E- Health Agricultural Monitoring System through WSN

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Abstract— The water level required by each soil type varies tremendously. The improper maintenance of water in agriculture leads to water scarcity. The farmers working in the farm lands are solely dependent on the rain, river and bore wells for irrigation of the land. Along with that scorching summers threatens our planet every year, our farmers are unable to cultivate our traditional crops at their suitable seasons.. Temperature dependence of crop depends on whether that crop belong to "wet harvesting crops" or "dry harvesting crops". Wet harvesting crops are those crops which depends on temperature or season, also they can be grown throughout the year. Hence with change in temperature, their water requirement changes Soil water level can be manipulated and accordingly irrigation can be done which can save a huge water that applied in the field in surplus amount. This research focuses on the design of a prototype using WSN to provide complete automation for the irrigation process In this modern era of agriculture the farm lands have water-pumps, drip irrigation system, but also manual controlling by farmers is required to turn the pump on/off whenever needed. In the proposed work WSN is used together to provide complete automation to the irrigation process. Sensor module includes Soil moisture sensor, temperature sensor and rainfall sensor. Selection of fields and the soil is done using WSN. Once the data is fed to the system the system follows the same configuration to water the soil. Water level of soil is maintained by switching on/off of pumps. Instead of calculating water requirement by different soils, the value obtained by the researchers in their researches is directly taken as threshold value for this prototype. The main aim of this prototype is to continuously monitor soil water level and irrigate the fields in proper duration with the exact required amount of water. Water requirement of soil varies with the type of soil. WSN is used to automatically water the soil in the required quantity.

Keywords: Soil Moisture Sensor, Ph Sensor, Salinity Sensor, Arduino, WSN, Power Supply

I. INTRODUCTION

Farming agriculture means to give high return and great quality efficiently with less work on restricted grounds. Taking focal points of modern designing methods and modern creation strategies, office agribusiness makes a decent use of the dirt, atmosphere and organic capability of fields to give a controllable and appropriate condition for plants so as to expand the efficiency in specify locales. In this manner, the essential advance of office agribusiness is checking the faming condition effectively. A rural situation checking framework incorporates information obtaining, transmission and the board. Sensors advances give persuade chances to information securing. Substantial measure of sensors can be sent in the earth to gather ecological parameters and send them to the clients through remote information correspondence. Be that as it may, a straightforward sensor can't accomplish the gathering of different parameters of various harvests on expansive farmlands. Remote sensors ought to have the capacity to self-composed what's more, to send information steadily and intermittently to the control focus. Most existing observing framework depends on the sequential transport by means of links. Be that as it may, in the office nurseries with high temperature, dampness and soil PH, the future of these gadgets will be brought down and it will cause pointless expenses to introduce and keep up the system with wiring issues.

Subsequently remote correspondence advances encourage the advancements of farming. Fast improvements in cutting edge specialized techniques and keen control advancements give us another point of view of robotization and systems administration in office farming. Remote sensor systems (WSNs) are systems of little sensor hubs that can detect, process and transmit information to the client by means of radio correspondence [2].These sensors are little in size, minimal effort, low-control, synergistic what's more, permit irregular arrangement, which guarantee a vast range of uses in condition observing frameworks. Besides, WSNs are appropriate to office agribusiness for two key reasons. Right off the bat, MEMS(Micro-Electro-Mechanical Systems), LSI (Large Scale Integration) and inserted advances are grown quick . Also, WSNs are attainable, self-configured and simple to oversee e.t, which tackle the issue of systems and arrangement through spatial spaces. In this paper, we propose another agribusiness observing framework dependent on WSNs in Hainan area, China .The subtropical atmosphere in Hainan with sufficient daylight and water assets, yet with restricted attractive and controllable grounds for some specific plants to develop. Accordingly, they create office agribusiness so as to develop off-season plants, which are low-estimate and delicate to light, temperature and modesty. Our lab coordinates with HaiNan State Farms Academy of Sciences to build up this observing framework, which can gather constant natural parameters and video data viably. The framework moreover gives the software of human interface for clients to screen the organization of sensor and camera arrange, to process verifiable information and to request constant and chronicled faming data. Besides, the framework could participate with a specialist framework to plan the office framework in like manner what's more, make an appropriate situation to improve the efficiency what's more, keep away from asset squander.

A Wireless sensor network can be defined as a network of devices that can communicate the information gathered from a monitored field through wireless links. The data is forwarded through multiple nodes, and with a gateway, the data is connected to other networks like wireless Ethernet. WSN is a remote system that comprises of base stations and quantities of hubs (remote sensors).These systems are utilized to screen physical or ecological

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conditions like sound, weight, temperature and co-operatively go information through the system to a principle area as appeared in the figure.

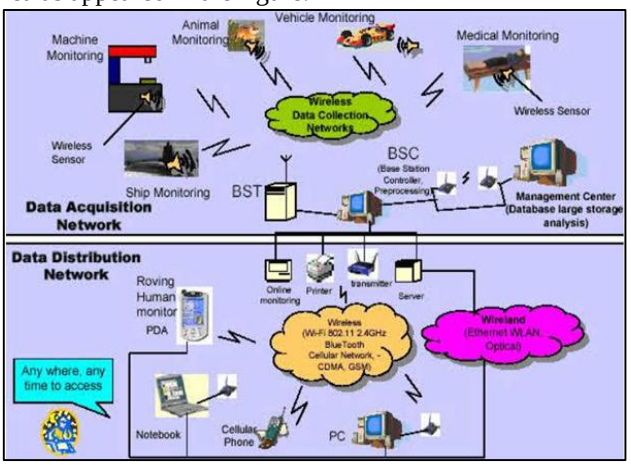


Fig. 1: Wireless Sensor Network

II. PROBLEM IDENTIFICATION

Energy efficiency in wireless sensor networks has been an area of intense research in the recent past. Achieving energy efficiency at the hardware level has its own fundamental physical limitations. As such, most of the research of late has focused on MAC and network layer protocols. In each system, the design decisions are specific to the application in mind, as the network stack for sensor networks is not generic and customized according to the application. Apart from the systems that target similar application and media access scheduling, we also review other energy-aware systems and approaches. The following points help us analyse all the designs and their suitability to the application and the scheduling protocol that we target.

- Whether the scheduling algorithm is centralised or distributed.
- What is the level of time synchronisation needed in the network.
- How much and what kind of information does one node store about its neighbours.

In general the per-node memory requirements.

- What is the extent to which the control packets are required.
- What is the latency in reporting the variable being monitored.
- How robust is the design in adapting to the changes in topology.
- What trade-off decisions have been made in the above parameters.

III. METHODOLOGY

In the proposed work WSN is utilized together to give total computerization to the water system process. Sensor module incorporates Soil dampness sensor, temperature sensor and precipitation sensor. Determination of fields and the dirt is finished utilizing WSN. When the information is nourished to the framework the framework pursues a similar arrangement to water the dirt. Water dimension of soil is kept up by exchanging on/off of siphons.

In the field segment, different sensors are sent in the field like temperature sensor, dampness sensor and PIR sensor. The information gathered from these sensors are associated with the microcontroller through RS232. The sensor based devices are deployed in the environment to sense and data collection. The related system has more benefit for farmers so he can manage his time, energy and costs. Data will be collected by system nodes and it transmits to server finally via the cross from probable other nodes and gateways. The all collected data in server side must be analyzed and be presented to the users in a user-friendly .platform. The sensing unit of the node has SparkFun Soil Moisture Sensor. Furthermore, the board has temperature and humidity sensors that sense different air humidity and temperature. At last, related information such as temperature, humidity, soil moisture and future air conditions are shown as an application in GUI that can be available in the related website and mobile application. Figure 2 shows a sample model of the system and node in the agricultural land. Today, the water issue is one of the important problems in our life. We need to avoid the litter and we must use this source correctly, especially in agriculture lands.

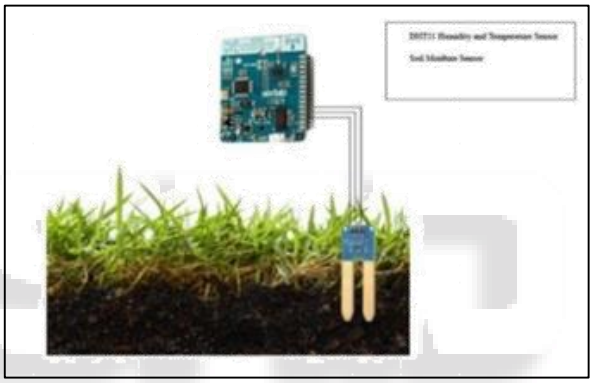


Fig. 2: Sensor based custom nodes in the farm

A. Soil Sensor:

Moisture is unequivocally identified with the various attributes of the dirt and its different powers. In the sand and mud, the water-holding limit is distinctive just as the soli cultivating abilities. As opposed to demonstrate the measure of water displayed in the dirt in rate (%), the various gadgets that demonstrates the dampness sum are legitimately identified with the power expected to concentrate water from the dirt. In this way the water-content meter readings were related altogether with tensiometer pF qualities is broadly utilized.

B. Ph Sensor:

The pH sensor was adjusted by examination with standard research facility pH cradle arrangements. A aggregate of 16 pH cushion arrangements were made utilizing pH support tablets, two each in the scope of 3- 10 with a stage of 1. The pH cathode was dunked in every one of these arrangements and the comparing voltage was perused by the microcontroller. The alignment bend so got. Further, to make execution basic, the voltage esteems were quantized with the end goal that a stage of 8 mV brought about a pH drop of 1 point. It was additionally tentatively discovered that pH esteems beneath 3 or more 8 were not agent of the real pH of

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soil thus the examples having pH esteem over 8 and underneath 3 were expelled from the alignment set.

C. Temperature Sensor:

Temperature can be estimated by means of an assorted exhibit of sensors. Every one of them deduce temperature by detecting some adjustment in a physical trademark. The two fundamental classifications of these sensors are contact and noncontact style temperature sensors. There are three strategies for contact style temperature estimation, which can for the most part be alluded to as temperature tests: warm resistors (RTD, thermistors), thermocouples and IC sensors.

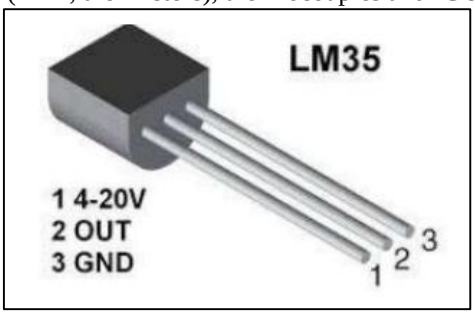


Fig. 3: Temperature Sensor

D. ZIGBEE:

ZigBee is an insignificant exertion, low-control, remote work compose standard. The straightforwardness allows the development to be extensively sent in remote control and checking applications. Low control use allows longer presence with more diminutive batteries. Work sorting out gives high steadfastness and continuously expansive range. ZigBee chip traders generally sell composed radios and microcontrollers with between 60 KB and 256 KB streak memory. ZigBee works in the cutting edge, legitimate and helpful (ISM) radio gatherings: 868 MHz in Europe, 915 MHz in the USA and Australia and 2.4 GHz in numerous domains around the globe. Data transmission rates change from 20 kilobits/second in the 868 MHz repeat band to 250 kilobits/second in the 2.4 GHz repeat band.

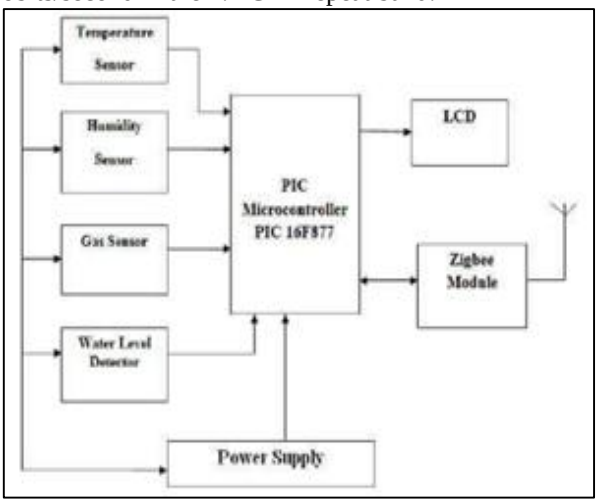


Fig. 4: End device block diagram

IV. RESULT

WSN importance is increasing day by day in our lives. There are a variety of applications in this respect. Because these methods are inspired by IOT technology, they can also be used to differentiate between different algorithms and software methods. They can be more usable in various applications so one of them is agriculture area. In today's world, people are beginning to make use of intelligent devices and system thus; they have a smart assistant thanks these systems. In this paper, an architecture has been proposed so it helps to farmers to manage the irrigation time of their agriculture correctly. The result of it is shown it is efficient in the resource consumption. The resulting of the system that is an application can be of great benefit to its users. The user can directly divide own land into as many regions as desired in this application. Therefore, the users will provide saving in their time and water. In addition, this application is reliable because it provides weather information instantaneously from the central stations.

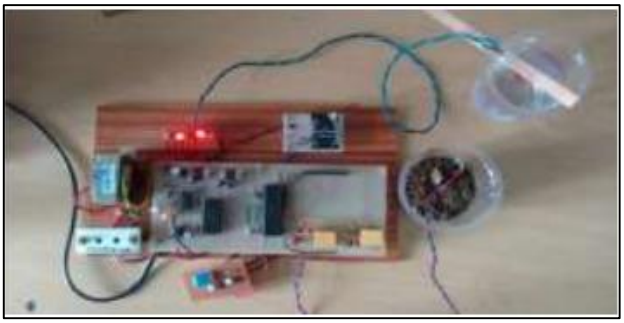


Fig. 6: Transmitter Section



Fig. 7: Receiver Section

The hardware is interfaced with all the sensors in the board. The hardware components include the microcontroller, buzzer, relay, ADC converter, GSM module and all the sensors interfaced. The board is inserted with a SIM card which is used to communicate with the owner and the recorded values. The output shown below denotes the temperature, soil moisture condition and the intruder detection. The second result is the output from the Android Application that is developed in the mobile phone. It determines the temperature, humidity, moisture and the intruder detection.

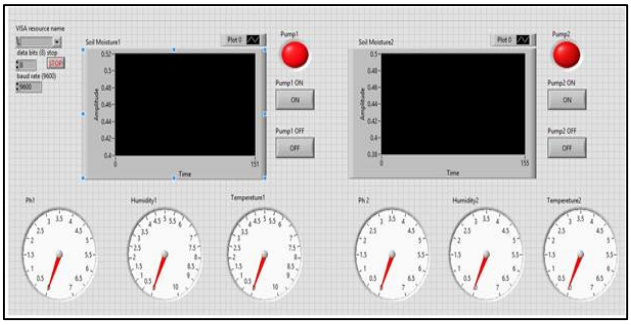


Fig. 8: Image of Human Interface

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V. CONCLUSION

Wireless monitoring of field reduces the human power and it also allows user to see accurate changes in crop yield. It is cheaper in cost and consumes less power. The smart agriculture system has been designed and synthesized. The developed system is more efficient and beneficial for farmers. It gives the information about the temperature, humidity of the air in agricultural field through MMS to the farmer, if it fallout from optimal range. The system can be used in green house and temperature dependent plants. The application of such system in the field can definitely help to advance the harvest of the crops and global production. In future this system can be improved by adding several modern techniques like irrigation method, solar power source usage.

VI. FUTURE SCOPE

Despite the fact that administration has some investigation of keen nursery, there are as yet numerous issues to be comprehended. The goals of these issues are helpful for exhaustive advancement framework:

- The nursery for trial arrangement of littler, set number of sensors, Zigbee systems less complex, which must be improved in the zone of expansive nursery, which will increment the multifaceted nature of the framework, which is the development to determine issues .
- Intelligent nursery the executives frameworks can now do temperature and mugginess programmed control, yet at the same time require human mediation, for example, treating, weeding, mechanization still should be improved.
- Systematic security components should be further reinforced, in a little zone when utilizing the framework security issues may not be noticeable, if the framework is as a rule generally advanced, you should research to fortify security instruments.

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