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A study On Smart Irrigation System Using Iot For Surveillance

Sanket Kumavat

Department Of Computer Engineering
Sinhgad Academy Of Engineering
Pune, Maharashtra, India

Chaitanya Tale

Department Of Computer Engineering
Sinhgad Academy Of Engineering
Pune, Maharashtra, India

Prathamesh Shendge

Department Of Computer Engineering
Sinhgad Academy Of Engineering
Pune, Maharashtra, India

Atharva Shitole

Department Of Computer Engineering
Sinhgad Academy Of Engineering
Pune, Maharashtra, India

Prof S.A.Mhaske

Department Of Computer Engineering
Sinhgad Academy Of Engineering
Pune, Maharashtra, India

Abstract

In India, agriculture plays an essential function for improvement in meals production. In our united states, agriculture depends at the monsoons which aren't sufficient source of water. So the irrigation is utilized in agriculture discipline. net of factors (IoT) is a milestone inside the evolution of generation. IOT performs an crucial position in many fields, one among this is Agriculture through which it is able to feed billions of human beings on this planet in future. The goal of this paper is aiming to conquer this task, the whole device is micro manage primarily based and can be operated from far off vicinity via wi-fi transmission so there is no need to situation approximately irrigation timing as in step with crop or soil condition. Sensor is used to take sensor reading of soil like soil moisture, temperature, air moisture and selection making is managed by means of user (farmer) with the aid of the usage of microcontroller. The records received from sensors are sent to server database the usage of wifi transmission. The irrigation will be computerized whilst the moisture and temperature of the sphere is reduced. The farmer is notified with the statistics regarding subject circumstance thru cell periodically. This gadget may be more useful in regions where there is scarcity of water and can be really worth effi- cient with gratifying its requirements.

Keywords: Smart Irrigation, Sensors, Bluetooth communication, Android.

1. Introduction

In India, wherein 60-70% economic system relies upon on agriculture, there's a extremely good need to modernize the traditional agricultural practices for the better productivity. due to unplanned use of water the ground water stage is

decreasing each day, loss of rains and scarcity of land water additionally results in decrement in volume of water on earth. in recent times, water scarcity is becoming one of the huge- gest problems inside the global. We want water in every and every discipline. In our day to day life

additionally water is essential. Agriculture is certainly one of fields where water is required in excellent amount. Wastage of water is the essential trouble in agriculture. each time extra of water is provide to the fields. there are many techniques to save or to govern wastage of water in agriculture. The objective of the sys- tem is to a) preserve strength & water resources b) handles the gadget manually and robotically c) detects the level of water.

due to the climatic adjustments and absence of precision, agriculture have led to negative yield

in comparison to population boom. Irrigation is often performed using canal structures in which water is pumped into fields after normal c language of time with none remarks of water degree in subject. This sort of irrigation impacts crop fitness and produces a poor yield because some vegetation are too touchy to water content in soil.

A smart irrigation system, opposite to a conventional irrigation method, regulates provided water. The comments mechanism of a smart irrigation device is a moisture sensor and temperature and humidity sensor. Evapo - transpiration (ET), thermal imaging, capacitive methods, and neutron scattering method and gypsum blocks are some of the technologies that

permit moisture sensing. Capacitive sensors, however instant, are costly and want to be calibrated often with various temperature and soil type. Neutron probe primarily based moisture sensors are very accurate but present radiation hazards, calibration difficulty and are expensive.

A big agriculture discipline provides is with unique a part of regions, hence, moisture measurement at a unmarried locating within the area does now not make a whole lot sense. consequently, what's required is a distrib- uted number of sensor nodes and scattered pumping gadgets to pump water to the ones specific places blanketed through the sensor gadgets. an automated irrigation unit, at the side of a low value moisture sensor, is proposed on this paper.

2. Literature Survey

2.1. Automated Irrigation System using WSN and GPRS Module

computerized Irrigation machine the use of WSN and GPRS Module hav- ing primary purpose is that optimize use of water for agriculture plants[1]. This device consists of distributed wi-fi sensor community with soil moisture and temperature sensor in WSN. Gateway gadgets are used to transfer records from

sensor unit to base station, ship command to actuator for irrigation control and control data of sensor unit. set of rules used in device for controlling water quantity as in keeping with requirement and condition of filed. it's far programmed in microcontroller and it sends command via actuator to govern water amount thru valve unit. whole machine is powered by using photovoltaic panels. communication is duplex take region thru cellular community. web software manipulate the irrigation thru continuous monitoring and irrigation scheduling programming. it can be done via net pages.

371

2.2. Crop Monitoring System based on WSN

the subsequent section introduces the Bluetooth generation. wireless Sensor community crop tracking software is useful to farmer for precision agriculture. The software monitors the whole farm from remote region using internet of factors (IOT). application works on sensor netowrk and two varieties of nodes. electricity saving algorithm is used in node to save energy. Tree based totally protocol is used for facts collection from node to base station. device having nodes one node that collect all environmental and soil parameter value and the opposite consist of camera to capture photographs and display crops. in this system

Environmental adjustments are not taken into consideration for sensor studying. system consumer isn't able to software utility. there may be no controlling gadget for applica- tion.

2.3. Automatic Drip Irrigation System using WSN and

Data Mining Algorithm statistics mining algorithm are used to take decisions on drip irrigation gadget. computerized drip irrigation gadget having WSN placed in all over farm and special type of sensors. [9]WSN uses ad hoc network which offers self configuration and versatility. Sensor records is given to base station and facts is received the usage of zigbee. statistics processing is performed at base station for decision making. information min- ing algorithm is used to take decision on information from sensor to drip. All statement are remotely reveal through internet software. This gadget works on Naïve Bayes set of rules for irrigation manage. set of rules works on preceding information set for decision making if any characteristic isn't frequent result is 0[11].

3. Components

3.1. Arduino Microcontroller

Arduino is an open-source electronics platform based on easy-to-use hardware and software[5][4]. Arduino boards are able to read inputs – light on a sensor, a finger on a button – and turn it into an output – activating a motor, turning on an LED. A microcontroller is a small computer on a single integrated circuit. In modern terminology, it is a system on a chip. It contains one or more CPUs along with memory and programmable input / output peripherals. Microcontrollers are designed for embedded application. There are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines and other embedded systems[4].

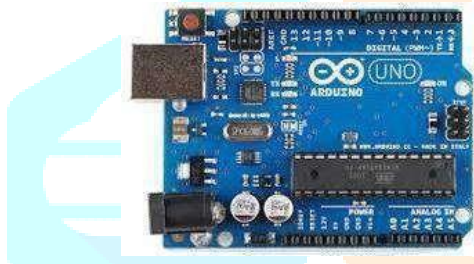


Fig. 1.: Arduino Microcontroller

Fig.1 suggests Arduino microcontroller were the Arduino board can speak at diverse baud rates. A baud is a measure of ways often the hardware can send 0's and 1's in a 2nd. The software used by the arduino is Arduino IDE.

3.2. Sensors on this machine two sensors are used so that you can attain the information about the soil and environmental condition, soil moisture sensor and temperature and humidity sensor.

3.2.1. Soil Moisture Sensor

Soil moisture sensors degree the volumetric water content in soil[11]. for the reason that direct gravimetric measurement of loose soil moisture calls for getting rid of, drying and weighing of a sample, soil moisture sensors measure the volumetric water content material not directly by way of the use of a few other assets of the soil, such as electric resistance, dielectric regular, or interaction with neutrons, as a proxy for the moisture content material.

This sensor has probes thru which cutting-edge passes in soil, then read the resistance of soil for reading moisture stage. We recognized that water make the soil greater vulnerable to electric powered conductivity resulting less resistance in soil where on other hand

dry soil has terrible electrical conductivity accordingly greater resistance in soil.

3.2.2. Temperature and Humidity Sensor

The DHT11 is a primary, ultra low-cost digital temperature and humidity sensor shown in Fig 3. It uses a capacitive humidity sensor and a thermostat to measure the encircling air, and spits out a digital signal on the information pin.

It measures relative humidity. Relative humidity is the amount of water vapor in air vs. the saturation point of water vapor in air. on the saturation factor, water vapor begins to condense and accumulate past due on surfaces forming dew. It detects water vapor by means of measuring the electric resistance between electrodes.

3.2.3. Bluetooth Wireless Technology

Bluetooth is a high-velocity, low-electricity microwave wireless link generation, designed to attach phones, laptops and different portable device collectively with very little paintings with the aid of the use. unlike infra-crimson, Bluetooth does no longer require line-of-sight positioning of related gadgets. The generation uses changes of current wi-fi LAN strategies however is maximum great for its small size and low price proven in parent 2. The modern-day prototype circuits are contained on a circuit board zero.9cm rectangular, with a much smaller single chip model in development. The fundamental strength of Bluetooth wireless era is the capability to concurrently deal with records and voice transmissions, which affords customers with a variety of progressiv solutions.



Fig. 2 . Bluetooth Device

This technology achieves its purpose by embedding tiny, inexpensive, short-range transceivers into the electronic gadgets which are available nowadays. The radio operates on the globally-available unlicensed radio band, 2.45 GHz, and helps statistics speeds of up to 721 Kbps, as well as three voice channels. each device has a completely unique forty eight-bit deal with from the IEEE 802 general. Connections can be factor-tofactor or multipoint. The maximum variety is 10 meters however can be prolonged to one hundred meters by way of growing the energy. Bluetooth devices are included from radio interference by way of changing their frequencies arbitrarily upto a maximum of 1600 times a second, a technique known as frequency hopping.

moreover, Bluetooth devices received't drain treasured battery existence. The Bluetooth specification targets energy consumption of the tool from a hold mode consuming 30 micro amps to the energetic transmitting range of 8-30 milliamps.

International Journal of Engineering & Technology

Bluetooth device makes use of radio waves in preference to wires or cables to connect with a smartphone or pc. A Bluetooth product, like a head- set o watch, contains a tiny computer chip with a Bluetooth radio and software program that makes it easy to connect. when two Bluetooth gadgets need to talk to each other, they want to pair. Communica- tion between Bluetooth gadgets takes place over quick-range, ad hoc networks called piconets. A piconet is a community of gadgets linked using Bluetooth era. when a network is estab- lished, one tool takes the function of the grasp while all of the other gadgets act as slaves. Piconets are mounted dynamically and automatically as Bluetooth devices enter and depart radio proximity. The sensors are connected to the Arduino board. those hardware talk via Bluetooth .

4. Proposed System

Irrigation can be automated through the use of sensors, microcontroller, Bluetooth, android software as shown in Fig.3. The low fee soil moisture sensor and temperature and humidity sensor are used. They constantly monitor wi-field. The sensors are related to arduino board. The sensor data acquired are transmitted through wi-fi transmission and are reached to the person in order that he can manipulate irrigation. The mobile software can be designed in one of these way to research the information obtained and to test with the threshold values of moisture, humidity and temperature. The decision can be made both through the software robotically with out user interruption or guy- ually via software with person interruption. If soil moisture is much less than the brink fee the motor is switched ON and if the soil moisture exceeds the edge value the motor is switched OFF.

The sensors are connected to the Arduino board. those hardware communicate via wireless Bluetooth transmission so that consumer can get admission to the facts through his mobile that has an android applica- tion which could get the sensor facts from the arduino through Bluetooth. As far as price of tool is considered Bluetooth

generation is used which can be replaced by means of c084d04ddacadd4b971ae3d98fecfb2a. motor is switched OFF.

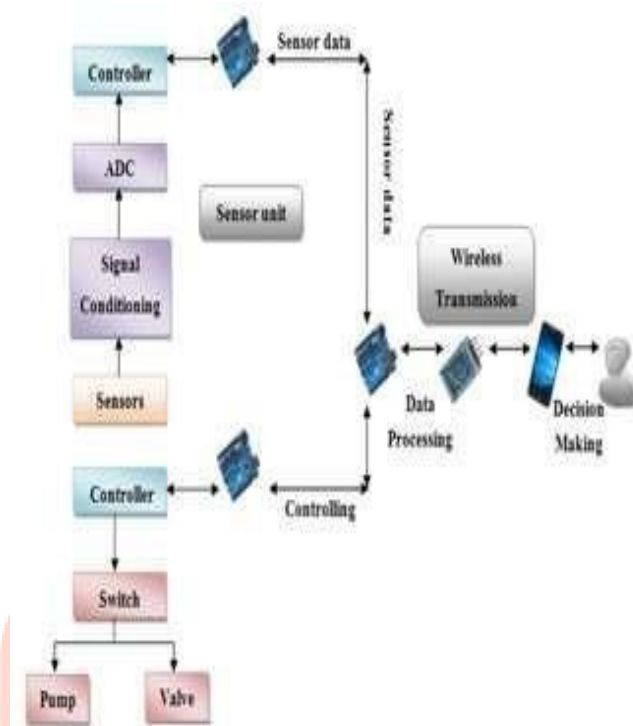


Fig.3: System Architecture

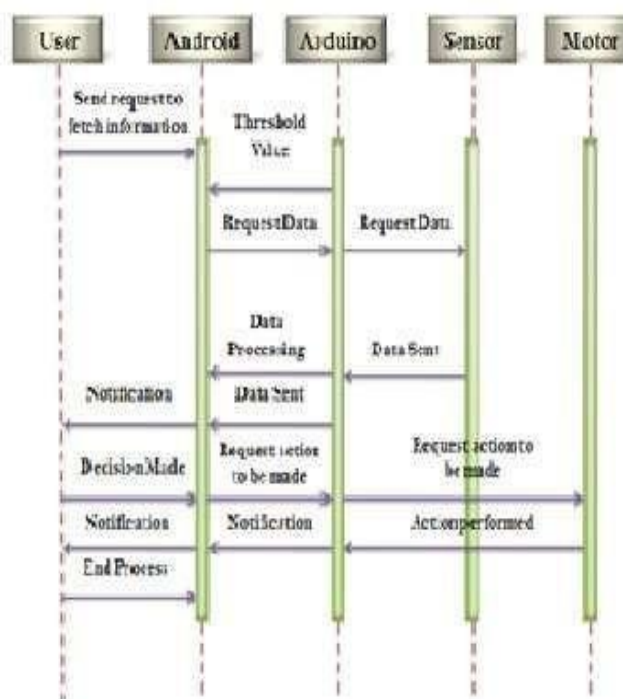


Fig.4: Sequence Diagram for the automatic irrigation

The Arduino board is programmed the usage of Embedded C to be able to manipulate the transmission of sensor information and the working of motor in line with the decision made. The coordination of the motor and 3 sensors is maintained via the program fed into the arduino. Water is provided to 3 exceptional areas

by the use of Servo Motor, motor which could pass its head at distinctive angles. the use of this, the head of the motor is made to transport at 3 distinct attitude in order that water may be supplied at extraordinary areas where the sensors are located. The sensors constantly send statistics concerning moisture content of the soil. Whichever sensor shows low moisture content to that location motor is switched on and then water is pumped, if it shows excessive moisture content material pumping of water is stopped through switching of the motor. these kind of are controlled via the program that has been written into the Arduino Microcontroller. The coordination of all of the additives are shown in the determine four.

The Arduino and the person talk through Bluetooth. The range of Bluetooth generation is utility unique. the brink val- united statesfor each soil moisture and temperature and humidity, may be set and saved inside the arduino and cell application. The sensor fee varies in accordance the climatic conditions. The soil moisture might be exceptional in summer time and winter seasons and so the temperature and humidity values. the threshold value is constant after considering all theses environmental and climatic situations. The motor can be switched on routinely if the soil moisture price falls under the threshold and vice versa.

The farmer may even turn on the motor from cell using mo- bile software.

The irrigation machine is automatic as soon as the manipulate acquired from the cellular utility. thru Bluetooth the decision is sent to the arduino and hence the motor switches are operated. The ultrasonic sensor is used to reveal water degree in reservoir. The ultrasonic sensor work primarily based on the piezoelectric method. It has cause pin and echo pin. The trigger pin act as transmitter and the echo pin is a reflector. The trigger pin sends ultrasonic waves as soon as it began functioning. The ultrasonic waves as soon as it commenced functioning. The ultrasonic waves hit the water and pondered to- wards the echo pin. The length to receive the echo is calculated and that suggests the water stage. The duration is converted to the space the usage of the subsequent equa- tion (1) and (2). Distance in cm = (duration/2) / 29.1 (1)

373

Distance in inches = (duration/2) / 74(2)

before the motor is switched on, the water level is checked to ensure that require quantity of water is to be had for irrigation. If required quantity of water isn't always present, the motor

will no longer be switched on or handiest much less quantity water is provided. The notifica- tion is sent to the farmer's mobile for further selection to be made. The farmer also can be able to activate and stale the motor from the cellular application[13].

5. Android Mobile Application

Android is used to develop mobile application for computerized irri- gation. Android is a cell working gadget developed by using Google, primarily based at the Linux kernel and designed primarily for touch display screen cellular gadgets including clever telephones and pills. Android's consumer interface is specifically based totally on direct manipulation the usage of touch gestures that loosely correspond to actual-world moves, which includes swiping, tapping to control on-display screen gadgets, in conjunction with a virtual keyboard for text enter[13]. The sensor information and threshold fee are saved in local reminiscence of the cellular. The person can study the sensor facts, and may set the system into computerized mode in order that the gadget automatically switches motor relying at the sensor facts and previously set threshold value. additionally the user can set the device to manual mode and he himself can determine the switching of the motor. And he can get the notifications regarding the water level in reservoir so that he can make alternatives while there's shortage of water in reservoir.

6. Conclusion and Future Work

the automatic irrigation gadget carried out changed into located to be possible and price powerful for optimizing water resources for agri- tradition manufacturing. This irrigation device permits cultivation in places with water shortage thereby enhancing sustainability.

The irrigation system allows the farmer with the aid of making his work smarter. as the call for for water will increase, alongside side the want to defend aquatic habitats, water conservation practices for irrigation want to be powerful and low-priced. As more than one sensors are used water can be supplied exceptional to the desired location of land.

This gadget reduces the water intake to more extent. It

International Journal of Engineering & Technology

desires minimal maintenance. The strength consumption has been reduced very an awful lot. The crop productivity increases and the wastage of plant life are very an lousy lot decreased.

The extension paintings is to make user interface lots less complex by actually the usage of SMS messages for notifications and to function the switches.

References

- [1] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra NietoGaribay, and Miguel Ángel Porta- Gándara” Automated Irrigation System Using a Wireless Sensor Network and GPRS module” , Ieee Transactions OnInstrumentation And Measurement, Vol. 63, No. 1, January 2014.
- [2] “An Automatic Irrigation System using ZigBee in Wireless Sensor Network” 2015 International Conference on Pervasive Computing (ICPC)-IEEE 2015 by Pravina B. Chikankar, Deepak Mehetre , Soumitra Das Computer Engineering Department K J College of Engineering Management Research, Pune, India
- [3] Stefanos A. Nikolidakis , Dionisis Kandris,Dimitrios D. Vergadoschristos Douligeris A”Energy Efficient Automated Control Of Irrigation In Agriculture By Using Wireless Sensor Networks, Computers And Electronics In Agriculture “0168-1699/ 2015 Elsevier B.V.
- [4] Venkata Naga Rohit Gunturi, “Micro Controller Based Automatic Plant Irrigation System” International Journal of Advancements in Research & Technology, Volume 2, Issue-4, April-2013.
- [5] www.arduino.cc
- [6] D. K. Fisher and H. A. Kebede, “A low-cost microcontroller-based system to monitor crop temperature and water status,” Comput. Electron. Agricult., vol. 74, no. 1, pp.168–173, Oct. 2010.
- [7] S. Li, J. Cui, Z. Li, "Wireless Sensor Network for Precise Agriculture Monitoring," Fourth International Conference on Intelligent Computation Technology and Automation, Shenzhen,China, March 28-29, 2011.
- [8] K. Honda, A. Shrestha, A. Witayangkurn, et. al., "Fieldservers and Sensor Service Grid as Real-time Monitoring Infrastructure for Ubiquitous Sensor Networks", Sensors, vol. 9, pp. 2363-2370, 2009.
- [9] I. Mampentzidou, E. Karapistoli, A.A. Economide, "Basic Guidelines for Deploying Wireless Sensor Networks in Agriculture", Fourth International Workshop on Mobile Computing and Networking Technologies, pp. 864-869, 2012.
- [10] G. Yuan, Y. Luo, X. Sun, and D. Tang, “Evaluation of a crop water stress index for detecting water stress in winter wheat in the North China Plain,” *Agricult. Water Manag.*, vol. 64, no. 1, pp. 29–40, Jan. 2004.
- [11] Kshitij Shinghal, Arti Noor, Neelam Srivastava, Raghuvir Singh; "intelligent humidity sensor for wireless sensor network agricultural application";*International Journal of Wireless & Mobile Networks (IJWMN)* Vol. 3, No. 1, February 2011.
- [12] Muhmad Azman Miskam, Azwan bin Nasirudin, Inzarulfaisham Abd. Rahim; "Preliminary Design on the Development of Wireless Sensor Network for Paddy Rice Cropping Monitoring Application in Malaysia"; *European Journal of Scientific Research* ISSN 1450216X Vol.37 No.4, 2009.
- [13] A Survey on Control and Monitoring of Home Appliances using Internet of Things, in *International Journal of Engineering Research during a International Conference on Convergent Innovative Technologies (ICCIT-2016)* held at Cambridge Institute of Technology, Bangalore, on May 20, 2016.