Nat. Volatiles & Essent. Oils, 2021; 8(6): 5696-5703

NVEO
Natural Volatiles &
Essential Oils

Energy Preserving Secure Measure Against Wormhole Attack In Wireless Sensor Networks

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ABSTRACT This IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensors deployed at various nodes and sends it through the IOT Technology. This smart agriculture using IOT system is powered by Arduino with Temperature sensor, Moisture sensor, water level sensor, DHT11 Sensor, Ultrasonic sensor, Flame sensor, water motor, buzzer and node MCU. When the IOT based agriculture monitoring system starts it checks the water level, humidity and moisture level. It sends SMS alert on the phone about the levels. Sensors sense the level of water if it goes down, it automatically starts the water pump. If the temperature goes above the level, water motor starts. When any animal reach the agricultural land, the buzzer we attached to the arduino will make the sound alert system. So that the animal will leave the land. Finally all data will be transferred to the IOT cloud system using node MCU module.

Key Terms: Agriculture Monitoring, Sensor

1.INTRODUCTION

Agriculture is the unquestionably the largest livelihood provider in India. With rising population, there is a need for increased agricultural production. In order to support greater production in farms, the requirement of the amount of fresh water used in irrigation also rises. Currently, agriculture accounts 83%ofthetotal water consumption in India. Unplanned use of water inadvertently results in wastage of water. This suggests that there is an urgent need to develop systems that prevent water wastage without imposing pressure on farmers. Over the past 15 years, farmers started using computers and software systems to organize their financial data and keep track of their transactions with third parties and also monitor their crops more effectively.

In the Internet era, where information plays a key role in people's lives, agriculture is rapidly becoming a very data intensive industry where farmers need to collect and evaluate a huge amount of

information from a diverse number of devices (Eg. Sensors, faming machinery etc.) in order to become more efficient in production and communicating appropriate information.

Generally most of the irrigation systems are manually operate done. The set rational techniques are being is replaced with semi-automated and automated techniques suggested an automated concept of irrigation to use the water efficiently and effectively Automated Drip Irrigation system is implemented either based on the soil humidity or based on the user input via SMS commanding systems.. Former method is an isolated irrigation system where the farmer doesn't updated with the irrigation status and later lags in smart utilization of water due to user command without considering the condition of soil.

2. MATERILAS AND METHODS

A. A.IOT Based Smart Irrigation System

Automation of farm activities can transform agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human supervision. This paper proposes an automated irrigation system which monitors and maintains the desired soil moisture content via automatic watering. Microcontroller ATMEGA328P on arduino Uno platform is used to implement the control unit. The setup uses soil moisture sensors which measure the exact moisture level in soil. This value enables the system to use appropriate quantity of water which avoids over/under irrigation. IOT is used to keep the farmers updated about the status of sprinklers. Information from the sensors is regularly updated on a webpage using GSM-GPRS SIM900Amodemthroughwhich a farmer can check whether the water sprinklers are ON/OFF at any given time. Also, the sensor readings are transmitted to a Thing speak channel to generate graphs for analysis.

Being an agrarian nation, about 65% of the Indian population depends on agriculture and it accounts for around 22% of the India's GDP[8]. Water management is the most important issue on which the growth of agriculture sector largely depends. Indian agriculture sector is in dire need of investment to meet the expenses. To fuel the capital needs of the agricultural economy and also to ensure that the benefits of growth percolate to bottom of the socio-economic pyramid, farming has to be projected as an avenue of investment for the urban population. The scarcity of available water both in its quantity and quality and the migration of labour from agriculture for various reasons resulted in modernizing and automating farming practices that will pave way for revamping agriculture. Recent scientific advancements have made possible the networking of a wide variety of sensors, independently from any pre-existing infrastructure. When ever physical conditions change rapidly, these allow for real-time data process in gata minimal cost.

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A system to monitor moisture levels in the soil was designed and the project provided an opportunity to study the existing systems, along with their features and drawbacks.. The whole Arduino, Node MCU, Soil Moisture sensor, ultrasonic sensor, PIR sensor, Flame sensor, water level sensor, DHT 11 Sensor. Soil Moisture sensor measures moisture content of the soil. Ultrasonic sensor is used to detect the animal presence in the land.

1.The work is built from easily available and reasonably priced components. Therefore, the cost is reasonable and maintenance is easy.

2. The status of crops can be viewed remotely on a smart phone or laptops using the internet. This helps to keep the farmer up to date even when he is away.

C. Xarduino Uno And Its Programming

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can be communicate with software running on your computer. The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

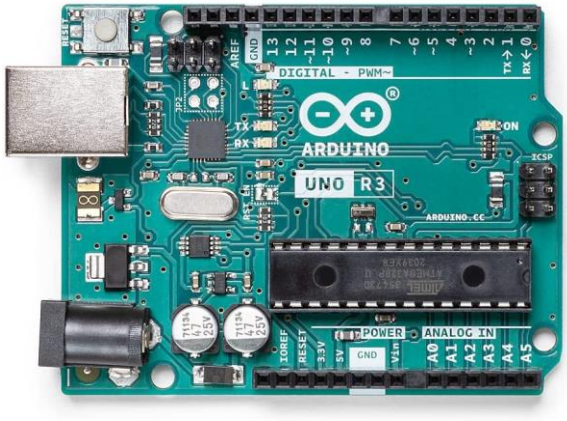

Fig.2.1. Arduino Uno

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

3. RESULTS AND DISCUSSIONS

A. Pin Configuration

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall- wart) or battery. The adapter can be connected by pluggінga2.1mmcenter-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

B. The Power Pins

VIN

The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V

This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltageviathe5V or 3.3V pins bypasses the regulator, and can damage your board.

3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

IOREF. This pin on the Arduino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs for working with the 5V or 3.3V.

C . Fire/Flame Sensor Module

Flame sensor is the most sensitive to ordinary light that is why its reaction is generally used as flame alarm purposes. This module can detect flame or wavelength in 760 nm to 1100 nm range of light source. Small plate output interface can and single-chip can be directly connected to the micro computer IO port. The sensor and flame should keep a certain distance to avoid high temperature damage to the sensor. The shortest test distance is 80 cm, if the flame is bigger, test it with farther distance. The detection angle is 60 degrees so the flame spectrum is especially sensitive. The detection angle is 60 degrees so the flame spectrum is especially sensitive.

D. pH SENSORS

In the process world, pH is an important parameter to be measured and controlled. The pH of a solution indicates how acidic or basic (alkaline) it is. The pH term translates the values of the hydrogen ion concentration- which ordinarily ranges between about 1 and 10 x -14gram-equivalents per litre - into numbers between 0 and 14.On the pH scale a very acidic solution has a low pH value such as 0, 1, or 2 (which corresponds to a large concentration of hydrogen ions; 10 x 0, 10 x -1, or 10 x -2 gram-equivalents per litre)while a very basic solution has a high pH value, such as12, 13, or 14 which corresponds to a small number of hydro genions (10 x -12, 10x- 13, or 10 x -14 gram-equivalents per litre).A neutral solution such as water has a pH of approximately 7.

E. Typical pH sensor

When immersed in the solution, the reference electrode potential does not change it the changing hydrogen ion concentration. A solution in the reference electrode also makes contact with the sample solution and the measuring electrode through a junction, completing the circuit. Output of the measuring electrode changes with temperature (even though the process remains at a constant pH),so a temperature sensor is necessary to correct for this change in output. This is done in the analyser or transmitter software. The pH sensor components are usually combined into one device called a combination pH electrode. The measuring electrode is usually glass and quite fragile.. The preamplifier also strengthens and stabilizes the signal, making it less susceptible to electrical noise. The sensor's electrical signal is then displayed. This is commonly done ina120/240 V ac-powered analyser or in a 24 V dc loop-powered transmitter.

F. Interfacing pH Sensors

(i). Ph sensors, interface and calibration

The pH electrode is essentially a simple single cell battery. The voltage is directly proportional to the hydrogen ion concentration surrounding the electrode. The pH is the logarithm of the hydrogen ion concentration.

(ii). The ideal pH electrode

The above values depend somewhat on the construction of the individual electrode, and its aging. That is why it is necessary to calibrate and standardize the pH monitoring and recording instrument from time to time, depending on the conditions it is subjected to. "Standardize" means to adjust the offset so that the instrument reads zero in neutral (pH 7) solution. "Calibrate" means to trim the slope of the pH/mV response to the the correct value for the electrode at that point in time. The instrument should probably have automatic temperature compensation, to adjust the slope in response to different calibration and working temperatures.

Here is the circuit of a pHx amplifier:

G. PIR MOTION SENSOR

A PIR detector is a motion detector that senses the heat emitted by a living body. These are often fitted to security lights so that they will switch on automatically if approached. They are very effective in enhancing home security systems. The sensor is passive because, instead of emitting a beam of light or microwave energy that must be interrupted by a passing person in order to “sense” that person, the PIR is simply sensitive to the infrared energy emitted by every living thing. When an intruder walks into the detector’s field of vision, the detector “sees” a sharp increase in infrared energy.

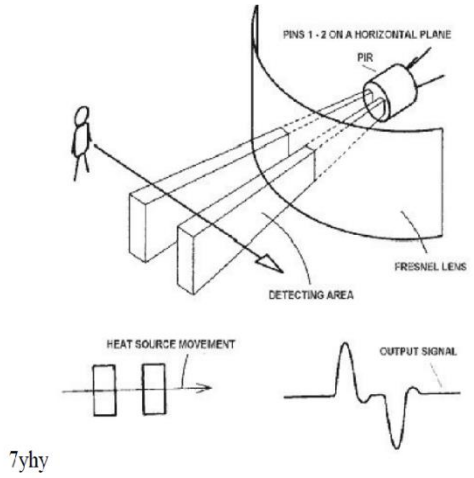

Fig 3.1. The PIR Sensor

H. Ultrasonic (UV) Sensors or Ultrasound Sensors.

Bats are wonderful creatures. Blind from the eyes and yet a vision so precise that could distinguish between a moth and a broken leaf even when flying at full speed. No doubt the vision is sharper than ours and is much beyond human capabilities of seeing, but is certainly not beyond our understanding. Ultrasonic ranging is the technique used by bats and many other creatures of the animal kingdom for navigational purposes. In a bid to imitate the ways of nature to obtain an edge over everything, we humans have not only understood it but have successfully imitated some of these manife stations and harnessed their potential to the greatest extent.

4. RESULTS AND DISCUSSION

The values obtained through sensors enable the system to switch the sprinkler on and off. A farmer can remotely monitor the irrigation process on the farm. Hence, the system contributed in making a smart farm. Table 2depictsthereadings of the two YL-69 soil moisture sensors taken over a period of one hour. Table depicts readings from two YL-69 soil moisture sensors one of which was inserted in over irrigated soil and the other in soil with initial moisturecontent79%. The readings were taken over a period of one hour to observe the rate at which moisture content in soil is reducing when the sprinklers are off.

At present, labour-saving and water-saving technology is a key issue in irrigation. a wireless solution for intelligent field irrigation system, based on IOT technology was proposed in this paper particularly, the toxins and hazardous metals in soil using embedded systems . instead of conventional wired connection, the wireless design made the system easy installation and maintenance. the hardware architecture and software algorithm of wireless sensor/actuator node and portable controller, acting as the end device and coordinator in IOT network respectively, the performance of the whole system was evaluated in the end. the long-time smooth and proper running of the system in the field proved its high reliability and practicability. as an explorative application of wireless sensor network in irrigation management, this paper offered a methodology to establish large scale remote intelligent irrigation system. 51 Thus our project creates an awareness about the automation in agricultural field. Here the manual intervention can be reduced by irrigating the plants automatically.

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