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Intelligent Layered Farming

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ABSTRACT

Industrialization is the major problem of modern world. So there is very less amount of land available for cultivation. The most prevailing issues of the modern world are food and water crises. It is neither possible to consume the pesticide affected food nor grow once own plants, due to scarcity of water and land. Under such conditions, there arises a need for portable agricultural system which uses less water, space and is purely organic. This can lead to cost effective, sustainable ways of organic farming independent of the need for comparable land space requirement. This system will have layered architecture which will have two layers. In this we will use two separate moisture and temperature sensors are used for two different layers. Bottom layer will have three partitions. The middle portion will be the fixed and other two will get adjusted according to the sunlight. This mechanism will execute with the help of motor driver IC L293D. The temperature and the moisture of the area will displayed on the display.

1. Introduction

1. This document is a template for Intelligent Layered Farming. In this paper we are introducing modern way of farming. Because the traditional farming has many limitations such as land requirement, pesticides, etc. Under such conditions, there arises a need for developing modern technologies. So, we come on this solution for developing layered farming. [1]

2. For this paper we referred the IEEE paper of aquaponic farming and hydroponic farming In human history agriculture, agriculture has been one of the most important industries for various resources such as food, medicines, energy, fiber are getting with industrialization is the major problem for today's world so that the land for utilization is not available sufficiently .The people which are very passionate about farming are unable to do it [2].

3. There are many types of farming done now a days

4. One of them and the oldest one is traditional farming in this type crops are grown with help of soil, water and sun-light. By nutrients present in soil crops nourishes, but this type is totally dependent on the temperature and whether conditions also amount of profit is proportional to amount of land used for cultivation [3].

5. Another type of it is hydroponic farming which over comes limitation of traditional farming, it needs less space and is done by water only. This form don't need any land it is done in pipes, water used here can be reused for fish culture. Small size plants are grown in pipes but there is a limitation on hydroponic farming that water is reused which contains pesticides and that are harmful for fishes [4].

6. Third type of farming is vertical farming in it production of food in done in vertical manner. Vertically stacked Layers, shipping containers or skyscraper are used .It is an indoor farming technique with controlled environment, temperature, weather is controlled by metal reflector artificial sunlight with help of temperature sensor, humidity sensor, gases. As we use Green houses for this type of farming amount of land and the economical expenditure is more comparing to its profit [5].

7. Hence to overcome all limitations of above mentioned all types of farming intelligent farming is used.

8. The intelligent layered farming is a smart agriculture according to the requirement of smarter planet and smarter agriculture.

The scheme contains two layers. Which is fully automated according to the sunlight requirement. This farming is similar to vertical farming but to overcome.

Some drawbacks in vertical farming this paper is used .In this system software can ensure that all the plants get the some amount of light, water and nutrients. Proper management means that there is no need of pesticides or herbicides are required [6]

2. Block Diagram

This design system consist of various sensors connected to a common ATmega 328 controller. Each sensor has its own function.

Two temperature sensors, moisture sensors, motor drivers, etc. are included in this block diagram.

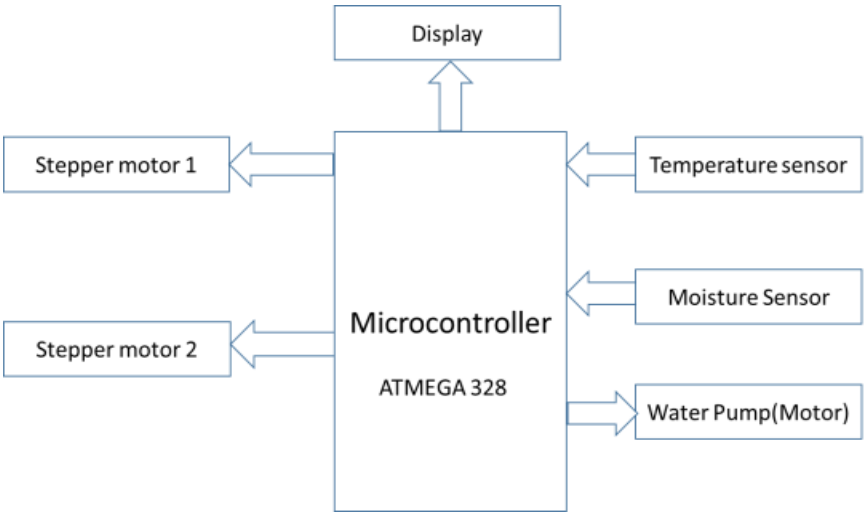


Fig 1: Block Diagram

The block diagram consist of different blocks such as controller block, sensors, water pump, etc.

ATmega 328p – It is single chip microcontroller created by Atmel in the megaAVR. It is 8 bit AVR RISC based microcontroller combines 32 kB flash memory. It has 28 or 32 pins .The operating frequency of controller is 20 MHZ.And we can give 2 external inputs to it. As of 2013 the ATmega328 is commonly used in many projects and autonomous systems where a simple, low powered, low cost micro controller.

It has multifunctional MOSI, MISO, SCK pins, which are used for serial communication.

Stepper Motor – It is brushless DC motor that divides full rotation into a number of equal steps. Brushless DC motors rotate continuously when DC voltage is applied to their terminals. The stepper motor is known by its property to convert a train of pulses into precisely defined increment in the shaft position.

L293D is motor driver IC which is used to drive the stepper motor. It is high voltage, high current, 4 channel driver. It requires up to 16 volts and can supply 600mA current per channel. They are designed to drive inductive loads such as relays, solenoids, Dc and bipolar stepping motors. It has low power consumption.

Temperature Sensor- LM 35 is the temperature sensor which is most widely used. It has 3 pins such as input, output and ground. It is two terminal integrated circuit temperature transducer that produces an output current proportional to absolute temperature. It requires 60uA from supply. The range of LM35 is -55˚C to 150˚C.

Moisture sensor –The moisture sensor is used to measure the water content of the soil. When the soil is having water shortage, module output is at high level, else the output is at low level. The working voltage for moisture sensor is 5V. And current is less than 20mA. The working temperature of moisture sensor is 10˚C to 30˚C.

Water Pump (Motor) - The pumping of water is a basic and practical technique, far more basic and practical than scooping it up with one's hands or lifting it in hand held bucket.

Display- Display is used to show the outputs of the sensors. It is 14 pin IC. 16×2 LCD display can display 16 characters per line and there are such 2 lines. It requires 5V input voltage and up to 2.5 mA current.

3. Flow Chart

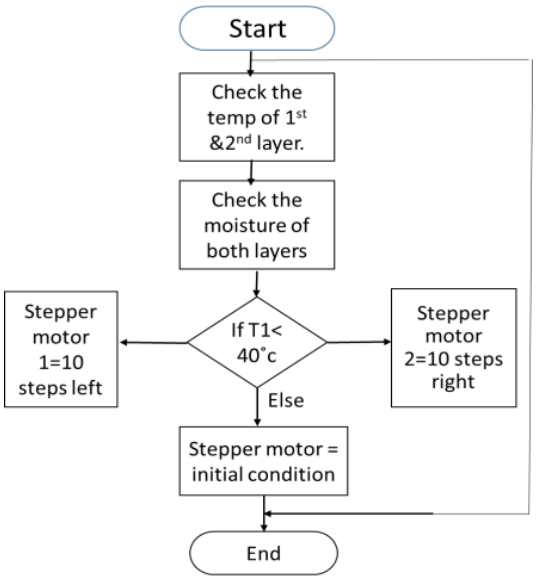


Fig 2: Flow Chart

Start the process. Switch on the power supply. Provide the input supply.

First temperature sensor will sense the temperature of the first layer that is T1. And then temperature sensor will sense the temperature of second layer that is T2. Then moisture sensor will sense the moisture of the soil. From both the layers. If T1 is less than 40˚C then stepper motor 1 will rotate 10 steps in left side and stepper motor 2 will rotate 10 steps in right side. Else stepper motors will be at their initial conditions.

And this process will be in loop and will execute repeatedly.

4. Circuit Diagram

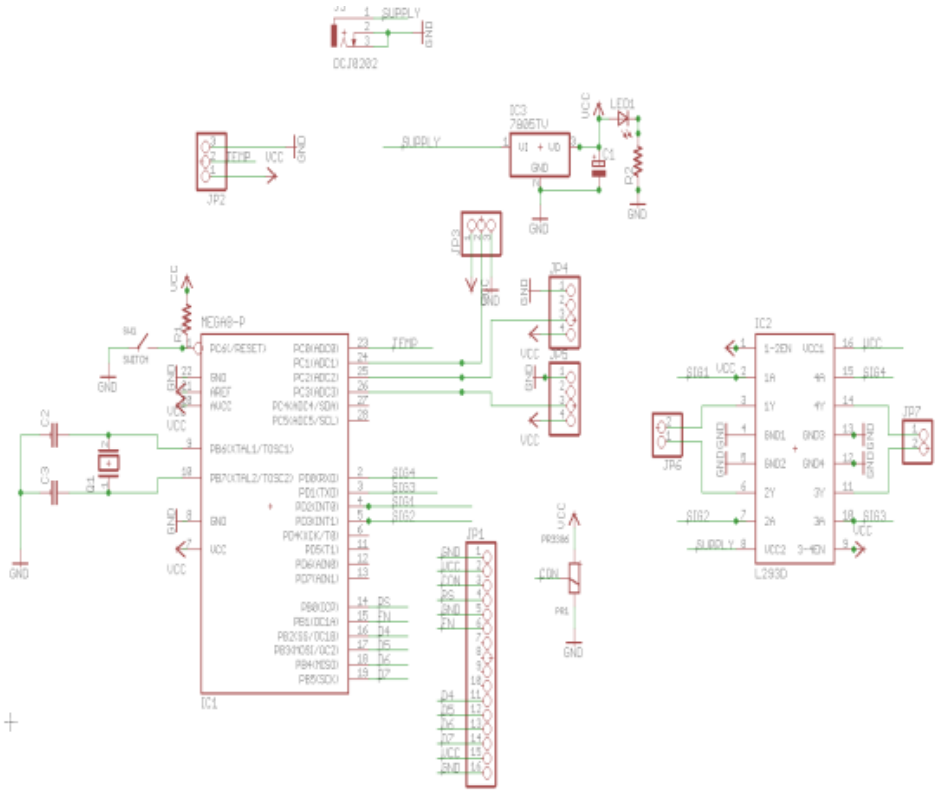


Fig 3: Circuit Diagram

The circuit diagram is designed using proteus software.
For this proteus 8 professional version is used.
Proper grounding is provided to the whole circuit.

5. Software used

Proteus: The proteus design suite is a Windows applications for schematic capture, simulation, and PCB layout design. It can be purchased in many configuration, depending on the size of designs being produced and the requirements for microcontroller simulation.

Eagle: Eagle is electronic automation application with schematic capture and printed circuit board layout. Eagle contains a schematic editor, for designing circuit diagrams. The PCB layout editor stores board files with the extension .BRD. This allows back-annotation to the schematic.

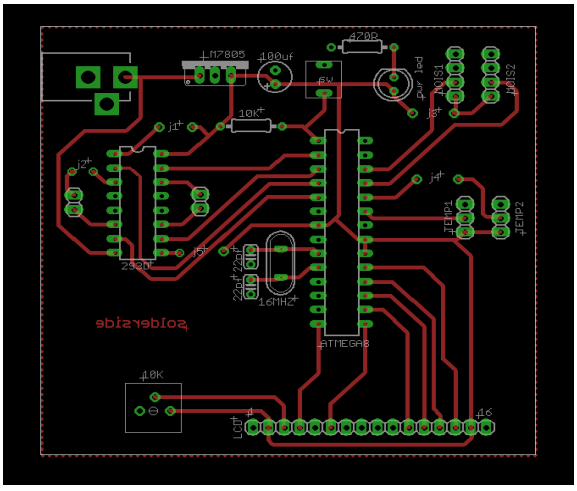
6. Methodology

Step 1: Switch on the power supply.
Step 2: Provide the input supply.
Step 3: First temperature sensor will sense the temperature of the desired layer.
Step 4: Then moisture sensor will sense the moisture of the soil.
Step 5: Water pump will get activated according to the water requirement.
Step 6: Observe both the output on display.
Step 7: According to the output condition, the driver IC will start working.
Step 8: Then the layers will get shifted towards left or right accordingly.

At first switch on the power supply. After that provident he required input supply. As per the situation the temperature sensor will sense the temperature of both the layers and will be displayed accordingly on the display. Then the moisture sensor will sense the moisture content of soil in both the layers and it will be displayed on the display. Water pump will get activated according to requirement. After that the controller will start working according to the input conditions. And depending on the temperature requirements the bottom layers will get adjusted.

In this way the operation will take place.

7. Layout-



This layout is designed using the eagle software. The version Eagle 7.6.0 is used for this design.

8. Conclusion

Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. After successful completion of this paper, the production of farm will increase to a greater extent. And these should be referred for the betterment.

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