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Design and implementation of agrobot by using IoT

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ABSTRACT

Many advances in technology have made the agriculture business a much less labor-intensive industry. Farmers are looking for new ways to implement technology to cut costs and reduce labor hours. One of the ways that farmers are beginning to explore new technologies in farming come from the automatic machines. Internet of Things (IoT) technology has brought revolution to each and every field of common man's life by making everything smart and intelligent. IoT refers to a network of things which make a self-configuring network. The Agriculture stick being proposed via this paper is integrated with Adriano Technology, Here we use two applications to show the working of the robot which is going to do crop harvesting and fertilizing in real-time manner. Other accessories are slaves performing specific operations. The approach is now to develop smarter machines that are intelligent enough to work in an unmodified or semi-natural environment.

Keywords— Arduino Uno, IoT

1. INTRODUCTION

The automatic farming robot is something that is very new to the agriculture industry but is quickly gaining popularity from agriculture research. This automatic agrobot are rapidly becoming more of a reality than an idea. When the agrobot is moving on a surface, it is controlled by Arduino Uno. This can be moved forward and reverse direction using a dc motor of 60RPM. The robot can move towards the left and right directions using these motors. This project uses Arduino Microcontroller and comprises of performing crop harvesting and fertilizing via Arduino decoder commands.

This robot is also interfaced with the ultrasonic sensors. Ultrasonic sensor will detect the obstacles in front of the robot and buzzer will be ON. The robot has a watering mechanism it

will spray the plants according to their needs by fertilizer. The dc pump helps the robot to sprinkle the water for the fertilizing process. This project uses a 12V rechargeable battery and inserts the LCD display for analyzing the whole mechanism clearly. Also, energy requires for this machine is less as compared with crop cutter or any agricultural instrument.

2. RELATED WORK

IoT is used which is used to operate the functions through the mobile with the connections of GPRS RS 32 to the android based mobiles and it can handle the process by automatically and artificially. The Arduino Uno microcontroller is used for controlling the robot according to the mechanism of agrobot. To control the devices from the mobile place we are using IoT technology. Connect a mobile at the receiver end (Controller side which is fabricated on the robot). If we give a command from another mobile automatically it gets received by the GPRS decoder unit placed on the receiver end. IoT process that information which is received by the receiver. The movement of the robot depends on the instruction (commands) received by the receiver unit.

The battery is an electronic circuit that enables a voltage to be applied across a load. It is used in robotics to run the motor forward & backwards for robotic operations. Micro-controller is a small computer on a single integrated circuit containing a processor core, memory and programmable input-output peripherals. Arduino Uno which is typically 8051 microcontroller having 4 different ports, each one having 8 input/output lines providing a total of 32 input/output.

3. PROBLEM IDENTIFICATION

The Indian farming is tormented by a few issues and some of them are normal and others are manmade. The little and divided landholding. The seeds and farming Seed is a fundamental contribution for attaining higher yields and the dispersion of

guaranteed quality seed is critical as the creation of seeds and the nature of seeds are out of achieves and good quality seeds are difficult to identify.

The absence of automation of agribusiness in a few sections of the nation. The majority of the agricultural task in bigger parts is carried on by human hand utilizing simple and regular apparatuses like wooden plough sickle and so on. The deficient storerooms. The composts manures and biocides. The water system and ploughing. Lack of lasting methods for the water system.

4. BLOCK DIAGRAM

The ultrasonic sensor is arranged to detect if any obstacles are in front of the robot by the particular distance and to avoid the obstacles by automatically. The Arduino Uno series are a microcontroller which feeds the program of optional for the two processes simultaneously. The IoT of GPRS system uses to operate the functions by the mobile app which is optimatically two mechanisms is followed. The driver circuit is directly connected to the dc motor and it to move the robot by dramatically. It is also used to control the speed of the moving robot. Rs 19 is connected with the dc pump to act as a sprayer and it is for the fertilizing. With the help of suitable mechanism input related to these will be fed to the controller and appropriate action will be taken by the controller. A separate mechatronic sprinkler with water motor is used for the irrigation process.

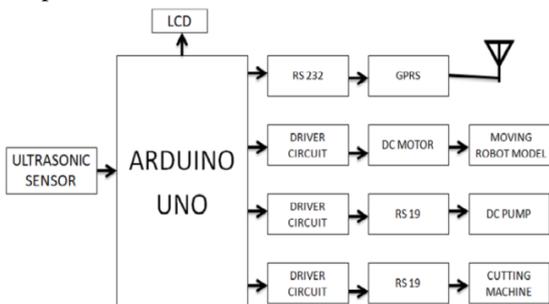


Fig. 1: Block diagram

5. METHODOLOGY

In this project, it is presenting that the farm cultivation process in autonomous agriculture system which is controlled by microcontroller assembly. The technique of seed preparation in ploughed land is based on row per column depending on the types of cultivation. The main part of the robot technique is the sensor part. The sensor performs to identifying obstacles as well as the completion of a farm for the end of the land and then turn the position of robot either in the left or right or forward direction. The operation of a dc motor is based on electromagnetic, to give the energy to the robot vehicle. The driver circuit is used for giving the constant voltage to the DC motor and the motor will turn in both the forward and reverse direction. When the DC motor starts, the vehicle moves along the particular column of ploughed land for seeding, closing the pits and side by side sprinkling the water. There are two cases to sense the sensor as:

Case 1: Obstacle present

If any obstacle is present in the front way of the vehicle, the ultrasonic sensor gets trigger automatically turn the vehicle into 180 degrees with the help of microcontroller instruction then it goes to the right ways.

Case 2: Completion of the end of the land

If there is not present in any obstacle in front of the way of the vehicle, it will go up to the last end of the land. At the position,

it tries to move in 270 degrees with the help of microcontroller then it goes in the next column. Then it repeatedly follows these two cases. This robot can analyse a particular area and doing the task as per the programming.

5.1 Simulation results

For the navigation of the robotic vehicle is done in the simulation with the help of proteus. The proteus software is used for the purpose of correctly sense the obstacle in the end of the land then its turn the position of the robot in the following direction. So it is easy to design the robot. A starting stage of the robot vehicle is in this stage the motor and the sensors can be in the initial stage.

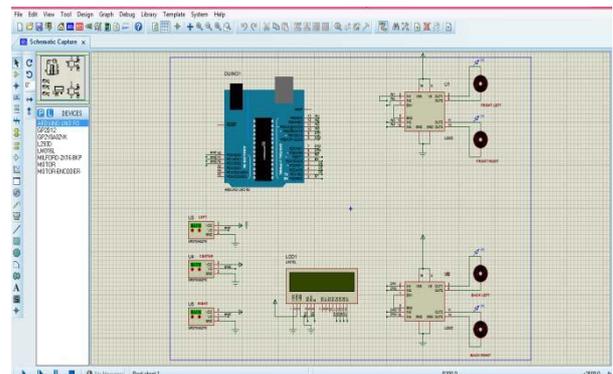


Fig. 2: Initial stage

5.1.1 Starting stage of the Robot: When the battery power supply supplies the microcontroller, it then starts the motor in the forward direction. And the sensor also senses as shown in the figure.

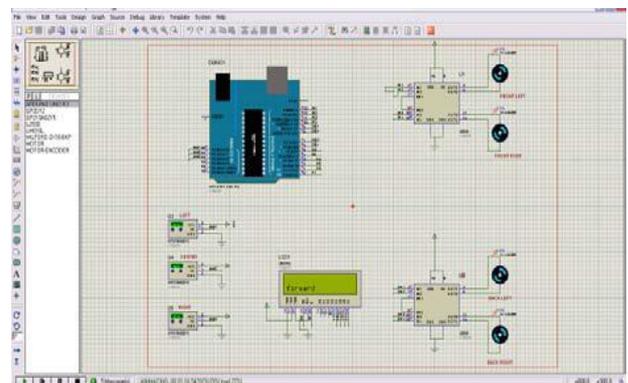


Fig. 3: Starting stage of robot

5.1.2 The Robot moves in the forward direction: If the condition of the sensor likes the voltage is high, low, low. The right motor will ON and its turn in the left direction as shown in the figure below. The process of cultivation is going on. This process again and again repeatedly as follows.

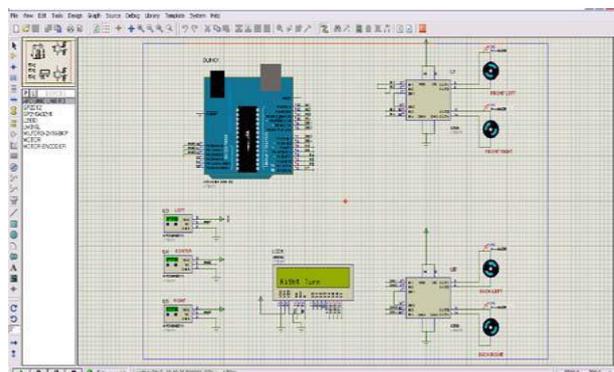


Fig. 4: Robot moves in a forward direction

5.1.3 The Robot will move right direction: At last, if the condition likes low, low, low then the motor goes stop as shown in the figure below. After the completion of the ploughed land, the process will start in a new land for cultivating it.

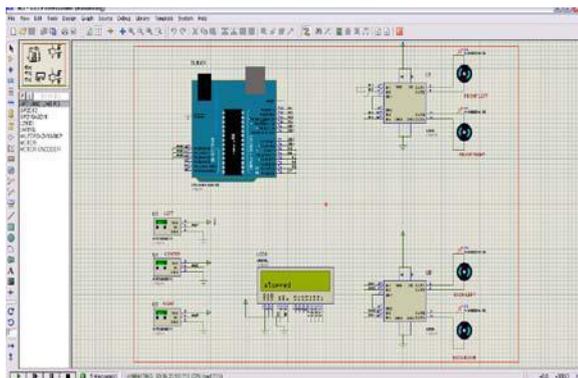


Fig. 5: Robot moves in the right direction

5.1.4 The Robot is in stop condition

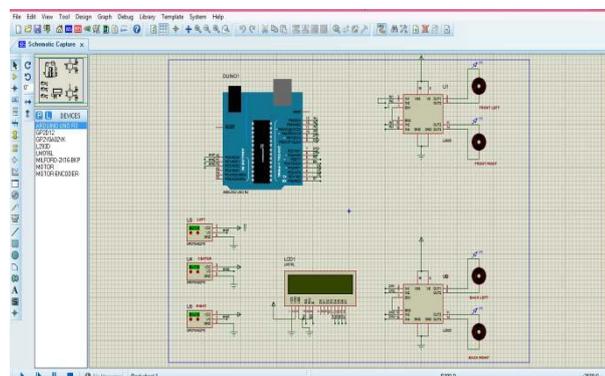


Fig. 6: Robot in the stop condition

6. FUTURE IMPLEMENTATION

The solar panel can replace the battery power supply to reducing the recharge cost. And one or more system can be monitored through the GSM system. Then it also includes the weeding and ploughing in this system. This system proposes to insert the web to watch the obstacles and to monitor the environmental conditions through the SCADA systems.

6.1 Scope of the Study

The objective of this paper is to develop a micro controller based system that helps in on-farm activities like seeding, closing the seed pit, spraying the fertilizer and watering the plants at designated the autonomous robot. The process of seeding is done by using the DC motor. The aim of the paper is reducing the manpower and increases productivity rates.

7. ADVANTAGES

- This fully automatic robot which works on open architecture principle and does a lot of work in farms, so it reduces human labour.
- It works faster than human efforts which definitely save time.
- The system observes different environmental conditions and takes actions accordingly which humans can't do accurately.
- The sensors and electronic drives for making this system are easily available in market and cheap which reduces the cost of the system.

8. APPLICATIONS

(a) It is used only for agricultural purposes: crop harvesting and fertilizing.

- (b) The system observes different environmental conditions (temperature, soil moisture) & take actions accordingly which humans can't do accurately.
- (c) An autonomous robot works on open architecture principle and does a lot of work in farms so it reduces human labour.
- (d) The robot is capable to do the harvesting work with a reduced time interval than the time required for doing it manually. The robot while operating the spraying mechanism, first senses the soil condition with the help of moisture sensor, if the soil is dry watering action is initiated by the robot on the other hand if the soil is wet enough there will be no watering action.

9. CONCLUSIONS

This paper is mainly based on minimizing man power and cost of the equipment, which can be affordable to all farmers. Most of the present successful agrobot models represent the use of powerful fuel based IC engines and heavy machinery, which require a skilled technician and causes unnecessary environmental pollution and also a reduction in fossil fuel. In order to solve this problem, the use of automation unmanned agrobot is implemented by this work. This project is developed to automatically cultivating the land. The project has consisted of two mechanisms. The first mechanism contains to navigate the assembly of the robot vehicle, whereas second mechanism is preparing the plough the land, seeding and watering it. Development of prediction driven irrigation activities of the Agrobot form the future scope.

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