Efficient Use Of Resources And Crop Planning Using Solar Driven Arduino Based Irrigation System

Nikhil Naitam,Pravin Bhoi,Saurabh Wath,Aniket Wasnik and Tejas Joshi

[1]Deparment of Electrical Engineering,Government College Of Engineering Nagpur

[2]Student at Government College Of Engineering Nagpur

Abstract: ***This paper discusses management of irrigation system automatically without presence of human being in the field. Node MCU considered the important component in this project received Signals of temperature and humidity sensors then electric signals transmitted to motor even to moving sprinklers forward and reverse even irrigated to field using pump to raise the water to the top of tower and distributed by using water spray .***

Keywords: Stepper motor, Node MCU , Arduino IDE,, Sustainability

1. Introduction

Irrigation is the processing of water to the soil in artificial manner. Growth of agricultural crops is aided by irrigation. landscape maintenance, and replanting and rebuilding of disturbed soils in dry areas and during periods of irregular rainfall. Protecting plants from soil frost, preventing weed growing in grain fields and aiding in preventing soil consolidation are the uses of irrigation. Dry land farming depends on direct rain it is also called as rain fed farming.. Dust suppression, disposal of sewage, and in mining are the uses of irrigation system.. Drainage, which is the natural or artificial removal of surface and subsurface water from a given area is often studied with irrigation .Different types of irrigation procedures differ in how we collect water from the source is distributed within a cerain field. In general, the aim is to support the entire field uniformly with water, so that each plant has the amount of water it requires for the optimal growth of the plant neither too much nor too little. The recent methods are effective enough to achieve this goal.In this research Solar based Arduino driven Irrigation System has been chosen because it can reduce high initial cost to be spent by the farmer. Also the cost of maintenance the machine could be cashing for the farmers. This can be compensated with the larger productivity of crops. The main advantage of the Arduino based Irrigation System is that it can be used to irrigate long distance with only limitation that surface topography should be flat.

1.1 Problem Statement

In many irrigation projects are facing some problems that include difficulty of guiding the amount of water and organized in vast areas, frequent labor in large spaces, difficulty in uniform irrigation that causes high cost. To solve these problems, solar based arduino driven automated irrigation systems must be introduced. In this paper Solar based Arduino driven Irrigation System was aimed to solve the problems involved in irrigation systems.

1.2 Objectives

The main objectives are:

· To solve the problem of water distribution throughout the field.

· To automate the irrigation system using Node MCU

· To ensure the suitable irrigation for the all field areas.

· To program using Arduino IDE for the simulation and building the code required in the project and application building.

1.3 Methodology

In this paper the following procedures and steps were taken:

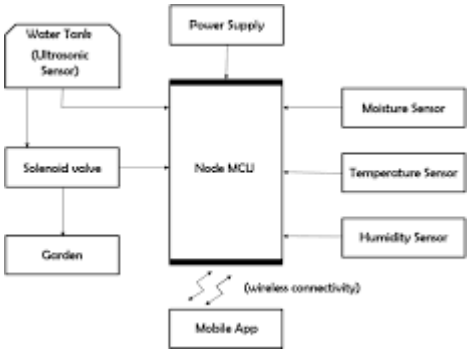
· Building android application.

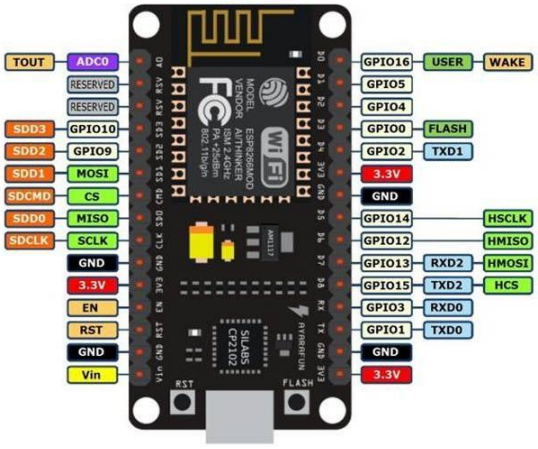
· Arduino IDE program to build code.

· Building hardware design

Figure 1: Block diagram Arduino based Irrigation System of **Node MCU**

2. Hardware Tools





The Idle Mode stops the CPU while allowing the Random Access Memory, interrupt system and serial port to continue their task. The RAM data is saved by power down mode but oscillator is freezed, Until the next interrupt or hardware reset all functions chip are disabled. The microcontroller is the heart of the circuit. It helps in performing all functions. Day and time is retrieved by RTC interfaced serially. All actions are performed when input is given to the microcontroller through the keypad. The microcontroller sends the real time alarm which is as well as the day to the display unit. When sends alarm which sends signal to the display Moreover, EEPROM stores the internal timing of microprocessor.The pin diagram is given in the fig.2

The Node MCU is a faster, efficient device which consumes less power and it has 8K bytes of programmable memory. The design of the device is done using Atmel's memory programmer. It's compatible with the industry-standard 80C51 instruction set. By joining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Node MCU supplies very effective and optimum solution to the applications in embedded systems. The Node MCU has the following features: 8K bytes of Flash memory, 256 bytes of RAM, 32 I/O lines, timer, two data pointers, three 16-bit timers, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry are present in internal circuit.

Figure 2: Node MCU **2.2 LM-35 Temperature Sensor**

The LM35 series, shown in Figure 14.2 are IC temperature sensors, whose output voltage is directly proportional to the Celsius (Centigrade) temperature. The LM35 and it has an advantage over other linear temperature sensor as there is no need of subtracting a large value to obtain the required reading. The LM35 does not require any external calibration or trimming and also it can show temperature from -55 to 150 degree Celsius.

The LM35' has a good control because of the output impedance and precise way of calibration it becomes very easy user to operate it.. It can be used with supply with positive polarity as well as negative polarity.Due to current in microampere range from the supply it causes very low self heating. .

The range of operation of LM35 is very large. in Figure 3. LM-35 Pinout.The LM35 series is available packaged in hermet

Figure 3: LM-35 Pin out

Submersible motot :

In this project we used mini Submersible motor to spread water on Field.This moror work on DC supply. rating of this motor is DC 3-6V.Generally this motor is used for fountain Garden.This is low cost and small size motor in general are designed to be fully submerged into the water. Submersible pumps are placed within the reservoir of water that requires pumping out, which is why they are normally used for drainage in floods, sewerage pumping, emptying ponds or even as pond filters. A mini submersible motor is small version of submersible pump.A mini submersible water pump is a centrifugal water pump.

2.4. Power Supply Unit

For the circuit operation,+12v and +5 v of power supply is needed. The relay requires +12 v of power supply. The microcontroller requires +5v of power supply. Similarly NODE MCU,RTC and the pull up resistors requires power supply of +5v. Power regulators and 12v rating step down transformer is used. The step down transformer step down the AC mains power supply of 230v,50Hz into +12 v. To get the output , a bridge rectifier circuit with voltage regulator is used.

2.4.1 Voltage Regulator

A voltage regulator is basically designed for maintaining a constant voltage automatically.It basically comes with a simple forward design and it may also include negative feedback.For IC7805 they are either present with fixed or variable output voltages.According to its design they are used to regulate one or more than one voltages which are either ac or dc.Most of the IC of fixed voltage regulator has 3 leads.An automatic protection is also available in most of the voltage regulators especially in the form of overload and overheat protection.According to necessity a hole is also provided to fix the heat sink.They run on predetermined ratings of powers.

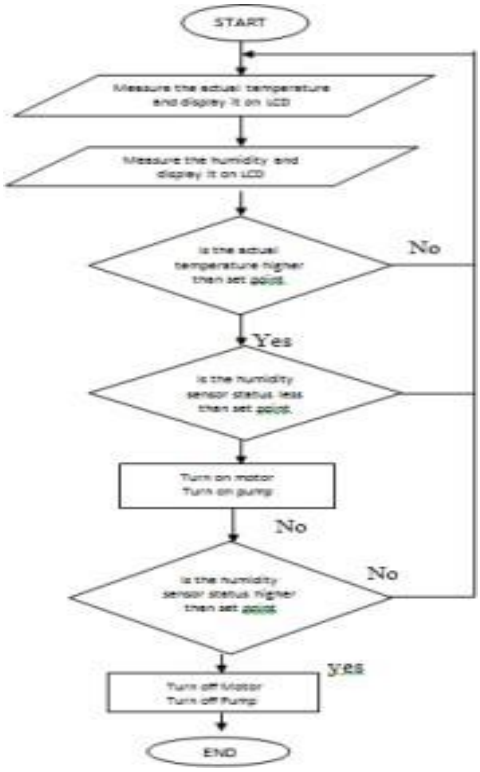
2.5 Display

The function of display is done by the application which controls the functioning of our project.

.2.6 Relay

Relay is a device which can sense if the circuit is working properly it can make path for current and also break it if necessary. Complete isolation can be provided by the relay between the source and output.

3.Flowchart



4. Result

4.1 Significant Result

The final implementation of the project and the final circuit of The project is shown with images of result of Irrigation system Application.

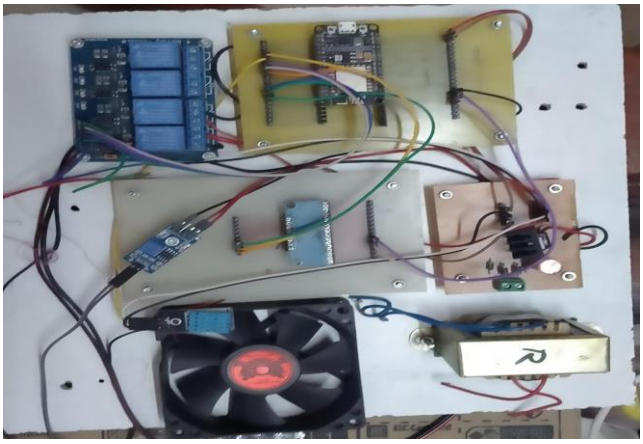


Fig- Project Implementation

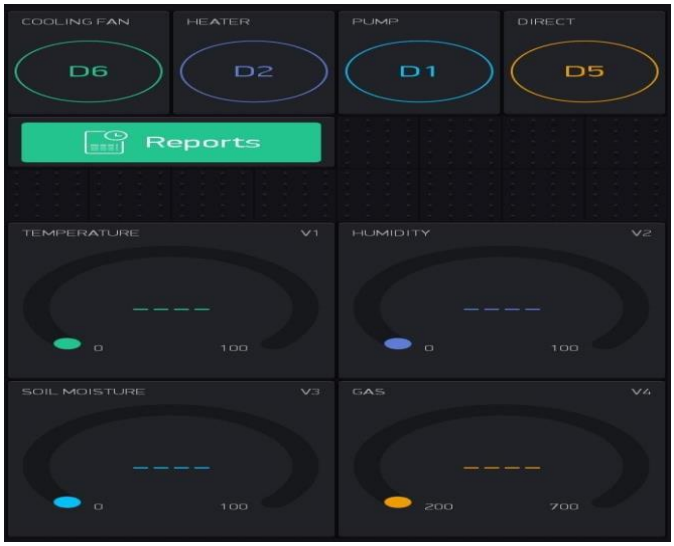


Fig- Solar IOT APP

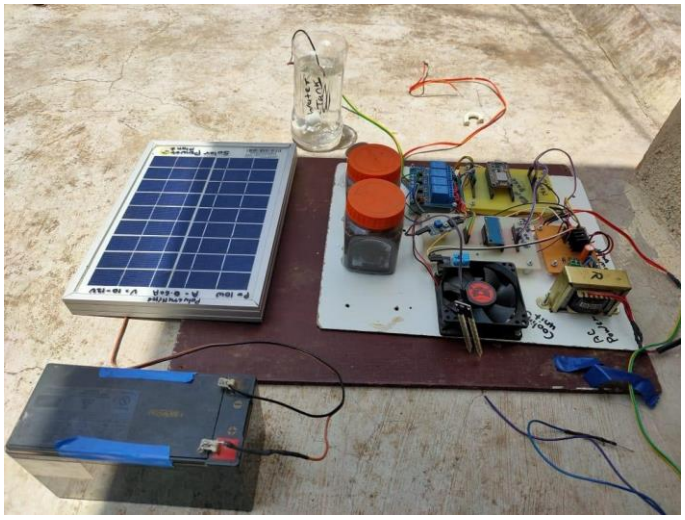


Fig - Project Implementation 2

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