A Research Paper on Automatic Irrigation System

Sakshi Singh
Department of Electronics and Communication Engineering
Faculty of Engineering, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India

ABSTRACT: ***Wireless Sensing Technology is widely used all over the scientific world today. With the technology growing and rapidly evolving, Wireless Sensing Network (WSN) is helping to update the technology. Agriculture and gardening are not trivial works. There are a wide variety of crops and plants and there are several types of each plant or crop. Various plants and crops have varying soil, fertilizer and sun requirements. Soil maturity for any strain or planting society is often determined by the amount of nutrients and humidity therein. Different occasions and nursery workers aren't prepared to support the dirt with enough compost or water, while usually just you do it. This undertaking is to enable the ranchers and nursery staff to retain control over the level of soil dampness. This primary focused on the primary applications are for farmers and gardeners who do not have enough time to water their crops / plants.***

KEYWORDS: ***Wireless communication, Arduino, GSM module, Moisture Sensor, Solar Panel, Irrigation System, Relay.***

INTRODUCTION

Continuously increasing food demand requires the rapid improvement of food production technology in highly specialized greenhouse vegetables. For a country like India, where the economy is based primarily on irrigation, in a production and it is a simple, precise method. It also helps to save time, eradicate human agriculture and isotropic climatic conditions, but make a mistake in changing the available levels of soil moisture and cannot make full use of agricultural resources. Maximize net profits of theirs. The key factor is the lack of rainfall & land scarcity Irrigation is the artificial addition of water to the water in the soil reservoir [1].

Continuous water extraction from normally to assist in growing crops. In crop production earth the water level is reduced due to which lot of land it is used primarily in dry areas and in periods of rainfall coming gradually in zones of unirrigated soil. Another shortcomings but also for protecting plants from frost [2]. Very important reason for this is due to unplanned use of Irrigation Water Types due to which substantial amounts of water go to surface irrigation waste. Localized irrigation in modern drip irrigation systems, the most significant advantage of Drip Irrigation is that water is supplied near the sprinkler irrigation root zone.

The plants drip by drop which saves a large amount of water. At the present time farmers were the traditional methods of irrigation using overhead irrigation techniques in India through manual control sprinklers, flood type feeding systems usually wet the land irrigation system at regular intervals by farmers. Lower leaves, and plant stem. The entire soil that this method often absorbs more water or surface is soaked and sometimes remains wet long after irrigation, because of which crops are completed sometimes the water reaches late [3]. Such a condition favors leaf-drying infections. Water deficiency can be harmful to mold fungi on plants.

On the opposite, it is before obvious wilting that the drip or trickle irrigation happens. Lighter growth rate, a type of modern irrigation technique that slowly applies weight fruit follows a slight deficiency in water. This problem is small amounts of water to a portion of the root zone of the plant. Water can be perfectly rectified if used frequently supplied automatic microphones, often daily to maintain a favorable soil controller-based drip irrigation system in which the moisture condition and moisture stress prevention in plant irrigation occurs only when water resources are acutely utilized. Drip irrigation saves water requirement, because the plant alone [2].

If the correct amount is applied, no water is lost to deep percolation. Drip irrigation is popular because the irrigation system can use valves to turn irrigation on and increase yields and both water and OFF requirements decrease. Using laboratory these valves can be easily programmed. Monitors and solenoids. Automating farm or nursery Drip irrigation uses about half of the water that irrigation takes, enables farmers to apply the correct amount of sprinkler or surface irrigation. Lower running pressures water at the right time, with decreased energy costs irrespective of availability and flow levels. Increased labor for turning valves on and off. In addition, it is achievable for farmers who use degree of water regulation [5]. Automation equipment can be supplied with more specific quantities of watering polluted soils to the runoff from over Plants, preventing irrigation at the wrong time. Damage to insects and diseases is minimized because of day plant, which will improve crop efficiency by ensuring dry foliage stays. Operating costs are normally lower. Suitable for water and nutrients, if necessary. During the irrigation process, Automatic Federations may continue Drip Irrigation is a valuable tool for accurate soil moisture because rows between plants remain dry.

This issue may be explained in case use of a fully flush Arduino programmed water system framework where water system occurs just when there is a solid water requirement. The venture uses a DHT sensor to keep track of a dampness, and a humidity sensor to monitor mugginess. In response to a real-time warning, the device automatically checks a water pump that can be triggered via SMS. Upon connection of the water pump via SMS, it automatically switches off after reaching the appropriate level of humidity. Equally, the rancher or guardian may disengage the water pump between sending an SMS or a manual task interface to an undertaking. This system specifies the strength of the photovoltaic cells dependent on the sunlight. There is no need for unfair dependence on exchange power in this way [3].

COMPONENTS USED

The following are the main components from which Automatic Irrigation System was manufactured:

- Arduino UNO
- GSM SIM module
- DHT11 humidity sensor
- 12v Relay
- BC 547 transistor
- Voltage Regulator- 7805 and 7812
- Solar panel
- Battery

Arduino UNO

Arduino UNO Arduino Uno is a (detail) Atmel ATmega328-dependent microcontroller. It has 14-stick advanced information sources / yields (6 of which can be used as PWM yields), 6 basic data sources, 16 MHz earthenware reverberation output, a USB connector, a power connector, an ICSP and a reset capture. It has everything you need to support the microcontroller; just attach it to your device through a USB cable or attach an AC adapter or DC source. This driver does not use the sequential FTDI USB chip, instead it is ATmega16U2 (Atmega8U2 to R2), updated as a USB port converter.

Variant 2 plate obstruction by pulling the 8U2 HWB edge of line, encouraging their DFU mode situation. Check the tab 3 with the corresponding new highlights: Pin 1.0: The ASD and SCL pins are placed next to the Are stick, and two new screws near the IOREF reset allow you to adjust the predetermined voltage of the goal. Use AVR, which works with Arduino 5V and the explanation it works with 3.3V, drives are compatible with the board in future. The second has nothing to do with the touch, that is to say future purposes. "Uno" means

one Italian, and is named to test Arduino 1.0's expected arrival. Arduino's reference forms will be Uno and Adaptation 1.0, pushing ahead. See record on Arduino for comparison of past forms. -- ATmega328 has 32 KB (using 0.5 KB for bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be perused and kept in touch with the EEPROM library). Arduino Uno can be powered by means of an external power source or a USB connection. The power source is selected automatically (non-USB) External power may come from a battery or a DC AC adapter.

The adapter can be connected to the paper feed connector by inserting a 2.1 mm positive center connector in. The second has nothing to do with the touch, that is to say future purposes. "Uno" means one Italian, and is named to test Arduino 1.0's expected arrival. Arduino's reference forms will be Uno and Adaptation 1.0, pressing forward. For examination with past forms, see the record on Arduino. Each ATmega328 has a capacity of 32 KB (0.5 KB used for boot loader). This also has 2 KB of SRAM and 1 KB of EEPROM (which can be perused and kept in touch with the EEPROM library). Arduino Uno can be powered by means of an external power source or a USB connection. Off chance the voltage controller can overheat and damage the board by more than 12V. The recommended range is between 7 and 12 Volts. The Power Pins are as follows:

VIN-Electrical vitality of the Arduino board when supplied with a fringe device (not at all like 5 volt USB or some other operated power supply);

5V-This stick produces a 5V controller plated on the plate. DC power connector (7-12 V), USB connector (5V), or VIN (7-12V) stick plate may be used to power the board. Power supply between pins 3.3Prevents 5V controller and that harm our board.

3.3V-A Controller board generated 3.3V power supply. Total limit is 50 mA.

GND-Earth-Pin.

IOREF- The reference voltage for the operating microcontroller is given by this Arduino pin card. A legitimately configured shield will peruse IOREF stick voltage and pick the source of appropriate force or empower live yield transducers for 5V or 3.3V function. An ATmega16U2 on this sequential correspondence board channels via USB and resembles a virtual programming port on the PC.

The 16U2 firmware uses standard USB COM drivers, and no external drivers are needed. Anyway an information document is required in Windows. The programming of Arduino includes a sequential screen that allows for simple information sent to and from the Arduino board. The RX and TX LED squints as the information is transmitted to the Device through the USB sequential chip and USB link. Software Serial library allows for sequential correspondence on one of one of the advanced pins. The ATmega328 also supports I2C (TWI) and SPI. To simplify the use of the I2C bus, the software includes an Arduino wire library. Use the SPI library for the communication with SPI.

GSM Module

GSM acronym for Global Mobile Communications System. It is an arrangement of measures created by the European Institute of Telecommunications Standards (ETSI) to represent conventions for advanced mobile networks of the second era (2 G) used by cell phones. A modem is a gadget that tweaks and demodulates the signs as required to fulfill the prerequisites of correspondence. Regulates the encoding of computerized data by a simple transporter flag, and demodulates the information transmitted to interpret that bearer flag. A GSM modem is a device that in this particular case tweaks and demodulates the signs and the 2 G signals [4].

The modem which is use is SIMCOM SIM300. It is a GSM / GPRS modem with three bands, since it can very well be differentiated and operated at three frequencies (EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz). The frequencies at work are EGSM and DCS 900MHz 1800MHz. GSM innovation has developed so much that there is no place where there is no GSM flag on the planet. In this scenario, GSM provides you with

your fingertips to remotely control a wide range of things from anywhere. GSM also provides the ease of more robust communication.

SIM300 GSM module can be used to send and receive SMS when a SIM card is installed, by interfacing it to a Laptop. The GSM modem will use a COM (sequential or USB) port to send or get SMS from PC. Such directions are called as directions for AT. You can play a few activities such as sending and getting SMS, MMS, and so on via the AT directions. The Sim300 has an RS232 interface and this can be used to communicate with your Mac. The Sim300 typically keeps running at 9600 baud, 1 bit stop, no equality, no equipment control, and 8 Data Bit. Sim300 is commonly used in many designs and many variants of these plates have therefore been made. These development boards come with several features to enable communication with the module SIM300. Some motherboards offer only the TTL interface, while a few cards integrate a RS232 interface and some others integrate a USB interface. You should buy a GSM modem with the financial device TTL and RS232 on the off chance that your PC has a sequential port (DB9). The sim300 GSM module used here is composed of a TTL and an interface with RS232. The TTL interface allows you to specifically interface with a microcontroller while the RS232 interface incorporates a MAX232 IC to allow correspondence to the PC.

DHT11 Humidity sensor

The DHT11 sensor comes in a one-line four-wire package and works with a 3.5 and 3.5 power supply. The temperature of 0-50 ° C can be determined with an accuracy of ± 2 °C and the relative humidity of 20-95 percent with an accuracy of 20-95 percent. For the two digital outputs the sensor provides fully calibrated measurements. It has its own proprietary protocol thread 1, and therefore communication between the sensor and the microcontroller is not possible with any of its peripherals via a direct interface. In the MCU firmware the protocol must be implemented with the exact time required by the sensor [5].

The accompanying plan charts depicting the convention on information exchange between MCUs and the DHT11 sensor. The MCU commences the transmission of information by issuing a "Begin" flag. It is for this reason that the MCU stick must be set as yield. The main low- MCU drag line was about 18 ms for somewhere and then removed for 20-40 ms before discharging. At that point, the sensor reacts to the MCU starting motion for 80 ms, which is further endured by a high logical flag 80 ms. Keep in mind that the MCU stick has to be built to join the "Home" sign after it has stopped.

When identifying the flag sensor, the MCU must be prepared to get sensor information. The sensor persistently sends information on the information line about 40 bit (5 bytes). Notice that the sensor sends the biggest piece during the byte transmission. Information (40 bits) = full bytes of RH + decimals RH byte + full bytes of Temp + Decimal Temp Byte + Checksum Byte For DHT11 sensor, decimal decimals of temperature and mugginess estimates are constantly zero. Therefore, the first and third bytes of the data received actually provide the numerical values of relative measured humidity (percent) and temperature (°C) [6].

The last byte is the byte checksum used to ensure the transfer of data is verified without error. If all five bytes are transferred correctly then the byte checksum must be the same for the last 8 bits of the first four bytes, that is Checksum = last 8 bits (byte integer RH + decimal RH + byte Total Temp Bytes + Decimal Temp Bytes)

BLOCK DIAGRAM

As shown in the block diagram in Figure 1, the basic elements of this structure are The block diagram above is composed of the controller, sensor, pump, and power supply. The controller is the one that controls the entire program. The sensor senses the environment and sends controller the appropriate values. The controller searches for the values it has got. If the values have exceeded a certain threshold then the controller will take some actions based on the specified algorithm. Here GSM block module is used for sending and receiving messages to the customer.

Power supply block consists of the part that provides the power for controller, sensor, and pump to operate. DHT 11, Humidity Sensor, Microcontroller, Relay Driver Water Pump, GSM Sim Board, Power Supply and use Arduino as the controller in this prototype because it is very stable and user friendly. The required program is the Arduino IDE code.

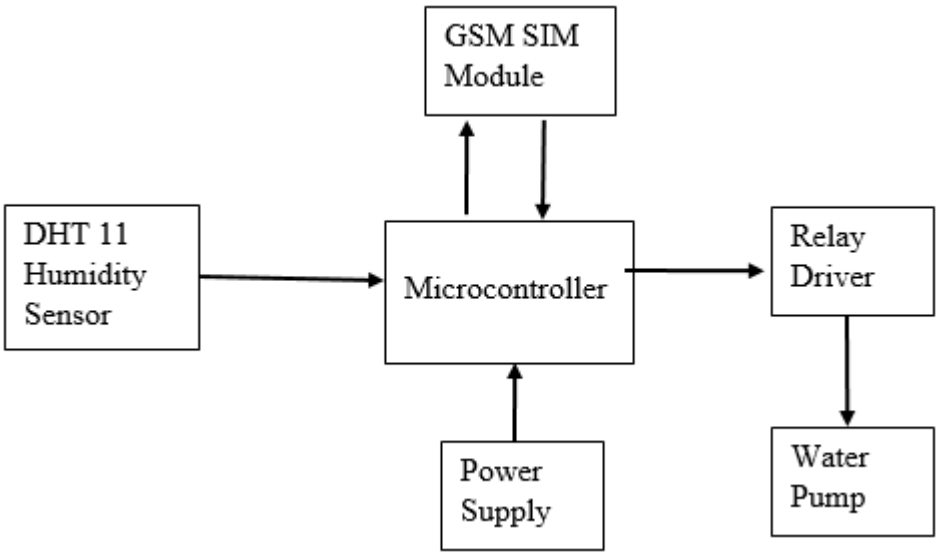

Figure 1: Block Diagram (Power Supply Consists Of Three 4V Lead Acid Batteries Connected In Series To Give 12V Supply).

CONCLUSION

A program to promote the agrarian cycle and the burden on farmers is urgently needed. India has increased its annual crop production, a fully-centric economy, with the recent advancement in technology. One of the main goals of establishing this technology in the country's agricultural sector is the ability to conserve natural resources and give impetus to superb agricultural production. The most important consideration has been saving the farmer's fatigue, water and time. Therefore, systems must be designed with the use of sensor networks, sprinklers, GSM, SMS technology to provide this effective functionality.

The hardware field has been prospering for a long time and causing awesome effect on people. The initiative will be implemented as a structured technique for the water network and has tremendous potential for future development. The role can be applied to nurseries where manual inspections are rare and uncommon. The standard can be reached to make nurseries and farmland completely robotised in the patio. Joined with the water gathering rule, extraordinary water reserve funds could be prompted whenever connected in the correct way. On farmland with extreme lack of rain this model can be effectively connected with most kinds of soil to achieve extraordinary results. By developing a smart wireless sensor and using farmers 'techniques, you can increase your profit by solving various farmers' problems. The role of the above-mentioned undertaking relies fundamentally on the moistness sensor yield.

Whatever point you need excess water in the coveted field (paddles), at that point you 're not going to have the capacity to use innovation in sensors. Using this watering the desired field and desirable quantity is possible. Author may also enter a smoke sensor in advance to avoid fire in the fields. The smoke sensor can detect the smoke or discharge and start shiny water through Rain gun or funnels We can use the idea of solar tracking to make our solar panel, a solar tracker that monitors sunlight and improves system output by supplying more electricity.

REFERENCES

[1] s Harishankar, R. Kumar Sathish, S. K.P., U. Vignesh, and T. Viveknath, “Solar Powered Smart Irrigation System,” *Adv. Electron. Electr. Eng.*, 2014, doi: ISSN 2231-1297,.

[2] N. M, R. P. U, S. K. G, and T. S. S, "Automatic irrigation system on sensing soil moisture content," *IJIREEICE*, 2015, doi: 10.17148/ijireeice.2015.3120.

[3] V. Naga and R. Gunturi, "Micro Controller Based Automatic Plant Irrigation System," *Int. J. Adv. Res. Technol.*, 2013.

[4] S. Lee, G. Tewolde, and J. Kwon, "Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application," 2014, doi: 10.1109/WF-IoT.2014.6803187.

[5] E. Pretorius, W. Arlt, and K. H. Storbeck, "A new dawn for androgens: Novel lessons from 11-oxygenated C19 steroids," *Molecular and Cellular Endocrinology*. 2017, doi: 10.1016/j.mce.2016.08.014.

[6] K. H. Storbeck, L. M. Bloem, D. Africander, L. Schloms, P. Swart, and A. C. Swart, "11β-Hydroxydihydrotestosterone and 11-ketodihydrotestosterone, novel C19 steroids with androgenic activity: A putative role in castration resistant prostate cancer?," *Mol. Cell. Endocrinol.*, 2013, doi: 10.1016/j.mce.2013.07.006.