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ADVANCED AUTOMATIC IRRIGATION SYSTEM WITH DAY AND NIGHT SENSING AND AUTO CONTROLLING OF MOTOR

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Abstract:

This paper addresses the advanced system which improves agriculture processesby monitoring parameters like Temperature, Humidity and Soil condition based on IoTplatform. We designed a circuit with integrated temperature & humidity sensor andIoT using NodeMCU (ESP-12). The platform will continuously monitor the ambientparameters like Temperature, humidity and Soil Condition. The whole algorithm,calculation, processing, monitoring is designed with Arduino and NodeMCU (ESP-12)microcontroller. The dc motor Pump is used to pump water and it will be controlled overcloud using android phone equipped with Blynk application. One AC Induction motorwill also be available for water pumping purpose and same will be controlled using sameandroid phone and Blynk application. In addition to that, user can monitor real timeatmospheric parameters on his/her android mobile on Blynk app. To drive AC Inductionmotor, we will design square wave inverter whose trigger pulses will be given fromArduino microcontroller for better performance.

Keywords — GSM, Arduino uno, solar panel moisture sensor, humidity sensor.

I. INTRODUCTION

As we all know that the sources of conventional energy deplete everyday, restoring to alternative sources of energy like solar and wind energy has become need of the power system.many of the urban and rural areas we already started solar powered lightning system.[4] These include solar lanterns, solar home lighting systems, solar street lights, solar garden, lights and solar power packs. All of them contains four components solar photovoltaic module, rechargeable battery. As the cost is continuously decreasing, photovoltaic (PV) generation has become one among the foremost important renewable energy sources and is being widely used. Grid-connected solar photovoltaic power plants are being installed globally at a quick pace. The main disadvantages of renewable energy sources are that they're much expensive, intermittent, reliability of supply reliability and to get qualities of electricity. Solar cells convert sunlight directly into electricity. Solar cells are often used to power calculators and watches.[10] They are made of semiconducting materials similar to those used in computer chips. When sunlight is absorbed by these solar cells , the solar power starts electrons loose from their atoms, allowing the electrons to flow through the fabric to supply electricity. This process of converting light (photons) to electricity (voltage) is named the photovoltaic (PV) effect. Solar cells were generally combined to form modules that hold about 40 cells; these number of modules are mounted in PV arrays that can measure up to several meters on a side.[2] These flat plate PV arrays can be mounted at a fixed angle facing south, or they will be mounted on a tracking device that follows the sun, allowing them to capture the foremost sunlight over the course of each day . there are number of connected PV arrays can provide enough power for a household; for giant electric utility or industrial applications, many arrays are often interconnected to make one , large PV system. Thin film solar cells use layers of semiconductor materials only a few micrometres thick. The main idea is to use little or no of the expensive semiconducting PV material while collecting the maximum amount sunlight as possible. But because the lenses must be pointed at the sun, the utilization of concentrating collectors is restricted to the sunniest parts of the country. Some concentrating collectors are designed to be mounted on simple tracking devices, but most require sophisticated

trackingdevices, which further limit their use to electric utilities, industries, and enormous buildings.[6]

II. COMPONENTS USED

i]Solar panel:

Solar panel is use to convert light energy into the electrical energy based on a phenomenon called photovoltaic effect. The joint between these two semiconductor is called the "P-N junction".[3]Sun light striking the photovoltaic cell is absorbed by the cell. The energy of absorbed light generates particles with positive or negative charge (wholes and electrons), which move about or shift freely in all directions within the cell.[1]

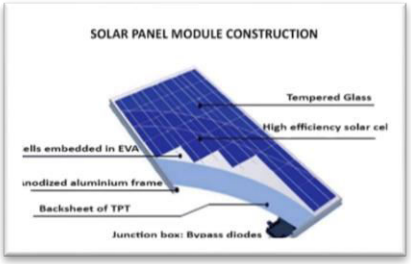

Fig. 1 solar panel

ii] Boost converter:

A boost Converter is that the charge regulator or battery regulator limits the speed at which current is added to or drawn from electric batteries.[7] It prevents over charging and deep discharging which can reduce battery performance or lifespan, and may pose a safety risk. solar battery charge controller also provide automatic dusk to down operation of the load.[4]

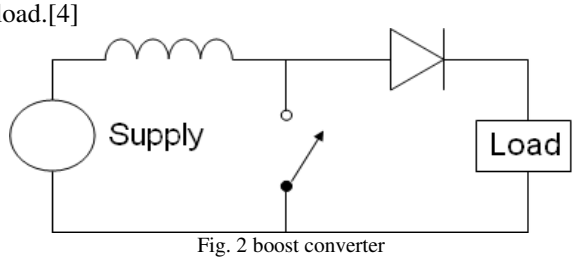

Fig. 2 boost converter

iii]lead acid storage battery:

The battery which uses sponge lead and lead peroxide for the conversion of the energy into electric power , such sort of battery is named a lead acid battery. The lead acid battery is most ordinarily utilized in the facility stations and substations because it's higher cell voltage and lower cost.[4]

Fig. 3 lead acid battery

iv]Arduino Uno:

The Arduino Uno may be a microcontroller board supported the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 are often used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, an influence jack, an ICSP header, and a reset button. It contains everything which is to be needed to support the microcontroller; Just we have to connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to urge started.[7] The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial.[1]

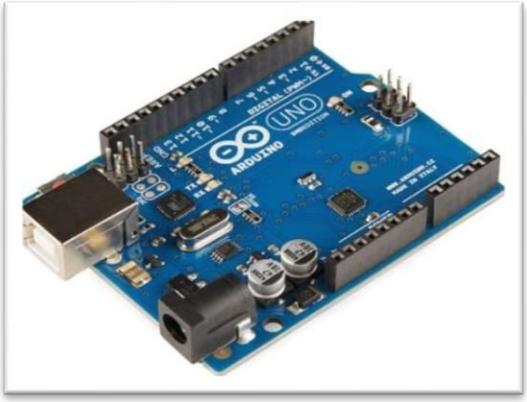

Fig. 4 Arduino uno

Specifications –

Microcontroller
ATmega328 operating voltage 5V
Input voltage (recommended)7v to12v
Input voltage limit 6v to 12v
Digital I/o pin 14 (of which 6 provide PWM output)
Input pin 6
DC current per I/O pin 40 mA DC
Current for 3.3V pin 50mA
Flash memory 32KB (ATmega328) of which 0.5 KB used by bootloader.
SRAM 2 KB (ATmega3280)
EPROM 1 KB
Clock speed 16 MHz

V] Liquid crystal display (16*2):

Fig. 5 liquid crystal display

LCD (Liquid Crystal Display) screen is an electronic display module and find a good range of applications. A 16x2 LCD display is extremely basic module and is extremely commonly utilized in various devices and circuits.[6] These modules are preferred over and other multi segment. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even (unlike in seven segments) and so on. A 16x2 LCD it used for to display 16 characters per line and there are 2 such lines.for each character LCD is displayed in 5x7 pixel matrix. This LCD has been consist of two registers, namely, Command and Data. The command register stores the command instructions given to the LCD.[2]

vi] GSM Module:

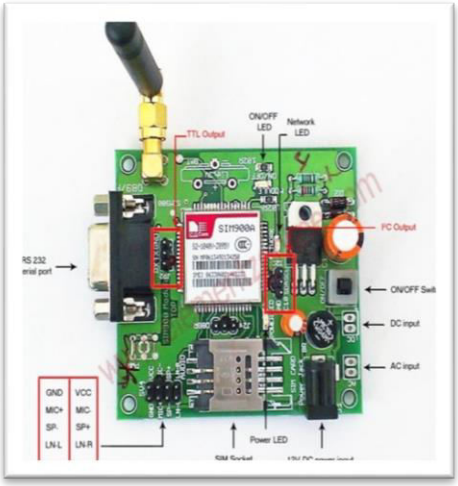

Fig. 6 GSM module

This GSM modem can accept any GSM network operator SIM card and act a bit like a mobile with its own unique telephone number . Advantage of using this modem are going to be that you simply can use its RS232 port to speak and develop embedded applications. Applications like SMS control, data transfer, remote and logging are often developed easily. The modem can either be connected directly to the PC serial port or to any microcontroller through MAX232.[6] It can be used to send and receive SMS or to make/receive voice calls. It also can be utilized in GPRS mode to attach to the web and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging.[2]

vii]Soil moisture sensor:

Soil moisture module most sensitive to the ambient humidity is usually used to detect the moisture content of the soil Module to succeed in the edge value is about in the soil moisture, DO port output high, when the soil humidity exceeds a group threshold value, the module D0 output low.[5] The digital output D0 are often connected directly with the help of microcontroller for detecting high and low by the microcontroller for detecting soil moisture. The digital output of DO shop relay module can directly drive the buzzer module, which is form a soil moisture alarm equipment Analog output AO and AD module connected through the AD converter, you'll get more precise values of soil moisture.[8]

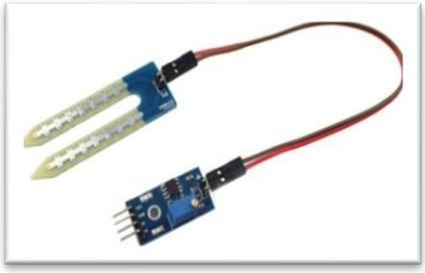

Fig .7 soil moisture sensor

viii] 5V Motor pump:

Fig.85Vmotor pump

The pumping of water its a basic technique and it'll be far more practical than scooping it up with one's hands or lifting it during a hand-held bucket. This is true whether the water is getting supplied from a Fresh source and this will move to a needed location, purified, or used for imagination, washing or sewage treatment, or for evacuating water from an undesirable location. Regardless of the result , the energy required to pump water is a particularly demanding component of water consumption. All other processes depend or benefit either from water descending from a higher elevation or some pressurized plumbing system.[3]

ix]L298 motor driver:

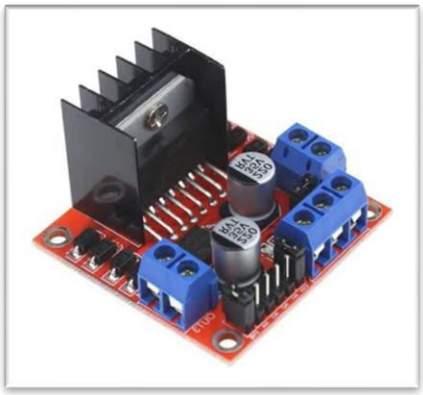

Fig. 8L298 motor driver

This dual bidirectional motor driver is predicated on the very fashionable L298 dual H-bridge motor driver. This motor (module) is to easily and independently control two motor of up to 2A each in both directions.[4] It is switch for the microcontroller requiring just a couple of control lines per motor. The L298 driver is a high voltage, high current dual full bridge driver chip and driver inductive load such relay, solenoid, dc and stepping motor.[9]

x]12V brushless dc pump:

DC 12v water cooling pump 4.5w brushless submersible pc cool pump low noise, carbon graphite seal, low coefficient of friction - voltage - DC 12v. [6]

Fig. 9 12v brushless DC pump

Max flow - 220L/H
Max head - 3H
Working life - 20000 hrs

III. DESIGND CIRCUIT

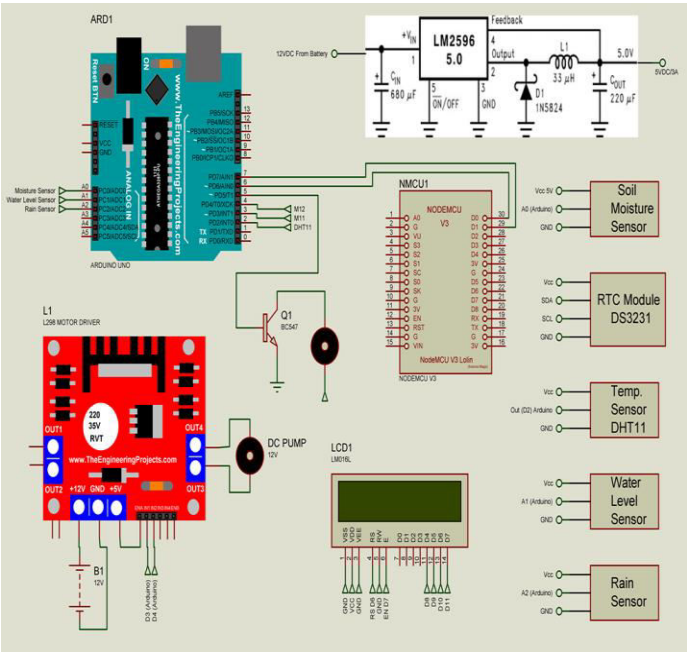

Fig. 10 block diagram

V. WORKING CONCEPT OF SYSTEM

1. In this project it will be demonstrating Automatic Irrigation System with integrated temperature sensor which irrigates or waters your plants automatically. This system is best fitted to drip irrigation technique.
2. A Moisture sensor is used to read the Moisture content of the soil.
3. this technique will assist you to irrigate your backyard Garden or your conservatory automatically and you would like not worry about watering your favorite plants in your busy schedule.
4. An LCD is provided to monitor the Soil Status, Ambient Temp. and Status of Water supply (Water Pump).
5. Arduino UNO is that the brain of this technique and every one the sensors and display devices are controlled by the Soil Moisture Sensor values depends on the resistance of the soil. The LM393 Driver may be a dual differential comparator which compares the sensor voltage with fixed 5V supply voltage .
6. The value of this sensor varies from 0- 1023. being most wet condition and 1023 being very dry condition.
7. The LM35 may be a precision integrated-circuit temperature sensor, whose output voltage is linearly proportional to the Celsius temperature. The LM35 is operates at -55˚ to +120˚C.
8. The Water level Switch Contains a Reed-Magnetic Switch surrounded by a floating magnet. When water is available it Conducts.
9. The Arduino reads the status of the soil using Soil Moisture Sensor. If the Soil is DRY it does the following Operations –
Checks for the availability of water using water level sensor. If the water is available, the Pump is turned ON and is automatically turned OFF when sufficient amount of water is supplied.

IV. CONCLUSION AND RESULT

In this paper, implementation of IOT technologies in agriculture fields can be made more profitable and adequate water is much needy thing in agriculture, due to poor irrigation and ineffectiveness of water management in farm's can be cost more in water crisis in future. The proposed system has dc motor pump is used to pump water and it will be controlled over cloud using Android phone equipment with blynk application. This system which improves agriculture processes by monitoring parameters like temperature, humidity and soil condition based on IOT platform We will develop a circuit with integrated temperature and humidity sensor and IOT using Node MCU (ESP-12). By all the counts and proven result we conclude that these is huge development in agriculture using IOT platform.

REFERENCES

1. *Samy Sadeky, Ayoub Al-Hamadiy, Bernd Michaelisy,Usama Sayedz,"An Acoustic Method for SoilMoisture Measurement", IEEE 2004.*
2. *Jia Uddin, S.M. Taslim Reza, Qader Newaz, Jamal Uddin, Touhidul Islam, and Jong-Myon Kim,"Automated Irrigation System Using Solar Power" IEEE 2012.*
3. *Ms. Sweta S. Patil, Prof. Mrs. A.V. Malvijay, "Review for ARM based agriculture field monitoring system",International Journal of Scientific and Research Publications, February 2014.*
4. *Zhang Feng Yulin, "Research on water-saving irrigation automatic control system based on Internet of things Institute of Information Technology", IEEE 2011.*
5. *Joaquín Gutiérrez, Juan Francisco Villa- Medina, AlejandraNietoGaribay, and Miguel ÁngelPortaGándara,"Automated IrrigationSystem Using a Wireless Sensor Network and GPRS Module" IEEE, 2013.*
6. *M.S. Ghute, S. Soitkar and K.P. Kamble, "Smart IrrigationSystem using GSM Module", International Journal of AdvancedResearch in Computer and Communication Engineering(IJARCCE), Vol.6, July 2017.*
7. *E. U. Singh, M. Vyas, G. Sharma, S. P. Singh and S. Khan, "Solar Based Smart Irrigation System", International Journal of Recent Research Aspects (IJRRA), Vol. 3, pp. 105-108, Issue 1, March 2016.*
8. *M.S. Ghute, S. Soitkar and K.P. Kamble, "Smart IrrigationSystem using GSM Module", International Journal of AdvancedResearch in Computer and Communication Engineering(IJARCCE), Vol. 6, pp. 158-161, Issue 7, July 2017.*
9. *RANE, SHARVIN."Automatedirrigation systemusing x-bee and labview" 3rd International Conference on Electrical,Electronics, Engineering Trends, Communication, Optimization and Sciences(EEECOS)-2016.*
10. *Alamgir Mahzabin, Chowdhury Alma Taziz, MullickHomaira Amina, MollahGloria,"Design andImplementation of an AutomaticIrrigation System",IARJSET, Vol. 3, Issue 10, October 2016.*
11. *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 2013*