International Journal of Research in Engineering, Science and Management
Volume-2, Issue-3, March-2019
www.ijresm.com | ISSN (Online): 2581-5792

Smart Atomizer System using IoT

B. Gokulavasan[1], S. Dhanish Ahamed[2], K. Gokul Kumar[3], K. Anu Priya[4], S. Dharani[5]
[1]*Asst. Professor, Dept. Electronics and Communication Engg., Sri Eshwar College of Engg., Coimbatore, India*
[2,3,4,5]*UG Student, Dept. Electronics and Communication Engg., Sri Eshwar College of Engg., Coimbatore, India*

***Abstract*: In the daily operation of farming and gardening, watering is the most important cultural practice. Considering the weather type may be both too hot or too cold, controlling and monitoring the garden can be done. The manual activities of watering the plants are being replaced. In this regard, we have proposed this idea to overcome the setbacks of regular sprinklers. Various sensors had been used for sensing the various parameters of the soil, the water level of the tank. The sensed parameters and motor status are delivered as a message through GSM Module and can monitor the status through web-enabled devices using IoT. The objective of the proposed idea is to save water and manual intervention. The most important objective is to automatically stop the atomizer or sprinkler if there are any human interventions. The moisture level of the soil measured and the plants are irrigated with the required amount of water. The water level of the main tank is also measured and intimated.**

***Keywords*: Moisture sensor, IR sensor, ultrasonic sensor, GSM Module, IoT.**

1. Introduction

The world is trending into different modern and new technologies and their implementation, so it's important to tend up in agriculture and farming as well. Many advanced researches are being conducted in the field of agriculture. Most projects are developed by using wireless sensor network and collect data from different sensors placed at various nodes and it's been sent through different wireless protocol. The various factors like soil moisture level, humidity, human intervention and water level in the main tank are monitored. So, to overcome the various issues in agriculture and gardening, automation must be implemented in irrigating water for both agriculture and gardening. It's important to develop an integrated system which must provide a solution for irrigating water and other manual activities. Where irrigation is the method in which a controlled amount of water is being supplied to plants and lawns at regular intervals for both agriculture and gardening. This type of irrigation also has a few other uses in crop production and preventing plants and crops from frost.

2. Internet of things with atomizer system

India is well-known for its small farms and gardens. Nearly 45-50% of gardens and fields are irrigated. Almost half of the total population of India depends on agriculture. When compared with US; it is about 2% only due of heavy mechanization of both agriculture and farming. The major fact is about the Indian agriculture is that, on the other side it has a very low farm and agricultural productivity. This can be improved through Internet of Things. Internet of Things (IoT) is the concept of connecting physical objects that are accessible through the internet. Since we are always talking and thinking about connecting everything to the internet, there prevails an unimaginable amount of opportunities involved. Intelligently connected appliances to the internet they become smarter and more reliable. The important things in IoT are internet and physical devices like sensors. The sensors used in the proposed system is controlled and monitored through IoT.

3. Proposed system

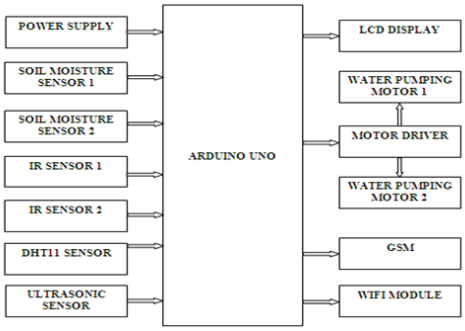

Fig. 1. Block diagram of smart atomizer system using IoT

The overall proposed system consists the block diagram of IoT based atomizer system that contains various sensors like IR sensors, ultrasonic sensors, humidity sensor, soil moisture sensors which are connected to the controller and the sensed values from these sensors are sent as SMS through the GSM Module to the user mobile phone and the sensed values are monitored in the web-enabled devices of the user. The atomizer system using IoT helps peasants to utilize various controlling and monitoring system in order to increase the yield with the help of automation in the field of agriculture along with agricultural parameters like temperature, humidity, and soil moisture are monitored and controlled. The monitoring and controlling of the system is done to help the farmers to improve the yield. This proposed work includes an embedded system for automatic control over irrigation. The project has a wireless sensor network for real-time sensing of an atomizing system. The proposed system provides the required amount of water to the lawns or garden which helps in reducing the wastage of

water. When the moisture level of the soil reaches below the limited threshold value, then the atomizer system automatically switches the motor ON. When the soil acquires the required amount of water the atomizer stops irrigating water to the soil and atomizer stops working. When there is human intervention near the sprinkler, the atomizer stops to irrigate and once the intervention is not present the atomizer resume its state. This system also monitors the water level of the main tank and informs the status of the tank through message.

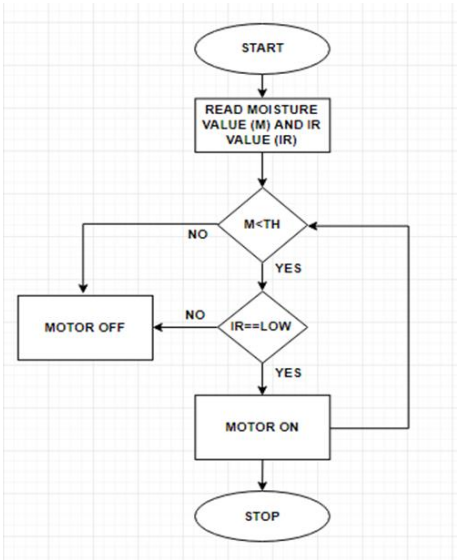

Fig. 2. Flow chart of smart atomizer system using IoT

4. Hardware

The major components used from which the atomizer system using IOT has been fabricated.

- Arduino UNO
- GSM module
- DHT11 humidity sensor
- IR sensors
- Ultrasonic sensors
- Driver motor
- Wi-Fi module
- Power supply
- Water pumping motor
- LCD display

A. Arduino UNO

The Arduino UNO is a microcontroller based on specification of Atmel ATmega328. This has various input and output pins with 6 analog input/output and 14 digital input/output out of which 6 can be used as PWM. It has hardware features like timers, external and internal interrupts, power jack and reset button. They are just connected to the computer using the USB cable or adapter. The driver does not use the FTDI USB serial chip, rather than that they use ATmega16U2 (Atmega8U2 to R2), which is programmed as a USB port converter. The ASD and SCL pins are located next to the A_{ref} pin and two new screws located near the reset IOREF allow you to adjust the target's specified voltage. The sensors and hardware are connected to the input/output pins of the Arduino. Since it has the feature of build-in voltage regulation, the external power source unto 12v can be connected and this will regulate into 5v and 3.3v. It contains 32 kb of flash memory for storing the code. The reset button helps to reset the program on the chip. The Arduino UNO received the input from the variety of sensors, which affect its surrounding by controlling lights, motors and other actuators. The Arduino programming language and the Arduino development is used to program the microcontroller.

B. GSM Module

GSM Module (Have to change content) GSM acronym Global System for Mobile Communications. This was developed to describe the protocols for second generation digital cellular networks (2G) used by mobile-phone users. To meet the communication requirements the modem modulates and demodulates the signals. A GSM modem is a device that always modulates and demodulates the signals and GSM in this particular case the 2G signals. The modem that is used is SIMCOM SIM300. It is a three-band GSM / GPRS modem, as it can be detected and operated at three frequencies like EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz. The Operating frequencies are EGSM and DCS 900MHz 1800MHz. In this scenario, the GSM Module provides a wide range of things to remotely control them from anywhere. GSM module also provides the ease of communication more robust. The SIM300 GSM module can be used to send and receive SMS by connecting it to a PC when a SIM card is being inserted. The GSM module can send commands either to send or receive SMS from PC via a COM (serial or USB) port. These commands are always called as AT commands. Through the AT commands we can perform several actions like sending and receiving SMS, MMS, etc. The Sim300 has an RS232 interface and which can be used to communicate with the PC. The Sim300 normally runs at 9600 baud, 1 stop bit, no parity, no hardware control, and 8 Data Bit. Sim300 is more widely used in many designs and therefore many developmental variants of these various plates have been developed. These development boards come along with several features to facilitate communication with the SIM300 module. In this system GSM helps to monitor the status of the field and main tank through SMS.

C. DHT11 Humidity Sensor

The DHT11 sensor is supplied in a 4-wire package of 1 line and works with a power supply of 3.5 and 5.5 V. The temperature, 0-50 °C can be measured with a precision of ± 2 °C and relative humidity lies between 20-95%, and which is comprised between with a precision of ± 5%. The sensor provides with fully calibrated measurements for the two digital outputs. The sensor has its own owner protocol thread 1, and therefore the communication between the sensors and the

microcontroller is not possible through a direct interface with any of its peripherals. The protocol must be implemented in firmware of the Micro Controller Unit, which provides the exact time required by the sensor. The following timing diagrams describing the data transfer protocol between the MCUs and the DHT11 sensors. The MCU starts its data transmission by issuing a "Start" signal. The MCU pin must be set as an output for this purpose. The first low-MCU drag line for at least 18 ms and then they are extracted for 20-40 ms before releasing them. Then, the sensors responds to the MCU's start signal for 80 ms, followed by a high logic signal for also lasts 80 ms. Remembering that the MCU pin must be configured to enter after completing the "Home" sign. Once if the signal sensor is detected, the Micro Controller Unit must be ready to receive the data from the sensor. The humidity sensor sends 40 bit (5 bytes) continuously data on the data line. During the byte transmission, the sensor sends the most significant bit during transmission.

D. Moisture Sensor

The soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and digital output. The digital output is fixed and the analog output's threshold can be varied accordingly. The sensor works on the principle of both open and short circuit. The output is high or low status is indicated by the LED. When the soil is dry, the soil will not be able to conduct electricity and hence the resistance will become higher. So it will act as an open circuit. Therefore, the output is determined as the maximum. When the soil is wet, the soil will be able to conduct electricity and hence resistance will become less. So the circuit is said to be short circuit and the output become minimum.

E. IR Sensor

The thermopile is the sensing element used in the Infrared Sensor. Thermopile detectors are the voltage-generating devices that can be used as a miniature array of thermocouples. The thermopile is a high output, thin film, and silicon based device which has it's48 thermopile junctions. The active or the 'Hot' junctions are blackened to efficiently absorb the radiation. The reference or the 'Cold' junctions are maintained at the ambient temperature of the detector. The blackening material used on the 'Hot' junctions is capable of absorbing the radiant energy from ultra violet to the far infrared. The spectral sensitivity is limited by placing the optical filters and windows in front of the detector. The window that is installed in the detector is a ruby-based material which has a spectral response from visible light to the far infrared (about 40,000 nano-meters). The hermetically sealed detector is a heat treated and filled with argon gas to improve its long-term stability. The absorption of the radiation causes a rise in temperature in the 'hot' junctions as compared to the 'cold' junctions of the thermopile. The difference in temperature across the thermocouple junction causes the detector to generate a positive voltage. If the active or the 'hot' junction were to cool to a temperature less than the reference or 'cold' junction the voltage output would be negative.

F. Ultrasonic Sensor

Usually, an ultrasonic sensor transmits the ultrasonic waves into the air and detects the reflected waves from an object. There are many various applications for ultrasonic sensors, such as in intrusion alarm systems, in automatic door openers and in backup sensors for automobiles. Accompanied by rapid development of the information processing technology, new fields of application, such as factory automation equipment and car electronics, are increasing and should continue to do so. The information contained in this catalog will help to make effective use of the ultrasonic sensors. The ultrasonic transducer is embedded, watertight, into the sensor housing, and in polyurethane foam. The transducer transmits a packet of ultra-sonic pulses and converts these echo pulse into voltage. The integrated controller computes the distance from the echo time and it's velocity of sound. Δt is the transmitted pulse duration. During, the decay time of the sonic transducer result in an unusable area in which the ultrasonic sensor cannot detect an object. The ultrasonic frequency lies between 65 kHz and 400 kHz, depending on the type of sensor the pulses repetition frequency is between 14 Hz and 140 Hz. The active range of the ultrasonic sensor is referred to the sensing range. This range is been bounded by the lowest and highest sensing distances, whose values mainly depend on the characteristics of the transducer. The highest sensing distance is been given in the type code. Ultrasonic sensors are available with the switching outputs and analogue output, various output functions are available according to type.

5. Result

Fig. 3. Prototype of smart atomizer system using IoT

The proposed system is designed to solve, to find an optimal solution to the water crisis. This enables effective use of water resources and advancement of human operation. The smart atomizer system is been designed and constructed. The specified components are rapidly available, readily available, very affordable, and quite reliable. The system helps to eliminate the stress of manual intervention and irrigation while at the same time controls and conserves the availability water supply. Here's an idea of watering the agricultural lands and gardens, which helps farmers to know the soil moisture level

and in accordance to the moisture level which switches the motor ON when the moisture level goes down, and automatically stops sprinkling water when the atomizer detects any human intervention and intimate the water level of main tank. This proposed system brings more accuracy in watering the plants.

6. Conclusion

The above proposed atomizer system can be used to overcome the water crisis and help peasant's limit their usage of water. This system acts as a useful technique for reducing the water consumption. Hence we will have great saving irrigation water, makes crops healthier, stronger and has stable high yield. The atomizer system is very feasible and eco-friendly and there by optimizing the resources for agricultural production. The atomizer system also allows cultivation possible even in water scarcity areas. This system proved that usage of water can be diminished. The present proposed system is a model to modernize the agricultural and gardening industries at a mass scale with optimum expenditure. With this, one can save man power, resources, way to improve production and ultimate profit.

References

[1] R. Vagulabranan, M. Karthikeyan, V. Sasikala," Automatic Irrigation System on Sensing Soil Moisture Content", International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 03 | Mar-2016.
[2] Bishnu Deo Kumar, Prachi Srivastava, Reetika Agrawal, Vanya Tiwari, "Microcontroller Based Automatic Plant Irrigation System," in International Research Journal of Engineering and Technology (IRJET), Volume 4 Issue 5, May -2017.
[3] D. Gainwar, Dinesh V. Rojatkar, "Soil Parameters Monitoring with Automatic Irrigation System", International Journal of Science, Engineering and Technology Research (IJSETR), Volume 4, Issue 11, November 2015.
[4] Wara Samuel. T, Awelewa Ayokunle. A, Oyediran Tobiloba, "Design and implementation of an Automatic Irrigation System on Monitoring Soil Moisture", Journal of Electrical Engineering, January 2016.
[5] Pavan Kumar Naik, Arun Kumbi, Vishwanath Hiregoudar, Chaitra N. K, Pavitra H. K, Sushma B. S, Sushmita J. H, Praveen Kuntanahal, "Arduino Based Automatic Irrigation System Using IoT", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Volume 2, Issue 3, May/June 2017.
[6] Pavithra D. S, M. S. Srinath, "GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), Volume 11, Issue 4 Ver. I (Jul- Aug. 2014), pp. 49-55.
[7] Aderemi A. Atayero and Adeyemi S. Alatishe, "Design and Construction of a Microcontroller Based Automatic Irrigation System", World Congress on Engineering and Computer Science 2015 Vol. 1, WCECS 2015, October 21-23, 2015, San Francisco, USA.
[8] Yuthika Shekhar, Ekta Dagur, Sourabh Mishra, "Intelligent IoT Based Automated Irrigation System", International Journal of Applied Engineering Research, vol. 12, no. 18, pp. 7306-7320, 2017.