

AGRI - ROBOT

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Abstract — The zone of horticulture is so wide, thusly this field requires the advance technologies in the process of sowing, cropping, cutting& irrigation. So, the disclosure of Agriculture is the primary enormous advance towards acculturated life. Advancement in agricultural tools, is the fundamental pattern of rural change. This advancement in technology will not affect the nature of soil and increase the efficiency of getting crop. Nowadays the accessibility of work is a major problem faced by farmer. The proposed machine limits the working expense and furthermore decreases the ideal opportunity for burrowing seed sowing & irrigation operations by utilizing solar energy to operate the agribot.

Keywords: Smart Agriculture System; Solar-Powered Agribot; Automated Seed Sowing; Irrigation Automation; Agricultural Mechanization; Sustainable Farming Technology;

I. INTRODUCTION

Today the environmental influence of agricultural production is very much in focus and the demands to the industry is Increasing. In the present situation, a large portion of the urban areas in India don't have adequate talented labor in agrarian segment and that influences the progress agriculture in developing country. Agriculture field contribute their presence in the Indian economy and it will continue to remain so far a long time. In any procedure of horticultural field opportuneness is required. Is most imperative factor and it can be accomplish by utilizing a fitting utilized of little, convenient and popel innovation.

Physically seed sowing will cause the wasteful and erroneous seed sowing. Manual technique incorporates broadcasting the seeds by hand. Sometimes method of digging i.e. making gaps and dropping seeds by hand is utilized. Likewise a couple of bullocks is utilized to convey the substantial hardware of leveling and seed dropping. Subsequently agriculturists need to utilize redesigned innovation for development movement (digging, seed sowing, irrigation etc.). So it's an ideal opportunity to computerize this procedure by cutting edge machine. The propelled machine is called as "Agribot". While planning this machine contamination has as been control, by utilizing sun oriented board. The vitality required for agribot is less as contrasted and different machines like tractors or any horticulture instruments; additionally this vitality is getting from the sunlight based vitality which is found abundantly in nature.

II. METHODOLOGY:

The Arduino Uno is a popularly used open-source micro-controller board that runs on ATmega 328P micro-controller. This board is developed by Arduino.cc which is an Italy based hardware company. This board contains a set of digital and

analog I/O data pins that are used to interface this board with other electronic components.

Arduino Uno consists of 14 digital pins and 6 analog pins. This board can be programmed with the help of Arduino IDE (Integrated Development Environment) that supports embedded C, its back-end is constructed using JAVA. Uno consists of an USB port through which the code can be uploaded on to the board. This post can also be used to power the board by connecting it to a laptop, PC, etc. Along with a USB port, it also has a DC input power jack. An external battery of 9V can also be used to power Arduino boardpoint and the receiver circuit will convert their voice signal in simple language and will show output in the speaker.

– The whole transmitter system will work on 9voltdc battery.

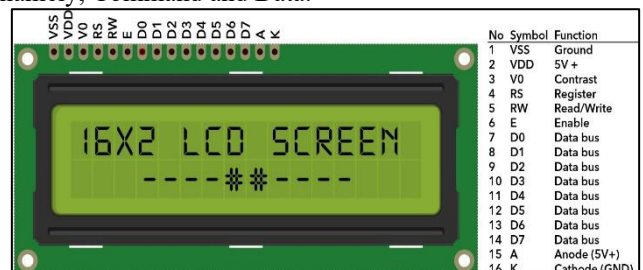
This communication system works on free wireless radio signals technology that are working on radio signals tower of government and the both the circuits can easily connect and the communication process can be easily shown free of cost.

III. COMPONENTS DESCRIPTION

A. LCD Display

Liquid Crystal Display, which is commonly known as LCD, is an Alphanumeric Display it means that it can display Alphabets, Numbers as well as special symbols thus LCD is a user-friendly Display device which can be used for displaying various messages unlike seven segment display which can display only numbers and some of the alphabets. The only disadvantage of LCD over seven segment is that seven segment is robust display and be visualized from a longer distance as compared to LCD. Here we have use d 16 x 2 Alphanumeric Display, which means on this display we can display two, lines with maximum of 16 characters in one line.

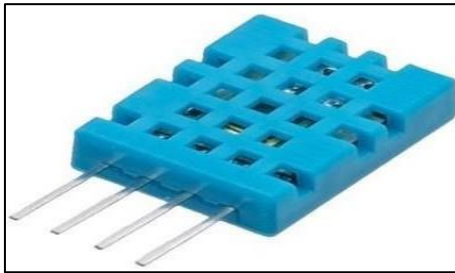
A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD, each character is displayed in 5x7-pixel matrix. This LCD has two registers, namely, Command and Data.



B. DHT11 Sensor

DHT 11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc... to measure humidity and temperature instantaneously.

DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.



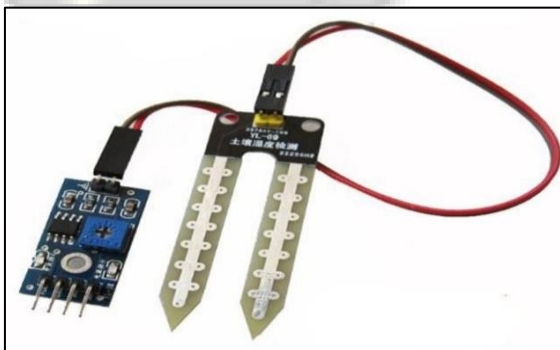
C. Soil Moisture Sensor

A soil moisture sensor is a device that measures the volumetric water content or water potential in soil. They are essential tools for precision agriculture and automated DIY gardening projects to prevent overwatering and optimize irrigation.

How They Work

Soil moisture sensors typically fall into two categories, both designed to convert soil moisture content into readable electronic signals: [1]

- Resistive Sensors: Contain two exposed metal leads that you insert directly into the soil. Water conducts electricity better than soil, so as the soil gets wetter, the electrical resistance between the leads decreases.
- Capacitive Sensors: Measure the dielectric permittivity of the soil. Because water changes the soil's dielectric constant, the sensor's capacitance changes with water content. Capacitive probes are widely preferred because their coated leads do not corrode as quickly as exposed metal leads.



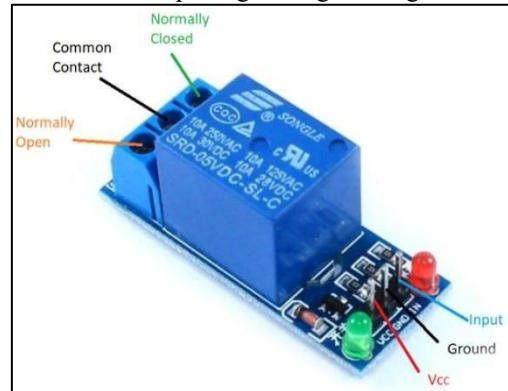
D. Relay

A relay module is an electrically operated switch that allows low-power control signals (like those from an Arduino or Raspberry Pi) to safely control high-power devices, such as motors, lights, and appliances. It provides complete electrical isolation between the fragile microcontroller and the high-voltage load.

How It Works

- Control Side (Low Power): Typically runs on 5V or 3.3V. The microcontroller sends a signal to a transistor or optocoupler, which energizes an electromagnet inside the relay.

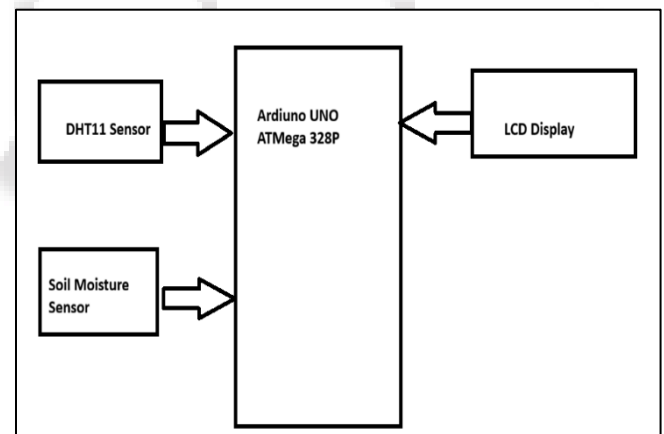
- Load Side (High Power): Features terminals labeled COM (Common), NO (Normally Open), and NC (Normally Closed). When triggered, the switch connects COM to NO, completing the high-voltage.



E. DPDT

A DPDT switch (double-pole, double-throw) is an electromechanical switch that can be formed by adding a pole to the SPDT switch. This is very easy to install because it is available with a locking system that can lock & unlock the switch directly in a remote cabinet without using any Nut-Bolts or screw for fitting. This article discusses an overview of a DPDT switch and its working with applications.

IV. BLOCK DIAGRAM



Working of this project is in manual mode music agriculture Horticulture and gardening area the manual mode of operation in land rotate in forward direction backward direction left direction and right direction. We have used four motor for for this robot and connect with DPDT switch operate all four manual code in this project we have also used soil sensor and dht11 sensor show the value of temperature and humidity in the land, this soil sensor is used for control the motor for pesticides spraying.

V. WORKING:

The working of this motor can be done in two ways like forward rotation and reverse rotation. Once the switch is pressed in forward direction then terminal- A is connected to terminal C whereas terminal B is connected to terminal D. Therefore, the DC motor rotates in forward direction because the battery is allied in forward connection toward the motor.

A gear motor is a mechanical system consisting of an electric motor and a gearbox containing a series of gears. The function of the gearbox coupled to the motor is to reduce its speed and increase its torque to do a given job at a given speed. The addition of the gearbox on the motor and the extremely simple design that can be easily adapted to the customer's needs, increases the usability of gear motors and makes them highly versatile in any field of mechanical automation (industrial and home automation, printers, vending machines, just to name a few applications). The motor can be with brushes, brushless, or stepper

The first step to make a project is its hardware part i.e circuit that can operate the mechanism required for Agrirobot system. We used the microcontroller Arduino UNO board to interface with different components required in our project.

All components are to be properly interfaced with the board then the circuit can be operated as we want. We have to also design the proper mechanism for pesticides spray

A. Interfacing planning

All the components are need to be properly interfaced with Arduino board also need to make sure the proper connections of lcd display, relay & pump module. Need to check all the connection to the Arduino before interfacing.

B. Soldering

Soldering is the stage for completion of any circuit. It is the process in which the alloy of tin and lead is heated of about 300 to melt and set itself around the components lead surface. There are two types of soldering techniques:

- Manual Soldering: Manual soldering is the technique which is operated by us for soldering very few components whereas wave soldering is used to solder mass number of components.
- Wave Soldering: Wave soldering is done by special machines. Care should be taken that flux or solder paste is applied to surface where soldering to be done so as to quicken the process.

C. Software required

1) Arduino IDE

Arduino IDE (Integrated Development Environment) is a software platform that enables a user to program Arduino or any controller of the ATmega family. The back-end of this software is developed using JAVA. This IDE provides a user the liberty to program an Arduino using C language. It connects to the Arduino and hardware to upload programs and communicate with them. The IDE consists of two main parts viz.

- void setup (): This is the location where a user can initialize all the variables that will be required during the course of programming a system. As the name suggests, this function is used to set up an Arduino before interfacing it with other circuits. This area can also be used to include libraries of various sensors. The popularly used functions in void setup are:
- pinMode: This function is used to declare pins of Arduino as input or output.

- serial.begin: This function is used when Arduino is communicating with other sensors or devices. This enables a user to set a specific baud rate for communication purpose.
- void loop (): The code written in this space will run over and over again unless Arduino is interrupted using an interrupt or the USB cable is disconnected from the USB port. The different functions that are often used in void loop are:
- digitalWrite: This function is used to make a specific pin on Arduino logically HIGH or LOW.
- digitalRead: This function is used when there is a need to read digital data from a sensor or when we have to control something using a switch/ push button.
- AnalogRead: This function comes in handy when we have to read analog data from a sensor eg. Analog read is used when there is a need to read data from a potentiometer.
- AnalogWrite: This function is used when a user wants to supply analog voltages to a component. The best example of analog write is when the intensity of LED is controlled using a potentiometer and analog write function.

2) Arduino IDE

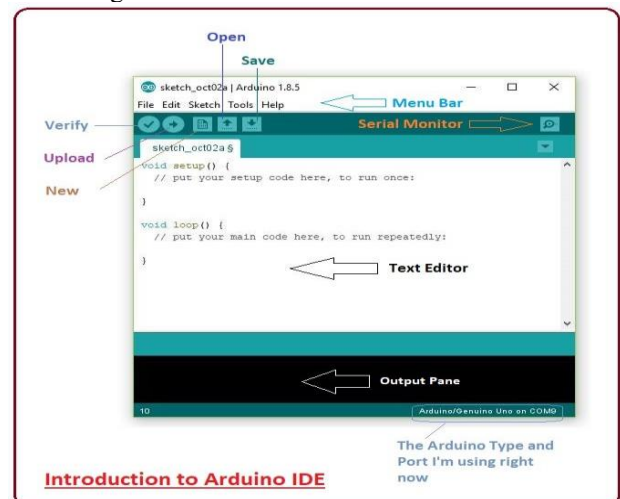
You can download the Software from Arduino main website. As I said earlier, the software is available for common operating systems like Linux, Windows, and MAX, so make sure you are downloading the correct software version that is easily compatible with your operating system.

- If you aim to download the Windows app version, make sure you have Windows 8.1 or Windows 10, as the app version is not compatible with Windows 7 or older version of this operating system.
- You can download the latest version of Arduino IDE for Windows (Non-Admin standalone version), by clicking below button:

The IDE environment is mainly distributed into three sections

- 1) Menu Bar
- 2) Text Editor
- 3) Output Pane

As you download and open the IDE software, it will appear like an image below:



The bar appearing on the top is called Menu Bar that comes with five different options as follow

- File - You can open a new window for writing the code or open an existing one. The following table shows the number of further subdivisions the file option is categorized into.

D. Application

- This can be used for to measure temperature and humidity of ssed and enviromrnt.
- They can also be used for Performing seed and digging.
- It can be used for agriculture for increase seed growth.

E. Advantages

- They can also be used for optimized crop growth.
- This can be used for to measure temperature and humidity of ssed.
- Asoil moisture sensor work with relay-controlled water pup to irrigate only water is necessary.

VI. FUTURE SCOPE

For further development of this project, we can add GSM and GPS modules as whenever the fire is detected gps will take the location of fire within 6m radius and it will send the sms to the concern person to take necessary action as if the there is large fire then Agribot cannot extinguish it then there me be a chance of lot of damage to the fields/crops.

VII. CONCLUSION

- This Automatic seed sowing & irrigation Agribot has increase productivity for INDIAN farmer.
- The chassis handles the complete weight of solar panel, battery and the hardware mounted on agribot which is able to perform each and every operation skillfully and successfully.
- The irrigation process is done better than before to yield the proper production done before and usage of water level is limited and increase the production rate.

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