that otherwise could not be produced at that specific location. The greenhouse enclosure permits the manipulation of the crop environment. This asset allows the farmer to steer the cultivation in a desirable direction. It leads to higher crop yield, prolonged production period, better quality, and less use of protective chemicals. The crop yield and quality can be influenced by operating the adjustable components of greenhouse. [5]In this paper crop and resource management in greenhouse is indispensable to adjust and control variables with are mote controlling system via SMS by using the GSM - SMS. This is because it is almost difficult for human being to manipulate and be present every day near the system. Indeed, remote communication systems are a major component of the policy of modernization and technology transfer, due to the increasing development of mobile communications. The use of mobile phones or handsets has grown exponentially over the years. Today, growth is coming from global expansion and services. A new surge of growth will come through new technology (Wireless), Using GSM it is possible to control and monitor systems from a long Distance. The primary aim of this paper is to propose the concept of Development of a Low-Cost GSM SMS- Based Remote Measurement and Control system for Greenhouse using the combination of a ARM Controller and a GSM communications module & Zigbee linked by a serial communications port. Using this various Parameter values could be efficiently understands from the remote location and whenever it crosses the set limit, the ARM processor will send an SMS to a concerned authority(s) mobile phone. The concerned authority(s) can control the system through the mobile phone by sending Message to the System. The benefits of this paper are:

- Flexibility / modularity in control.
- Extremely low cost device adapted for different applications.
- Scalable, Robust and Reliable.
- Efficient and cheap means of communication by use of SMS.

Ideal for monitoring and control critical plant on unmanned sites.

III. EXISTING SYSTEM



Water management system is microcontroller based and web application using the concept of cloud and data mining is used to monitor and control the water management system from remote location. Whole system is in WSN infrastructure. Water management is done through sensor reading from farm. Web application provide easy monitor and control mechanism to farmer. Graph generated in web application make easy analysis. Cloud computing is a technique in which a large number of computers connected through a real-time communication network.

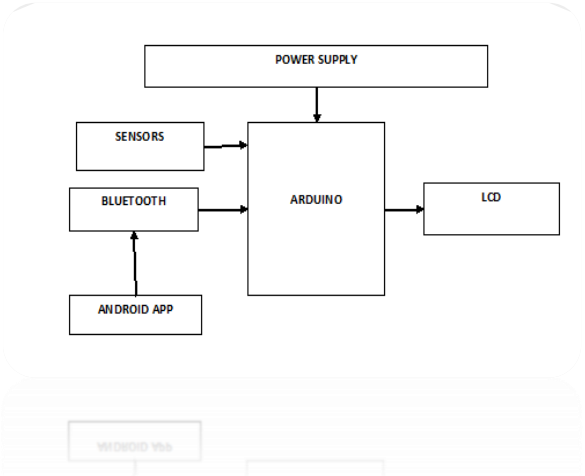
In this system sensor senses the data and sends the reading to the micro-controller. Then micro-controller sends those reading to the farm pc through serial communication. Then these readings get stored in the database that is connected to farm pc in which we use data mining concept. These readings will be displayed on the android phone and pc. The mobile and pc is connected to the database through cloud.

In this system we will be including data mining concept for the prediction of future outcomes. Data mining concept examine the large pre-existing data in order to produce the new information. We will be including the cloud computing concept for the communication between the pc and mobile. Cloud computing is a technique in which a large number of computers connected through a real-time communication network.

Disadvantage

Sometimes network problem will occurred. It collects data from all WSN network and take decision if threshold cross of any sensor unit.

IV. PROPOSED SYSTEM



Hardware Components

- Arduino Microcontroller
- Bluetooth
- Water pump Motor
- Power supply
    1. Transformer
    2. Bridge rectifier (Diodes)
    3. Voltage Regulator
    4. Capacitor
    5. Resistor
    6. LED
- LCD
- Sensors

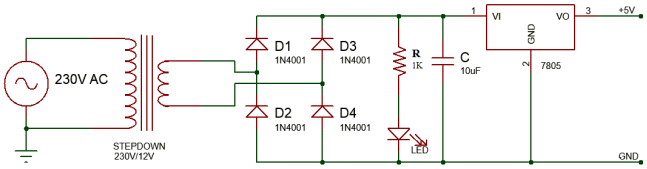
Software Components

- Arduino IDE
- Android app

Working

Arduino Microcontroller is used to control the system. The sensor reads the surrounding value and store it in a controller. If the reading of sensor is less than the threshold value then we can start the drip using a android app through a bluetooth. The LCD is used to display the value of sensors. According to the value we can operate the application.

Power supply



The power supply circuit is common for all the home supplies. The 230V AC is get from the transformer and it is reduced to 12V AC of power by using the Step down transformer. Then it rectifies the 12V AC as a 12V DC and then the noise is reduced by using a capacitor. Then the 12V is reduced to 5V using Regulator.

Arduino

The Arduino is a microcontroller board. It is used to operate a Sensors, LCD, Bluetooth and also storage devices.

- Microcontroller UNO
- Operating Voltage 5V

Input/output pins

- Digital 0-13 (6 pins are PWM pins) PWM: 3, 5, 6, 9, 10, and 11.
- Analog 0-5v
- It comes with an open supply hardware feature that permits users to develop their own kit
- The software of the Arduino is well-suited with all kinds of operating systems like Linux, Windows, and Macintosh, etc.

Sensors

- Temperature sensor
- Humidity sensor
- Water level sensor

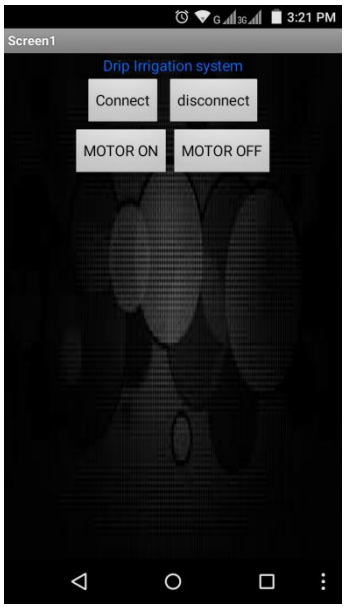
Temperature sensor (LM35) : The temperature reads the temperature values from the surroundings and display it in LCD.

Humidity Sensor: This sensor reads the moisture content of the land(especially in soil).

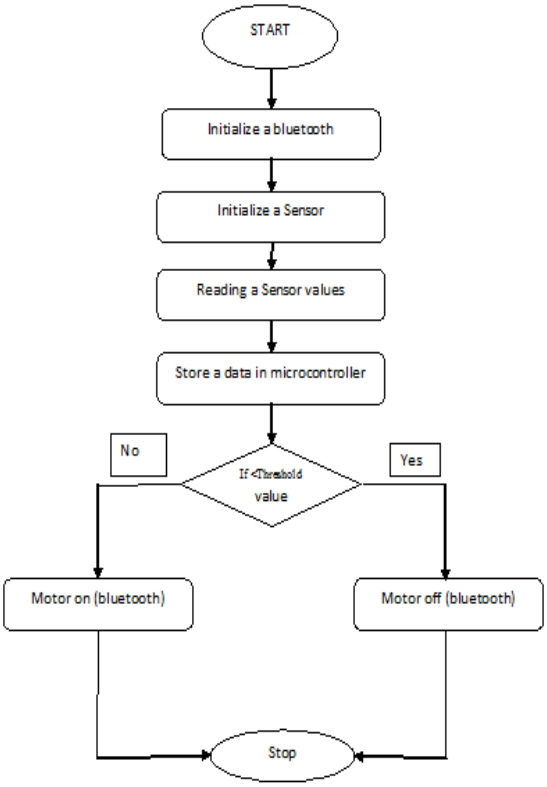
Water Level Sensor: This sensor reads the level of water and controls drip ON/OFF.

Android App

Android app is connected to the Arduino using a Bluetooth HC-05.It is used to operate drip to ON/OFF.



FLOW CHART



V. CONCLUSION

In this irrigation system the drip is ON/OFF using a bluetooth module. In our system the data storage device is reduced to control a drip and reduced a man power. The sensors are used to taken the surrounding value and store it in a Controller. The controller is used to operate a bluetooth. It helps to operate a wherever to control the drip. It reduce the time.

VI. REFERENCE

[1] [1] J. Broeders, D. Croux, M. Peeters, T. Beyens, S. Duchateau, T. J.Cleij,P. Wagner, R. Thoelen, and W. De Ceuninck, “Mobile Application for Impedance-Based Biomimetic Sensor Readout," IEEE Sensors J., vol.13, no. 7, pp. 2659-2665, July 2013.

[2] Mahir Dursun and Semih Ozden, 1573-1582, April2011.Shen Jin,Song Jingling,Wanf Shengde, Remote Mea-surement and Control System for Greenhouse Based on GSM, SMS, IEEE international conference on Electronicand Measurement, 2007.

[3] Shen Jin, Song Jingling, Han Qiuyan,Wang Shengde, Yang Yan,” School of Electric and Electronic Engineering”

[4] Mark E. Casada, P.E.,"Wheat Moisture Measurement With A Fringing Field Capacitive Sensor", USDA ARS Grain Marketing and Production Research Center Manhattan

[5] Santoshkumar; Udaykumar; R.Y. , “Development of WSN system for precision agriculture",embeded and communication system, 2015

[6] X. Wang, W. Yang, A. Wheaton, N. Cooley, and B. Moran, “E_cient registration of optical and IR images for automatic plant water stress assessment", Comput. Electron. Agriculture., vol. 74, no. 2, pp.

[7] Xihai Zhang, Junlong Fang, Xiao Yu 2010 “Design and Implementation ofcodes Based on CC2430 for the Agricultural Information Wireless Monitoring", IEEE.

[8] AWATI J.S., PATIL V.S. (Automatic Irrigation Control by using wireless sensor networks) Journal of Exclusive Management Science

– June 2012-Vol 1 Issue 6 - ISSN 2277

[9] Abreu VM, Pereira LS (2002). Sprinkler irrigation systems design using ISAMim.

[10] Associate Prof.B.T.Salokhe, Miss Shilpa G. Gadekar, “A wireless application of drip irrigation automation supported by soil moisture sensors ” ,International Journal of Advanced Research in Computer and Communication Engineering, Vol. 4, Issue 4, April 2015

[11] Venkata Narayana Eluri, K. Madhusudhana Rao, A. Srinag, ”Wireless Solution for Water Saving In Agriculture Using Embedded System”, International Journal of Computer Science and Business Informatics, ISSN: 1694-2108 — Vol. 2, No. 1. JUNE 2013

[12] Prabha, Tanujabai J.M, S. Krupesh, ”Real-Time Atomization of Agricultural Environment for Social Modernization of Indian Agricultural System Using Arm 7” International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 6, June 2014

[13] Tameem Ahmad, Shamim Ahmad ,Mohammed Jamshed , “A knowledge based Indian Agriculture: With Cloud ERP Arrangement” 2015 IEEE

[14] S.Sumeetha, D.Sharmila, “Embedded based Remote Control Application using Mobile Phone in Irrigation”, International Journal of Power Control Signal and Computation(IJPCSC), Vol3. No1. Jan-Mar 2012 ISSN: 0976-268X Santoshkumar, Udaykumar R.Y, “Development of WSN System for Precision Agriculture”,EEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems ICIIECS’15 , 2016 IEEE