Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 6, June : 2020

ANALYSIS OF AN IOT-BASED IRRIGATION SYSTEM AND ITS CREATION

[1]Vijaya Bhaskar Reddy, [2]Sujatha Kaipa, [3]Lenkay Sunil Kumar, [4]Yellanuru Rachana
[1,2,3] Assistant Professor, [4]UG Student, [1,2,3,4] Department of Electronics and Communication Engineering, Rishi MS Institute of Engineering and Technlogy for Women, Kukatpally, Hyderabad.

ABSTRACT
In India, people's primary source of income is agriculture. It is important to the nation's economy. The last ten years have seen a remarkable growth in this area of technology. A huge agriculture large-scale firm is the foundation for the precision research currently being conducted in American agriculture. However, small farmers lack the funds to purchase pricey monitoring equipment. Therefore, IOT (internet of things) technology has revolutionized every aspect of the life of the average person by making everything smart and intelligent in order to overcome these challenges. IOT describes a network of interconnected objects that can self-configure. For usage with GSM and the internet, we created an Arduino-based agricultural monitoring system. The system regulates water flow in accordance with humidity and ambient temperature measurements. The controller activates the relay drive unit when a message is received via GSM and the pump motor by using a relay switch. This design can be used for alerts, user knows moisture content via SMS (Short Message Service) and the temperature exceeds the threshold value.
Keywords: IOT, GSM module, Arduino, Wi-Fi module, Sensors.

INTRODUCTION

One universal Network Device Capability Concept is the Internet of Things. Record and gather information from the environment around us, and then share it online for processing and other amusing purposes. IOT moves quickly become a fact. We can observe evidence all around us. From smart phones to smart TVs, smart cars, and smart kitchens, our equipment will continue to get smarter every day. Nowadays, everything is linked to the Internet.

It describes the Internet of Things (IoT). a network of online physical devices that are interconnected. Objects, or "things," that can transmit information wirelessly and without human work. Any object with an IP address and the ability to transmit data over the Internet can be considered a "thing."

LITERATURE SURVEY

Various investigations have been conducted on how to improve soil irrigation efficiency. The researchers used different ideas based on soil conditions and water levels. The researchers discuss the design of the different techniques and systems used.

This article aims to reduce the water waste and labor involved in manual watering. The proposed system is designed to measure soil moisture content through sensors placed directly in the soil. These sensors detect the water level on the ground, and if the water level is low, the user will be notified via a message sent to the app, which will be installed on the user's phone [1].

The Arduino board is a microcontroller that controls the digital connections and interactions between objects in the proposed system, allowing object recognition and action [2].With its powerful on-board processing power, various sensors and other application-specific devices can also be integrated. In the system, sensors detect water

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 6, June : 2020

and humidity levels and send readings to fixed access points, eg. A PC, which in turn can wirelessly access an irrigation module installed in the field or a physical module in a tank via the Internet.

Wireless applications of drip irrigation automation assisted by soil moisture sensors are essential in agricultural areas to utilize freshwater resources for irrigation. Traditional instrumentation based on discrete and wired solutions presents many difficulties for measurement and control systems, especially over large geographic areas. If different types of sensors (such as humidity, etc.) are involved in this irrigation in future work, it can be said that Internet-based remote control of irrigation automation will be possible [3].An automated irrigation system was developed to optimize water use for agricultural crops. The system has a distributed wireless network of soil-moisture placed in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to an android application [4].

PROPOSED TECHNIQUE

Automatic irrigation system with wireless sensor network and mobile communication. The WSN consists of sensors used in agriculture to record soil moisture and temperature.

The collected data is fed to a microcontroller to adjust the value of the pump. When soil moisture decreases, the sensor sends data to the microcontroller. The microcontroller then tells the value to turn on. Once the humidity threshold is reached, the microcontroller tells the value to shut down.

BLOCK DIAGRAM

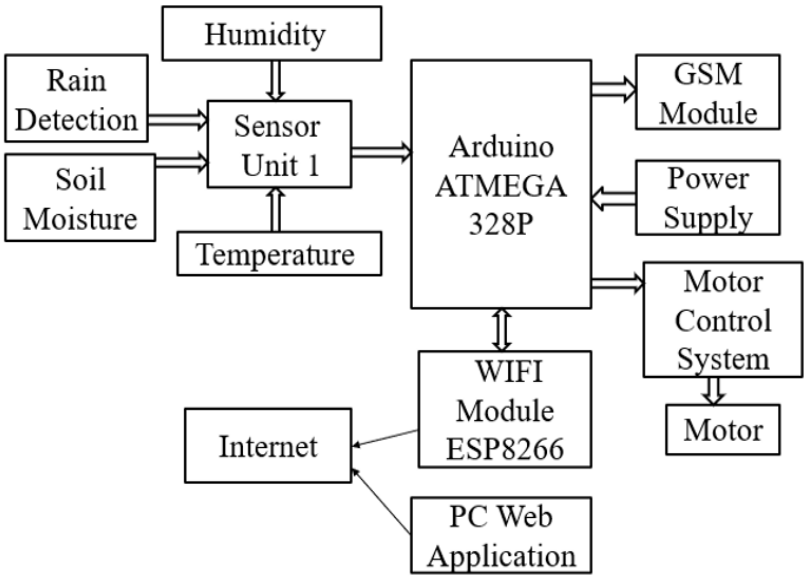

Fig**:** Block diagram of the system

HARDWARE IMPLEMENTATION

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 6, June : 2020

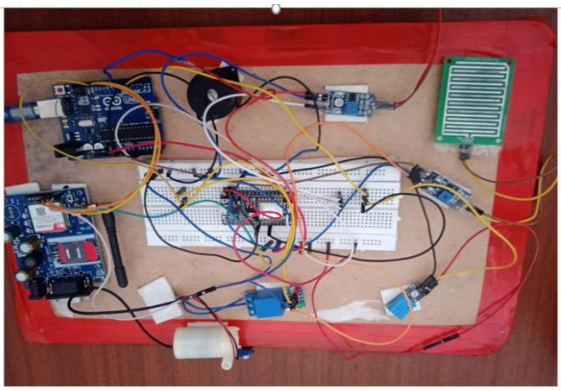

Fig: Implementation of smart irrigation system

COMPONENTS USED IN THE PROJECT

- Arduino Uno
- GSM module
- Node MCU Wi-Fi module
- Soil moisture sensor
- DHT11 sensor
- Rain sensor
- Motor pump & relay

1.ARDUINO

Arduino boards are an open-source platform for creating electronics projects. It consists of a microcontroller and a software or integrated development environment (IDE) that runs on your PC to write and upload computer code to the physical board.

2. GSM MODULE

GSM (Global System for Mobile Communications, originally Group Special Mobile) is a standard developed by the European Telecommunications Standards Institute (ETSI).

It was created to describe the second generation (2G) digital cellular network protocol used by mobile phones and is now the global standard for mobile communications - with over 90% market share and operations in over 219 countries and territories.

3. NODEMCU:

Node MCU is an open source development board and firmware based on the widely used ESP8266-12E Wi-Fi module. This allows you to program the ESP8266 WiFi module using the simple yet powerful programming language LUA or Arduino IDE.

4. SOIL MOISTURE SENSOR:

Soil moisture sensors are sensors that measure soil moisture content. The sensor has analog and digital outputs. The digital outputs are fixed and the analog output thresholds can vary. It works by opening and shorting. The output is high or low, indicated by the LED. When the ground is dry, no current flows through it, thus acting as an open circuit. Therefore, the output is called the maximum value. When the ground is wet, current flows from one terminal to the other, the circuit is called a short and the output is zero.

5. DHT 11 SENSOR

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 6, June : 2020

DHT11 Humidity and Temperature Sensor can be used as sensor and module. The difference between this sensor and the module is the pull-up resistor and the power-on LED. DHT11 is a relative humidity sensor. The sensor uses a thermistor and capacitive humidity sensor to measure ambient air.

6. RAIN SENSOR

The rain sensor module is a simple rain detection tool. It can be used as a switch when raindrops fall from the rainboard, and it can also measure rainfall intensity. For convenience, the module features separate rain and control boards, a power indicator LED, and potentiometer-adjustable sensitivity.

7. MOTOR PUMP & RELAY:

In our project prototype we are using a motor pump coupled with Arduino through a dc relay of rating DC5v/AC 230v relay module. For our convenience of apparatus avaliability we are using dc 5v pump.

ALGORITHM

STEP1: Start the process.
STEP2: Connect to WIFI.
STEP3: Read temperature and humidity & soil moisture values.
STEP4: Control motor pump by analysing the data.
STEP5: Send data to Thing speak API.
STEP6: Delay to 10 seconds.
STEP7: Repeat step 4,5&6 until the process end.
STEP8: End.

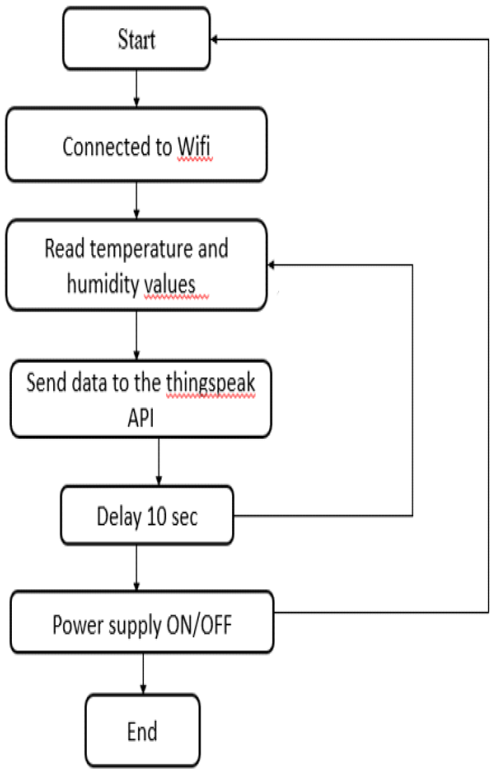

Fig: Algorithm of the proposed system

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 6, June : 2020

RESULTS

- The outputs obtained in thing speak platform from parameters of moisture, humidity and temperature.

Fig: Moisture Parameter Output.

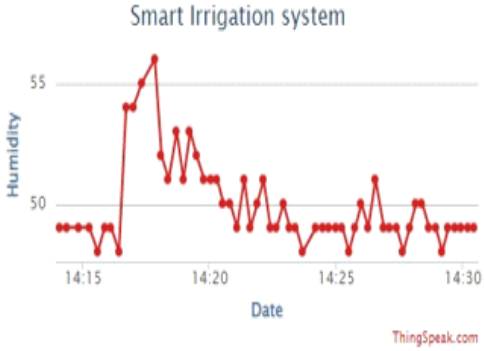

Fig: Humidity Parameter output

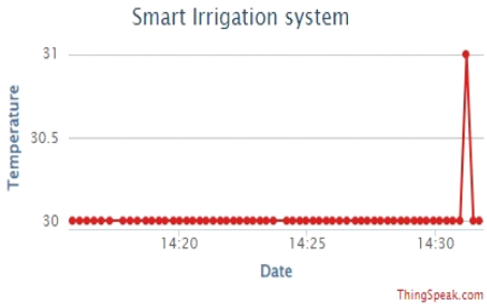

Fig: Temperature Parameter Output

- The output parameter of temperature, humidity, moisture and rain water level getting from the system is displayed on the specified mobile number:

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 6, June : 2020

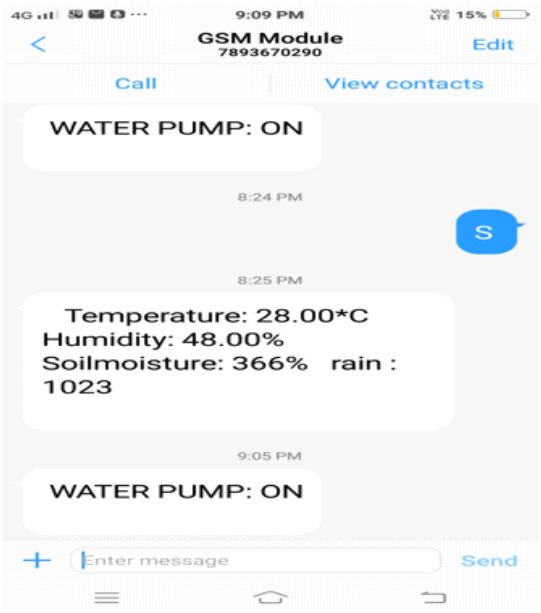

Fig: SMS alert for Mobile from GSM Module

CONCLUSION

New inventions and new technologies have been made possible by advancements in electronics and telecommunications. Components that are convenient and have improved precision and dependability are needed as we proceed with downsizing. Here, we're creating an embedded system that will support agricultural monitoring.

Different metrics are measured by the system's sensors. Using the GSM module, the captured data is sent by SMS to the receiving station. The engine's choice is based on the sensor, H, responding to the input. Signals were received from humidity and soil moisture sensors. Proteus software is used to run simulations by installing the required sensors (such as temperature and soil moisture sensors) and evaluating the outcomes under various circumstances.

REFERENCES

[1] IOT based Smart Irrigation System “Srishti Rawal” presented at International Journal of Computer Applications, volume 159-No 8, February 2017.

[2] Design and Implementation of Automatic Plant Watering System “Archana and Priya” presented at International Journal of Advanced Engineering and Global technology, vol- 04, Issue-01,Jan-2016.

[3] Sensor Based Automated Irrigation System with IOT “Karan Kansara and Vishal Zaweri,” presented at International Journal of Computer Science and Information Technologies, vol-06, 2015.

[4] C.H.Chavan and V.Karnade, “ Wireless Monitoring of Soil moisture, Temperature and Humidity using Zigbee in Agriculture” presented at International Journal of Engineering Trends and Technology (IJETT), vol-11, May- 2014.

[5] Asian Journal of Science and Technology Vol. 10, Issue 0 6, pp.9756-9768, June, 20.

[6] Measurement of Temperature and Humidity by using Arduino Tool and DHT11 "Deeksha Srivastava, Awanish Kessarwani, Shivani Dubey", International Research Journal of Engineering and Technology (IRJET), volume5, Issue 12, Dec 2018.

[7] The working principle of an Arduino "Yusuf Abdullahi Badmasai" published in 2014 11th International Conference on Electronics, Computer and Computation.