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AGROBOT

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Abstract: *AGROBOT is a short form for Agricultural robot. Nowadays 40% of the world has chosen agriculture as the major profession, throughout the last decade the event of the automated vehicles and robots are dynamic. This Agrobot project is designed to decrease the labor work of farmers additionally to increasing the speed and accuracy of the work which leads to the saving of time.*

Agricultural robot includes automation of agriculture. Here, we include ploughing and seeding. First step in agriculture is ploughing and creating loose land and increase in growth of the crop. Second step is to form lines and sow the seeds. This can be accustomed as cut back of human efforts.

This robot will receive few command directions through/via Bluetooth with the help of robot controlling mobile app that performs the required actions. Bluetooth module receives the commands and sends it to the Arduino for the functioning of motion of the robot.

Keywords: *Agriculture, Automation, Bluetooth, Efficiency, Ploughing, Seed sowing.*

I. INTRODUCTION

In India most of the people depending on agriculture as occupation, as India is known for its culture and tradition. So, as to reduce their efforts we are here with a solution i.e., AGROBOT.

This system works independently or with user interreference. The main part of this system is Arduino which controls the whole system as per requirements of inputs/output. This system comes under embedded system which includes software to write instructions known as code and hardware part known as components.

In the present scenario, most of the countries don't have sufficient human resources in the agricultural sector, and this will affect the growth of developing and undeveloped countries. In India, 70% of the population is dependent on agriculture. So, we really need to study agriculture. All of the processes that are advanced in order to change the infirming of mechanism, which works automatically without the need of the human energy.

The small machines are assembled with the value of the components of the mass, without the need for any special design features and tools. Also, the power consumption of the machine is not in relation to a tractor, or some farming tools. For the preparation of the seed sowing or dispensing, in our day-to-day life, we use a tractor on the farm. However, this requires a little more time, and due to the lack of people, it is necessary to work all the time.

II. LITERATURE SURVEY

In the year 1971 the first device depended on embedded system was developed. The first device was a calculator made by the Japanese company Busicom, in 1969. This embedded system is also known as real time operating system. There are many applications of embedded system like: - Consumer Electronics, Office Automation, Industrial Automation, Biomedical Engineering, Wireless Communication, Data Communication, Tele-Communication, Transportation, Military etc.

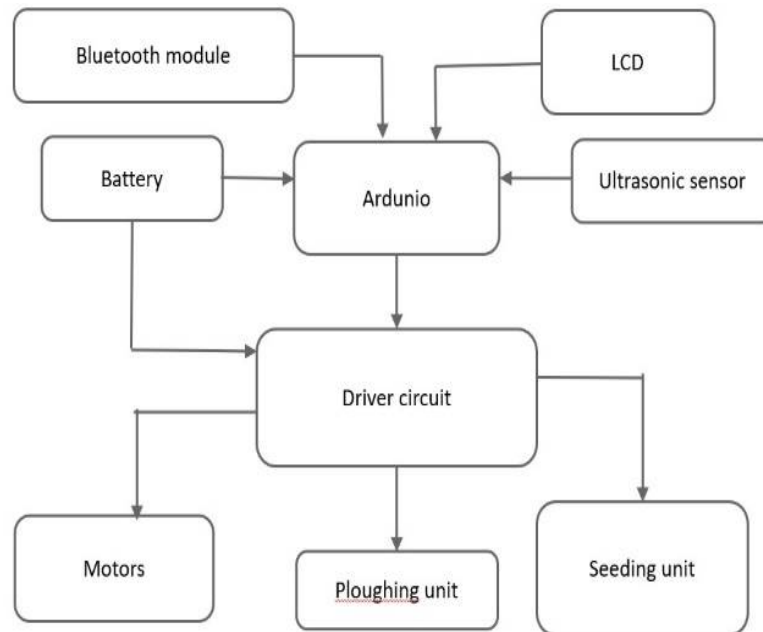
A primary investigation is being carried out under following stages, Such as Understanding the existing approaches/methodology, understanding the requirement or need and developing an abstract for the system.

III. METHODOLOGY

In this project, it is presenting the farm cultivation process in agriculture which is controlled by microcontroller. The battery is connected to the Arduino. Bluetooth module gives the input to the microcontroller the ultrasonic sensor sends the obstacle distance and shows the output on the LCD display.

The motors are used to move the robot in the desired direction and for ploughing and seeding. The driver circuit is used to regulate the power difference between the Arduino and motors.

IV. HARDWARE USED



A. Arduino Uno



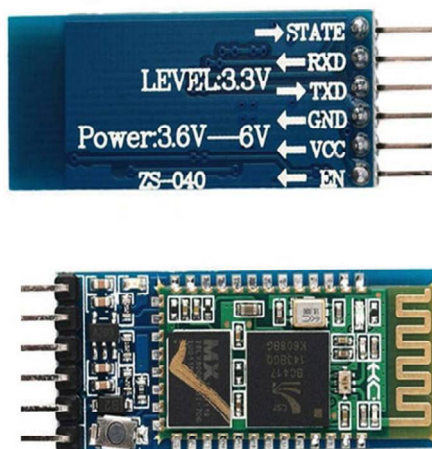
Arduino uno is a device with a microcontroller named atmega328p. This includes analog pins, digital pins and PWM pins. This is used to control the whole system according to the code given to it. The arduino is connected to rectifier and regulator. This microcontroller processes the internal program. This microcontroller is the heart of the project.

B. Ultrasonic Sensor



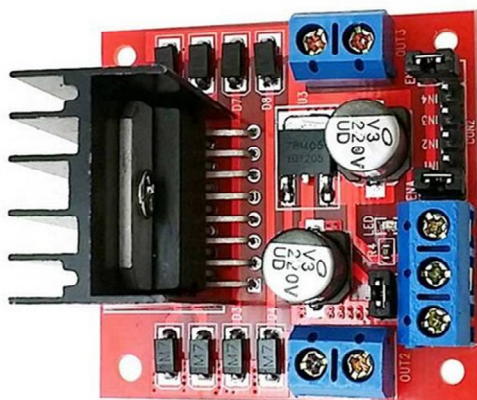
Ultrasonic sensor is a device which works on the principle of IR sensor. Transmitter continuously emits ultrasonic waves and receiver receives the waves. In general, ultrasonic sensor is used to calculate the distance between the object and it self by calculating the time taken to travel from the transmitter of the sensor and hit the object and then back to the receiver of the sensor. This ultrasonic sensor detects the distance of up to 230 cm, and above that it gives all the junk values. If the obstacle is at a distance of 10 cm, it sends the information to the micro-controller of the robot, so that the movement will be interrupted.

C. Bluetooth Module



Bluetooth module is a device consists of an ic HC05 this is used as a communication bridge for user and microcontroller. The module can transmit and receive the data wirelessly by using two devices this module can receive data from host system with the help of the host controller interface. The bluetooth acts as a serial communication module which sends and receives the data serially. It consists of two pins one for supply and other for data carrier. The frequency of the module is 2.4GHz. It is a short-range wireless communication technology.

D. L293D Motor Driver



Motor driver is a device which consists of L293D which is used to control motor in particular direction at a particular speed. It has 6 inputs and 4 outputs. this device uses 12v/9v as power input. 6 inputs are En1, En2, In1, In2, In3, In4 and the 4 outputs are Out1, Out2, Out3, Out4. The main purpose of Motor driver is to convert low power signal to high current signal. We use this driver because the motor cannot be directly connected to the arduino as they do not get sufficient Power from Arduino.

E. DC Motor



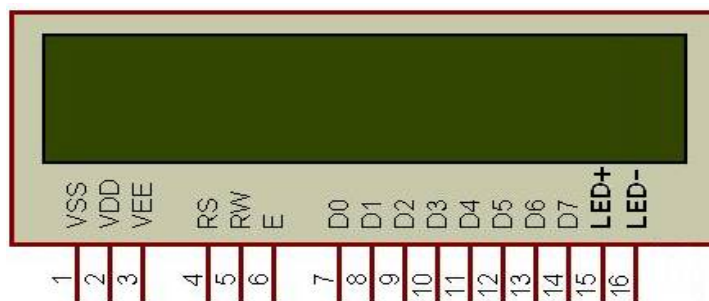
A DC motor converts electricity into motion by electromagnetic induction. DC motors convert electrical energy into mechanical energy. The DC motor does this by producing a continuous angular rotation that can be used to rotate the wheels. We are using four DC motors two at the wheels for the movement of the robot and two each for ploughing and seeding. The DC motor is connected to motor driver the motor driver gives the supply to the DC motors so that it moves in the desired direction. The arduino is also connected to it by the motor driver so that the microcontroller can give instructions to the motor. By this the microcontroller controls the DC motors when to start, stop, plough and seeding.

F. Batteries



A battery is a source of electrical energy, which is composed of more than 1 or multiple electrochemical cells with external power supplying source for electronic devices such as: flash, mobile devices and electrical vehicles. When a battery provides electricity, it supplies through its terminals which are: positive terminal is the cathode and its negative terminal is the anode. The battery is connected to the rectifier which converts 12v DC supply to 5v DC to give input to the Arduino.

G. LCD display



LCD- Liquid Crystal Display is a flat panel display. LCD is a combination of two states of matter solid and liquid. It uses a liquid crystal to produce a visible image. It is a kind of electronic display module used in an extensive range of applications. This lcd can operate voltage 4.7V to 5.3V. It includes two rows where each row can produce 16 characters. The LCD displays the obstacle value and shows the current position and movement of the robot.

H. Plough



Plough is a farming tool used for loosening/turning/digging the soil before sowing seeds or planting. The prime purpose is to turn over the upper most soil. In this project the plough is connected to a DC motor, when the motor is running it starts ploughing. The instructions are given by the microcontroller to the motor by the android app.

I. Robotic Vehicle



This is a vehicle on which the whole system is placed and moves throughout the field. The wheels are connected to two DC motor for the movement of the vehicle and the whole system is on the vehicle which moves around the field for ploughing and seeding.

V. SOFTWARE IMPLEMENTAION

A. Arduino IDE



Arduino IDE is a software where you can write code for Arduino devices like uno, Node MCU, nano, mega. This helps device to understand user and make it works accordingly.

VI. SETUP

The input to the robot is given through bluetooth using mobile phone android app, the ultrasonic sensor is used to determine the distance of the obstacle. The regulator is used to regulate the power between the arduino and DC motors. There are four DC motors two for the movement of the robot and two for ploughing and seeding respectively. The distance of the obstacle is shown on the LCD, the LCD shows the current position and movement of the robot. If the obstacle is at a distance of 10 cm, it sends the information to the micro-controller of the robot, so that the movement will be interrupted.

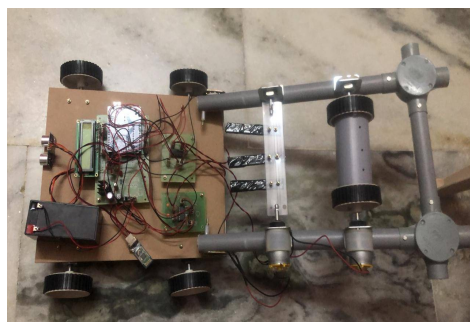
In this agrobot project we are using Arduino UNO as motherboard or the brain of the robot which will control the robot driving motors and seed dispenser. The whole project works on 12V lead-acid battery.

VII. EXPERIMENTAL PROCEDURE

We are using 12V battery is connected as input to the board, which is connected to a rectifier. The rectifier converts AC to DC. A Filter is used to control and remove fluctuations. A regulator is used to convert 12V to 5V, which is given to Arduino board. In this board we have ATMEGA 328 microcontroller, which executes the internal program. The controller acts as a system, so it needs some inputs, there are two inputs in this Ultrasonic sensor and Bluetooth module. The ultrasonic sensor generates ultrasonic waves when 5V supply is given the echo pin generates the input to microcontroller and trigger pin generates the output. When an obstacle is there the frequency cycle is changed, based on that the duration time will differ. We convert it to distance and it is displayed on the lcd. That information is given to the Arduino and then displayed on the lcd.

The other input is bluetooth, it is a serial communication module which sends and receives data serially. It works with 2.5ghz frequency. When data is sent to the Bluetooth, it gets transmitted to Arduino. Arduino sends data to motor driver IC. We are using two Motor driver IC, as one ic can run two motors at a time. Two motors are used for moving and two motors are used for ploughing and seeding. The microcontroller will send data to the driver IC. The L293 ic acts as a mediator between Arduino and the motor. The motor driver is used as it can bare 5v to 12 volts DC.

VIII. RESULT



This robot is controlled by a mobile app via Bluetooth connection to the robot. Each button pressed in the app leads to a certain function of the robot. By pressing the buttons, we can control the robot movements, its ploughing function and its seed dispensing function. When the robot starts the ploughing action, the ploughing rods attached to the main rod start rotating with the help of the motors attached to the main rod which ploughs the land. The tube loaded with seeds which is attached behind the plough starts rotating and the holes of the tube dispense the seeds on the ploughed land. All of these functions can be done individually or simultaneously.

IX. CONCLUSION

Here, we can conclude that the objectives and the requirements of our project have been successfully fulfilled. We made the farmers work more efficiently, and reduced their work. The main focus of this project is automatic way of ploughing the soil and sowing the seeds. The seeds have been sown in a proper sequence. By using this project the man power is reduced and the speed and efficiency is increased. This presents less cost, less power and simple design for device control. The daily work hours are reduced. The robot has made to automate the work routine. The project gives a low power and is simple to control the system. This system has given high application in farming, gardening and Agro University.

X. FUTURE SCOPE

For future development of this project, we can expand this project by adding more features like water sprinkling, pesticide spraying etc. to this robot for multiple purposes in the agriculture by doing all the necessary processes by the robot itself so that it leads to the reduction of the man labour works and their time too.

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