

AGRIBOT: Agriculture Robot

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Abstract

Agriculture robot is used for operations like ploughing, seeding, sprinkling water and to detect humidity, obstacles using sensors. To establish communication, Bluetooth module is used and is controlled using app. DC motors are used to drive wheels. Ploughing, seeding mechanism are performed with the help of motors. Watering can be done with the help of relay ON. Humidity sensor detects moisture content and ultrasonic sensor is used for obstacle detection and buzzer is used to give an alert. Agribot automates most of farming activities and reduce manual work which helps farmers to save money. It requires low operations cost and increases productivity which also saves time and energy of farmers. Major disadvantage is Agribot requires higher investment which is not affordable to all and is complex to use. Agribot can be used in farming activities such as crop monitoring and analysis, fertilizing, picking and harvesting.

Components used are: DC motors, Motor driver, Relays, Moisture Sensor, Ultrasonic Sensor, Buzzer, Bluetooth module, Water pump, Seed sowing tool, Ploughing tool, LCD, Microcontroller, DHT11.

I. Introduction

To design a multipurpose husbandry outfit which can be run with battery power for performing major agrarian operations like ploughing, seed sowing, smattering water. It also uses android operation. An operating system, middleware, and essential functions are all part of the mobile bias software platform known as Android. Android comes with a Bluetooth and Wi-Fi module. The radio frequency (RF)-based, short-range networking technology known as Bluetooth is an open standard that has the potential to revolutionise wireless phones and computing.

It's designed to be affordable, wireless networking system for all classes of movable bias, similar as laptops, and mobile

The robot also consists of water position detector to descry the water content in soil and grounded on that it'll switch ON/ OFF the irrigation motor, moisture and temperature detector to descry the ambient temperature and moisture of field and ultrasonic detector to descry the handicap in its path and stop the motor automatically if the handicap is presence.

Vehicle controls robot as well as water motor and seed drop motor using android mobile phone through Bluetooth. A plough tool is attached to the robot, ploughing can be done automatically while moving the robot. The exertion done by robot will be displayed on TV module. Two DC motors along with L293D motor motorist is used to move robot.

II. Literature Survey

Agribot is one of the best technologies which is helpful for farmers. Agribot is used for multipurpose activities like ploughing, seeding sowing, sprinkling water which is useful for farmers. Agribot is controlled through IOT, Bluetooth module. Mostly it reduce the burden on farmers and the performance increases effectively.

Due to increase in wages the workers are charging more so that may affect on farmers. In order to reduce it, agricultural robot is introduced. The robots are current technology where it includes smart working. They are controlled through Bluetooth module, IOT. For operation of agriculture robots doesn't need more knowledge. The main disadvantage of these robots are high investment, maintenance is required and if any part get damages then for repairing it takes more charge.

III. Motor driver

Quadruple high-current half-H motorists are the L293 and L293D. The L293 is made to provide over 1 A of bidirectional drive currents at voltages ranging from 4.5 V to 36 V. At voltages ranging from 4.5 V to 36 V, the L293D is intended to provide bidirectional driving currents of over 600 mA. Both bias are intended to drive inductive loads in positive-force activities, such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads. Featuring a fully functional hallmark-pole drive circuit. All inputs are compatible with TTL. Each affair functions as a pseudo-Darlington source and the Gomorrah of a Darlington transistor. Drivers are enabled in pairs, with Drivers 1 and 2 being enabled by Drivers 1, 2, and Drivers 3 and 4 being enabled by Drivers 3, 4. The related motorists are enabled and their labours are active and in step with their inputs when an enable input is high.

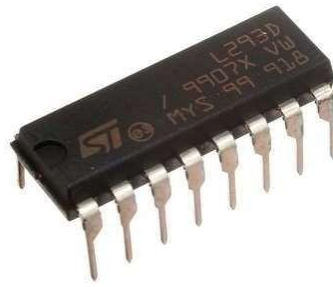


Fig: Motor Driver

IV. Bluetooth Module (HC-05)

A simple-to-use Bluetooth SPP (serial Port Protocol) module called the HC-05 is intended for setting up transparent wireless periodic connections. The HC-05 Bluetooth Module is an excellent choice for wireless communication because it can be used in either a Master or Slave configuration. This Bluetooth module for recurring use is Bluetooth V2.0 EDR (Enhanced Data Rate) compliant. It makes use of the CSR Bluecore 04 External Single Chip Bluetooth System with AFH (Adaptive Frequency Hopping Point) technology. The plant setting is SLAVE due to neglect. The only way to configure the module's portion (Master or Slave) is through AT COMMANDS. The slave modules can accept connections but cannot establish a connection with another Bluetooth device. The master module has the ability to link to another bias. The stoner can use it for nothing more than a recurring harborage alleviation to connect MCU and GPS, PC to bed design, etc..

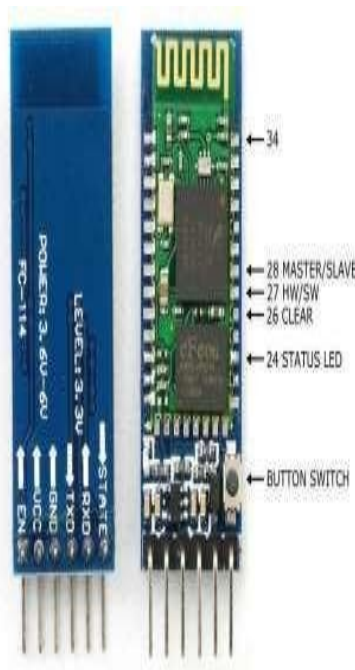


Fig: Bluetooth module

V. Block Diagram

The below block diagram consists of Regulated power supply through which power supply is given to microcontroller and microcontroller sensors are connected. The instructions are sent to motor driver through Bluetooth module. LCD is connected to microcontroller and displays the temperature, humidity, moisture and obstacle distance. Relays act as switches for irrigation and seed sowing connected motors.

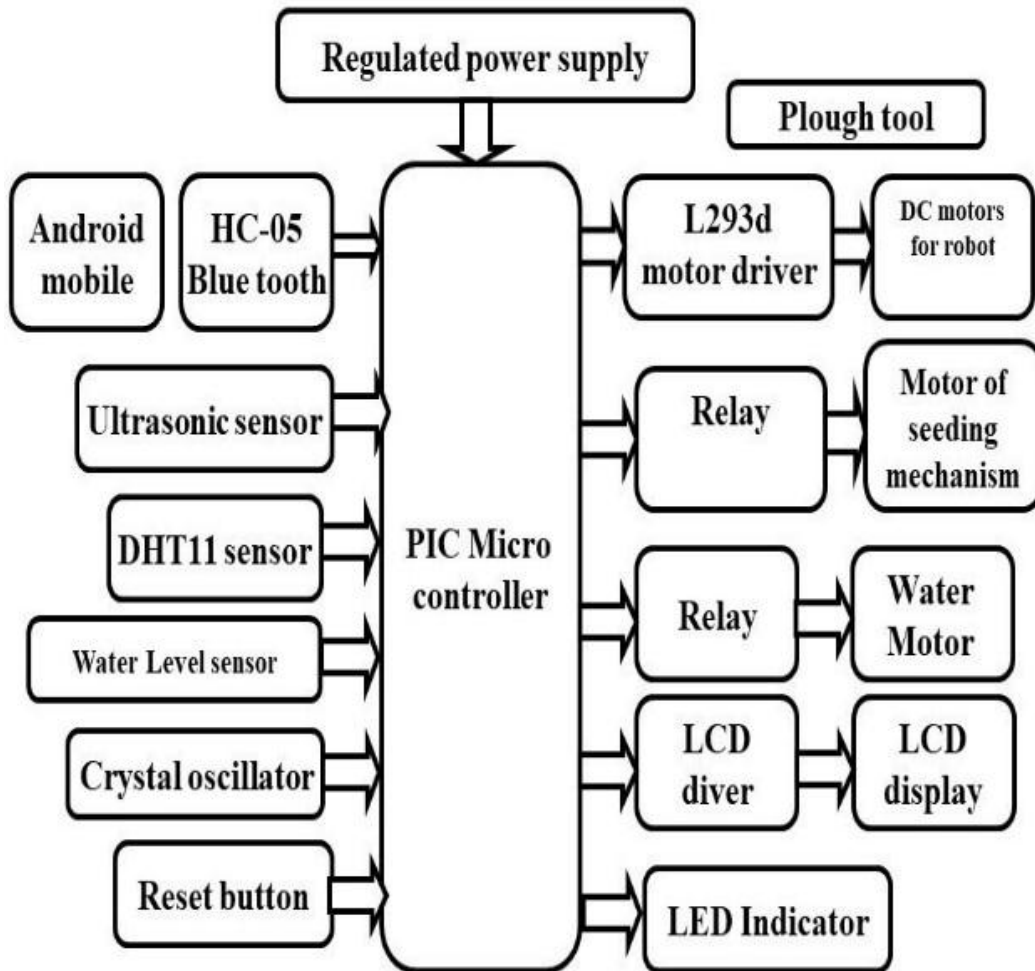


Fig: Block diagram

VI. Working

When DC supply of 12v is given, then the voltage regulator sends the input to microcontroller. Microcontroller is connected with L289IC of motor driver which rotates either in clock wise or anti-clock wise direction. Motor driver consists of 2 wheels which can move in forward, backward, left, right directions. Motor driver is connected with dc motor for sowing seeds which helps in sowing seeds and spray pump which helps in sprinkling of water.

If 2 motors run in clockwise direction then it moves in forward direction. And according to electrical, if positive voltage is applied it moves in forward direction. And if 2 motors run in anti-clock wise direction then it moves in backward direction. And according to electrical, if negative voltage is applied it moves in backward direction. If left side motor run in clockwise direction or positive voltage is applied and right-side motor run in anti-clockwise direction or negative voltage is applied, then robot turns left side.

If left side motor run in anti-clockwise direction or negative voltage is applied and right-side motor run in clockwise direction or positive voltage is applied then robot turns right side.

Microcontroller is also connected to moisture movement sensor which helps in soil checking which helps in sowing of seeds. DC motor is connected near to motor driver which rotates at the speed of 100 rpm. Bluetooth module is connected to the microcontroller which helps for controlling the robot.

App working

Bluetooth must be connected. It displays 4 directions i.e, top, down, left, right. App displays the seeder, watering switches either that are in ON or OFF position. Based on that working is done.

forward	backward	left	right	stop
Water on	Water off	Seed on	Seed off	-

VII. SOFTWARE USED

Software: PIC C programming Language

The software used to write and compile machine language laws is called a PIC compiler. The machine source law is then compendiumed into hex law and dumped into the microcontroller for further processing. C language law is supported by snap compiler as well. For microcontrollers, C language, sometimes known as Bedded C, is crucial to understand. It is known as PIC C since PIC Compiler is used.

VIII. HARDWARE RESULTS

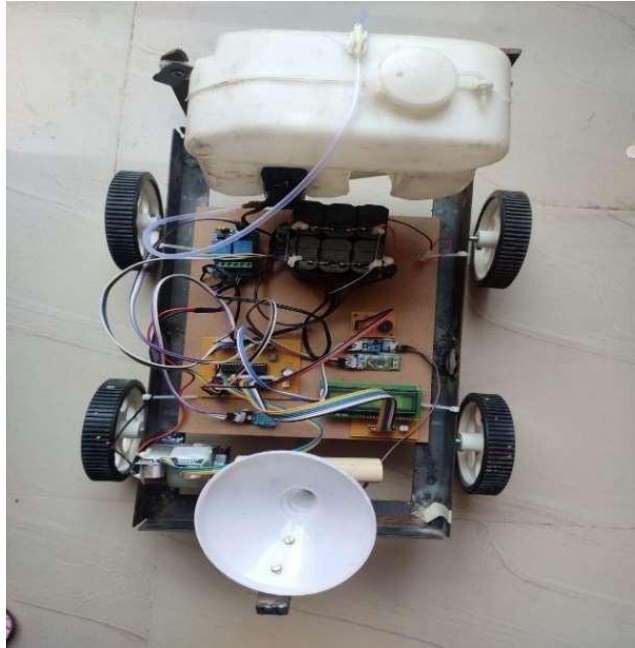


Fig: Kit for agriculture robot

Agribot uses bluetooth module for connectivity and is used for water spraying, seeding, obstacle detection, humidity and temperature detection using sensors.



Fig: Displaying in LCD

Agribot while checking moisture content of soil, humidity, temperature and obstacle detection.



Fig: Seed Sowing

Funnel is placed above the seed pipe which is connected to motor, when seeds are put in the funnel and motor is ON, pipe is rotated in clockwise direction and this leads to falling seeds in tilled soil. The command given to turn on the motor is 'A'.



Fig: Water Spray

Water pump through which water is sprayed. If instruction is 'S', relay which acts as a switch closes the circuit and water is sprayed with help of motor.

Conclusion:

Agribot is used to perform primary agricultural operations like tilling, seeding, watering and consists of a sensor to detect the water content in soil and the obstacles. This robot consists of DHT11 sensor to detect the ambient temperature and humidity of the field. An Ultrasonic sensor is used to detect the obstacle in its path and stops automatically if any obstacle is present.

A plough tool is attached to the robot, ploughing is done automatically when robot moves. The status is displayed on LCD module. Two DC motors along with L293D motor driver used for movement. PIC microcontroller is used for controlling. HC-05 terminal is used for connectivity. Integration of hardware components has been done and a prototype of Agribot has been developed. The developed model has been tested and it has been observed that all the specified operations are performed. Agribot can be used in domestic applications like gardening along with farming activities.

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