E-vehicle for Agricultural

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ABSTRACT

The primary aim of our project is to develop a multitasking agricultural robot, which can be used for agricultural processes like seed Sowing, Ploughing & Spraying system. This robot will derive its power from solar panel or rechargeable battery making it energy efficient and eco-friendly.

Such types of robots, which are used in the agricultural fields, are called as Agro-bots. Here in this module we have designed a robot, which can be controlled by using a Android application for spraying the pesticides or in the field or greenhouse & vineyard. By the development of these agro-bots lot of manual labor will also be decreased. In this regard here is a demo model of such equipment, which performs the operation very effectively. Here in this project the Bluetooth module is used for communication & android application will used, which encodes the data to the robot for controlling the movement as well as spraying purpose. The transmitting and receiving modules are constructed using micro-controllers.

KEYWORDS: Motor driver, DC Motor, power Controller,   Battery, pic microcontroller.

I.   INTRODUCTION

In the current generation most of the countries do not have sufficient skilled man power specifically in agricultural sector and it affects the growth of developing countries. So it's a time to automate the sector to overcome this problem.

In India, near about 70% people are dependent upon agriculture. As compared to other fields globalization in agriculture system is less. So, it is necessary to make some advancement in this field. The idea of robotic agriculture (agricultural environments maintained by good machines) isn't a replacement one.

Now a day we have lack of man power, Energy required for this machine is less as compared with tractors or any agricultural instrument pollution is also a big problem which is eliminated by using solar plate. A manual farm consumes more time & leads to more pollution. So it is a time to automate the process of Spraying, ploughing and sowing of seed.

This E-vehicle is a multifunction Robot that performs three major functions normally required in Agriculture field i.e. Ploughing, Seed distribution and Spraying. A start button will activate the DC motors to run the E-vehicle to perform desired function. These things are interfaced with pic-microcontroller and programming for the operation of the mode and motor is done on pic microcontroller.

Some of disease & their solution:

Pollution is also a big problem which is eliminated by using solar plates and batteries.

A manual farm consumes more time and human may not be able to work in hazardous environment , humans need to rest, the does Automation saves a lot of tedious manual work and speeds up the production processes.

Then by using the e-vehicle we can reduce the pollution and   human effort in the agriculture.

Insects are cause of many agriculture problems as they eat and damage the leaves and crops of farm.
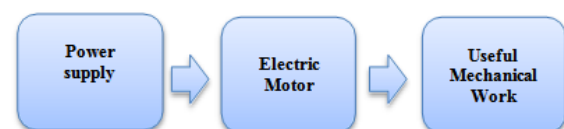

Fig.1 Block diagram of Electrical Vehicle

II.   LITERATURE REVIEW

Amrita Sneha. A. proposed "Agricultural Robot for Automatic Ploughing and Seeding "The author proposed a robot capable of performing operations like automatic ploughing, seed dispensing. It also provided manual control when required and kept tabs on the humidity with the help of humidity sensors. The main component here is the AVR AT mega microcontroller that supervised the entire process. Initially the robot tills the entire

field and proceeded to ploughing, simultaneously dispensing seeds side by side. On the field the robot operated on automated mode, but outside, the field is strictly operated in manual mode.

Dr. V. Nandagopal et al. proposed "Design and Implementation of Seeding Agricultural Robot" In this paper, the robot system was used to develop the process of cultivating agricultural land without the use of man power. The aim of the paper was to reduce the man power, time and increase the productivity rate.

Abdullah Tanveer et al. proposed "Automated Farming Using Microcontroller and Sensors" In this, farming was done using new technologies to yield higher growth of the crops and In this project, they had checked temperature, light, humidity and soil moisture. In That paper there were all about automatic control features with latest electronics technology using microcontroller and GSM phone line. The project worked automatically and hence reduced the manpower.

Nikesh Gondchawar et al. proposed "IOT Based Smart Agriculture" In this; the system was powered by photovoltaic panels and can have a duplex communication link based on a cellular internet interface that allowed data inspection and irrigation scheduling to be programmed through a web page.

III. VEHICLE DESIGN

The center of gravity of the robot body is kept below the axel; usually this is accomplished by mounting the batteries below the body. They can have their wheels parallel to each other, these vehicles are called bicycles, or one wheel in front of the other and tandem placed wheels.

Two wheeled robots must keep moving to remain upright and they can do this by driving in the direction the robot is falling. To balance, the base of the robot must stay with under its center Of gravity.

In this model we use three wheels and one DC motor which is connected to the back wheel. This model is similar to the four wheel robot only difference is that three wheel used in this robot.

In this project the seeding, ploughing and spraying mechanism system is connected mechanically by the back side of the vehicle.

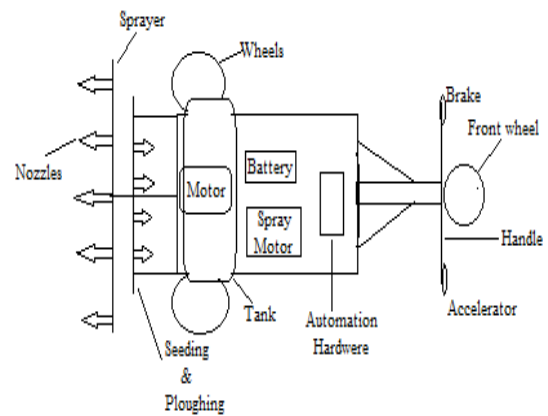Figure of four wheel robot with carrier is as shown below.

Fig 2 design of E-vehicle

Development of a robot that can perform ploughing and seeding operation can be manually & automated the spraying system by the farmer and stabilize the humidity in the environment. Robotics and automation can play a significant role in enhancing agricultural production needs Automation can be done by man in operations such as seeding, ploughing & spraying.

Hold the throttle with your right hand, with your wrist very high. Now, watch what happens if you quickly grab the front brake lever and squeeze. Chances are, as you applied pressure with your fingers, your thumb rolled down the inside of the throttle grip, rolling it on while you were braking.

Well, as the name suggest, they help you in adjusting the levers of the brake and the clutch. Basically, you can adjust the distance or the gap between the levers to the handle, or to put it in other words you can set the lever at a distance which is best comfortable for you.
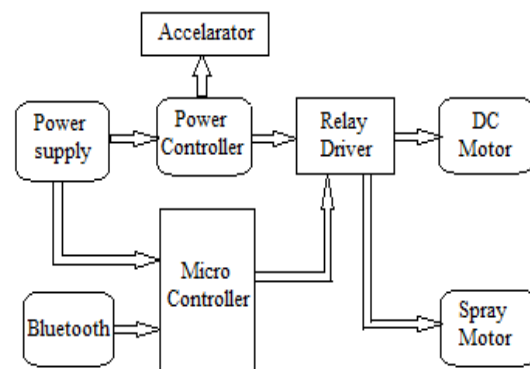
IV. GENERAL BLOC K DIAGRAM

Fig.3 Block diagram of E-Vehicle

1.   *Actual Design:*

Fig.4 Actual Design

2.   *Components Details:*
1. Power supply

Fig.5 power supply

This is an important block why because all the components require power supply to be operating. In or project 12v 12Ah battery are used. There are 4no.of batteries are used. This Micro controller requires +5v, relay requires12v and DC

Motors require +24v.the connection of batteries are connected in series and parallel. In the spraying motor a 12v battery is used and a voltage regulator in order to derive the required power supply for the micro controller i.e., 5v. And in the receiver as we require a maximum of 12v we are using a 12v battery to operate the relay. Again voltage regulator is used to derive 5v DC.

2. DC Motor:
Permanent magnet DC motor responds to both voltage and current. The steady state voltage across a motor determines the motor's running speed, and the current through its armature windings determines the torque.
Apply a voltage and the motor will start running in one direction; reverse the polarity and the direction will be reversed. If you apply a load to the motor shaft, it will draw more current, if the power supply does not able to provide enough current, the voltage will drop and the speed of the motor will be reduced. However, if the power supply can maintain

voltage while supplying the current, the motor will run at the same speed.
In this project we used one DC motors which are mounted on backward wheel shaft and the capacity of motor is3850 rpm.

Fig 6 DC Motor

3. Motor controller:

Fig 7 Motor controller

Motor speed controllers are electronic devices that control motor speed. They take a signal for the needed speed and drive a motor to that speed. There are a variety of motor speed controllers available.   DC Motor power op-amp speed controller.
Motor controllers are usually supplied with AC power. The power that comes in to a controller is at a set frequency. The motor controller first turns that AC to DC, then turns the DC back into AC at the right frequency. it uses a device called a rectifier to make DC current. Inside the rectifier are diodes which function like one way value, When the AC is in the negative half of its phase, a diode attached to a negative wire lets it through while another diode attached to a positive wire stops it. When the AC is in the positive half of its phase, the opposite happens and the AC flows down the positive wire. All the negative current is shunted into one wire and all the positive current is shunted into another one, making DC power.

4. PIC16F877A Microcontroller:

Fig 8 PIC16F877A Microcontroller

It is a 40 pin low power 8 bit microcontroller which is developed using CMOS technology. CMOS is an advanced technology which is mainly used for developing integrated circuit.

It comes with low power consumption and high noise immunity. This microcontroller based on AVR architecture which is belongs to Atmel mega family.

Depending on the Bluetooth application the controller will be transmitting the data. Here in this project we are using PIC16F877A microcontroller. The controllers play a major role in the project, there by the following description mainly focuses about pic microcontroller and its architecture because it is treated as heart of the project work. Today, there is no such instrument that can function without Micro controller.

5. Bluetooth module:

Fig.9 Bluetooth module

Bluetooth module is a PCBA board which integrated Bluetooth functions. Bluetooth module can be used in short-distance wireless communication, which can be divided into the module and Bluetooth voice module according to its usage.

HC-05 module is an easy to use Bluetooth SPP (Serial   Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

6. Spray motor:

Fig 10 spray motor

Sprayer pumps are mechanical devices designed to generate a pressure differential to drive spray fluid from a storage tank, through system plumbing, and out to the spray nozzle(s).

A sprayer is a device used to spray a liquid, where sprayers are commonly used for projection of water, weed killers, crop performance materials, pest maintenance chemicals, as well as manufacturing and production line ingredients.

V.   WORKING

Block diagram of e-vehicle for agricultural is shown above figure.The Robot contains components Bluetooth application, microcontroller, motor driver, battery, sprayer and spray motor, nozzle, tank etc. will work as shown in block diagram. The required pressure in the tank is maintained by motor controller.

Key board of Bluetooth apps works as transmitter. The Bluetooth transmits the wireless signal which is given to it. This signal is captured by robot which works as receiver by microcontroller. As robot senses signal through the wireless data then D.C motor will actuate and motors get revolution. Wheels which are connected through D.C motors shaft by using the chain. So as the motors get revolution the wheels are also rotate. Wheels are rotated as given order reverse, forward. Firstly burn the code into microcontroller IC using flash magic and switch on the power supply

The seeding and ploughing mechanical system is connected to back side of vehicle when the vehicle moves in forward direction then we takes the seeding or ploughing rod down in the earth manually and vehicle moves in same direction because of this the process will done by mechanically system.

Now send the command spray ON to the

relay driver using Bluetooth and microcontroller receive these commands which decides which relay is operated and takes the decision and to ON the spray on relay after that robot perform the spraying operation as per the given commands.

VI. CONCLUSION

Our ideas definitely will become advantageous when it will be implemented on practical and real time basis. Primarily on demo basis it looks somewhat costly, but in future it may become more usable when produced on large scale. It will also minimize the energy requirement, if we make use of convention energy sources like solar energy sources like solar energy, which looks costly today.

This type of machine reduces the highly skilled labor requirement. It also increases the accuracy and linearity in seed sowing and ploughing.

The robot for agricultural purpose an AgRo-bot is a concept for the near the performance and cost of the product once optimized, will prove to be work through in the agricultural spraying operations.

Traditional methods are much time consuming, this type of new inventions definetly reduces time requirement and increases the speed of operation.

REFFERANCE

[1]. Sahil Y. Shaikh, Prashant G. Salunkhe, Mayur S. Dhable, Danes. I. Sayyad. "Automatic Seed Plantation Robot", (IJESC), 2016.

[2]. Amrita A, Sneha. A, Abirami.E, Ankita.A. "Agricultural Robot for Automatic Ploughing and Seeding",2015 IEEE (TIAR 2015)

[3]. Shwethaand Shreeharsha.G. H. "Solar Operated Automatic Seed Sowing Machine",(International Advanced Research Journal of Advanced Agricultural Sciences and Technology,2015).

[4]. P.Usha, Dr. V. Nandagopal,"Design and Implementation of Seeding Agricultural Robot", (JIRAS).

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