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Agricultural Robot in Farming

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ABSTRACT: Current methods for off-road navigation using vehicle and terrain models to predict future vehicle response are limited by the accuracy of the models they use and can suffer if the world is unknown or if conditions change and the models become inaccurate .In this paper, an adaptive approach is presented that closes the loop around the vehicle predictions. This is applied to an autonomous vehicle known as field robots used in agriculture.

Agricultural Robotics is the logical proliferation of automation technology into bio systems such as agriculture, forestry, green house, horticulture etc. Presently a number of researches are being done to increase their applications. Some of the scientist contributions are mobile robot, flying robot, forester robot, Demeter which are exclusively used for agriculture. A brief discussion is being done about the types of robots which increase the accuracy and precision of the agriculture.

Experiments are being done on newly proposed world's smallest, weightless robot for using them as scouts in fields. Even in developing countries, such as India and Brazil, farmers are interested in using robots to tend fields of crops, pick fruit, or even maintain animal. At present time, agriculture robots must have human interaction in order to compensate for programming complexity issues.

KEY WORDS*:* Sugar cane cutter, Sprayer, Drier.

I. INTRODUCTION

A. About Auto Irrigation

Irrigation is the most important cultural practice and most labour intensive task in daily agriculture sector. Automation involves mechanism of all the industrial activities so as to improve the speed of production, reduction of cost, effective use of resources. Automation is the use of control systems such as computers, cell phones microcontrollers. The main objective of this project is to develop a microcontroller and Bluetooth module operated based system for irrigation purpose automatically.
In agriculture the opportunities for robot enhanced productivity are immense and the robots are appearing on farms in various bases and in increase in numbers. In this project we implemented robot performing agricultural operations autonomously such as spraying and sugarcane cutting.
From time immemorial, the Sun has been the prime source of energy for life on earth. The solar energy was being used directly for purposes like drying clothes, curing agricultural produce, preserving food articles, etc. Even today, the energy we derive from fuel-wood, petroleum, paraffin, hydroelectricity and even our food originates indirectly from Sun. Solar energy is virtually inexhaustible. The total energy we receive from the Sun far exceeds our energy demands. The idea of applying robotics technology in agriculture is very new.
The applications of instrumental robotics are spreading every day to cover further domains, as the opportunity of replacing human operators provides effective solutions with return on investment.

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B. The Current Status of Agricultural Robotics

Today agricultural robots can be classified into several groups: harvesting or picking, planting, weeding, pest control, or maintenance. Scientists have the goal of creating robot farms. All of the work will be done by the machines. The main obstacle to this kind of robot farm is that farms are a part of nature and nature is not uniform. It is not like the robots that work in factories building cars. Factories are built around the job at hand, whereas, farms are not. Robots on farms have to operate in harmony with nature. Robots in factories don't have to deal with uneven terrain or changing conditions.
Scientists are working on overcoming these problems.

C.Solution to the Problem

In this project we will be designed a multipurpose vehicle that will be able to cut the sugar cane, spray the pesticide and dry the seeds. We will be using an android smart phone application to control the vehicle to respond to the control signal. This type of vehicle instead of buying 2 or more machines to carry out the various functionalities, the farmer can get his work done by using single efficient multipurpose agricultural robot. We use four geared motors are connected to control the forward, backward, left, right Movement. One motor each is used for sugar cane cutter and seed drier.

II. LITERATURE SURVEY

In this paper the backpack sprayer is used it is a compressed air sprayer with a harness that allows it to be carried on the operators back it leads to the back pain to the operator. For cutting of sugar cane extra cutting operations are occurring i.e. it is costlier process. In order to eliminate the labour problem and to save the time of the farmer an agrobot is designed and which works on the Bluetooth module and the system is embedded. [1]

Energy demand is one of the major threads for our country. Finding solution to meet the energy demanding is great challenge for Scientist, Engineers. Now a day pesticide sprayer is operated based on fuel engine. This operation is more economical. In order to overcome this we found the new concept known as "Solar Pesticide Sprayer". In this pesticide sprayer is operated mainly based on solar energy and hence there is no need of any kind of alternative source. It has many advantages such as cost of spraying and also saving on Fuel/Petrol. There is less vibration as compared to the petrol sprayer. Hence the system can be easily operated there is no need of labours which increases the efficiency of farmers.[6]

III. BLOCK DIAGRAM

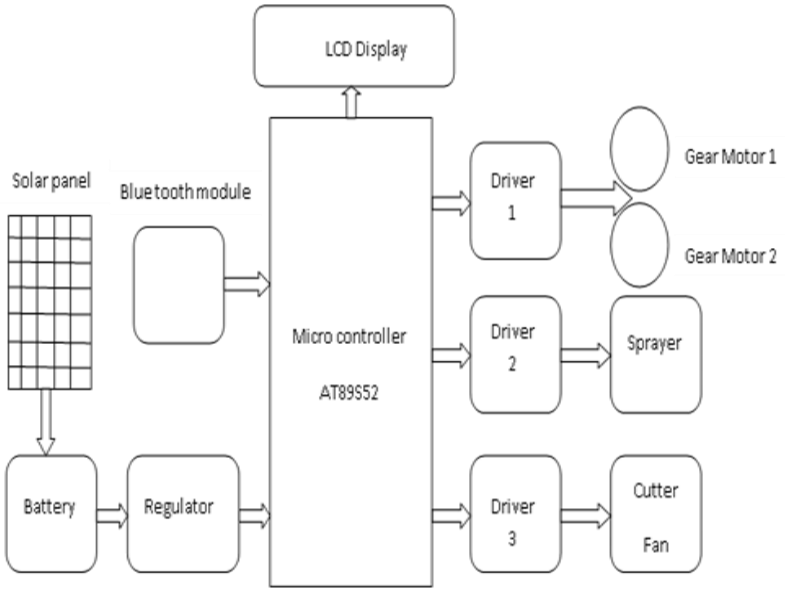

Fig. Block diagram

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A. Solar Panel
10 watt solar panel has been used the system to charge battery of 12 volts. Conventional power supply is also used to charge the battery when SPV fails to generate the required energy.

B. Battery
A 12 volts battery is used to store the energy from the solar panel as well as the conventional power supply to provide it to the system.

C/ Regulator
A 7805 IC Voltage Regulator is the IC's that are used to regulate voltage. IC 7805 is a 5 volts voltage Regulator. It steps down the 12 volts dc supply to + 5 volts which is drawn from the battery and provided to the microcontroller.

D. Microcontroller
The AT89S52 is an 8 bit microcontroller and controller board is a heart of the project. The complete activities of the controlling will be controlled by controller board.

E. LCD Display
The 16x2 display is used to display the operation of the Robot.

F. Bluetooth Module
A HC05 Bluetooth module is used for wireless communication. The Bluetooth module acts as an interface between the user and the Robot.

G. Driver Circuit
Here three driver circuits, and these are connected to the microcontroller, driver1 is connected to two gear motors, for the movement of Robot. Driver 2 is used for spraying operation. Driver3 is consists of two channels, channel1 is connected to the cutter and channel 2 is connected to the fan.

IV. SYSTEM DESIGN

A. System design

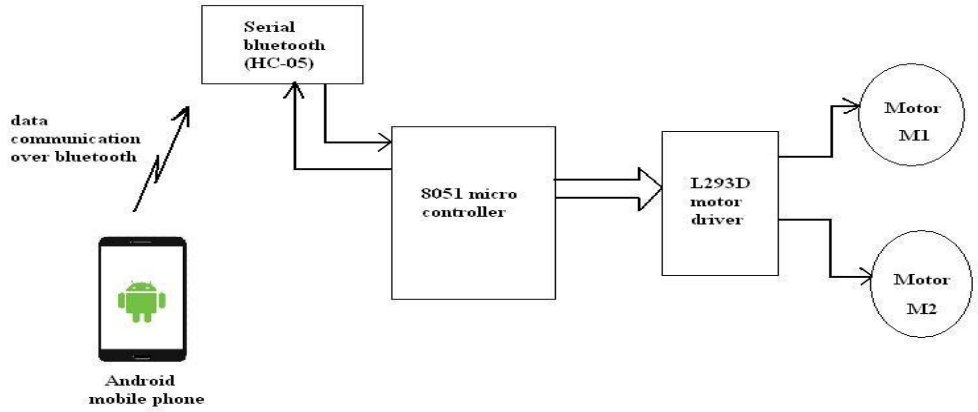

Fig. shows the overview of system

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The above fig shows overview of system interaction, central to which is the android smart phone which has the application installed. Depending upon the option selected by the user in the application, the corresponding id of the selected option is sent via radio frequency signals to the Bluetooth receiver on the agricultural robot. Based upon the id received the corresponding activity is performed.

B.Activity Diagram

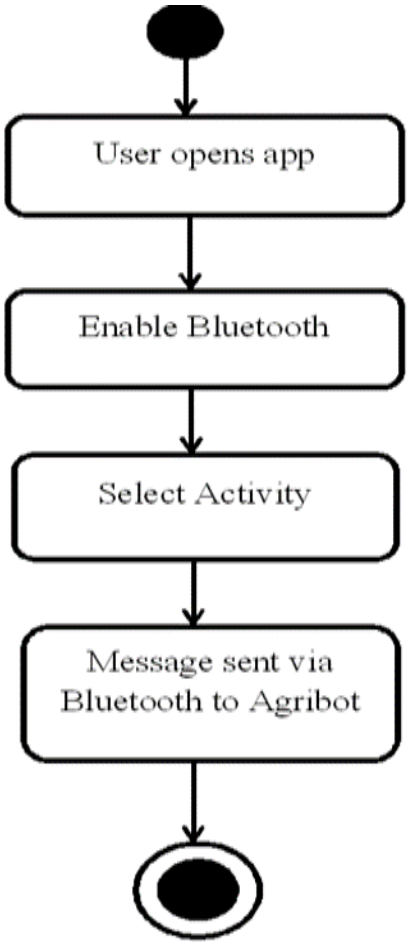

Fig. Activity Diagram at User End

The figure shows the activity diagram at user end. When the user opens the application, a message requesting Bluetooth to be enabled appears. Once the Bluetooth is switched on and the Agrobot is paired a list of activities appears. The user selects the desired activity and the id corresponding to the activity is sent to the Agrobot via Bluetooth.

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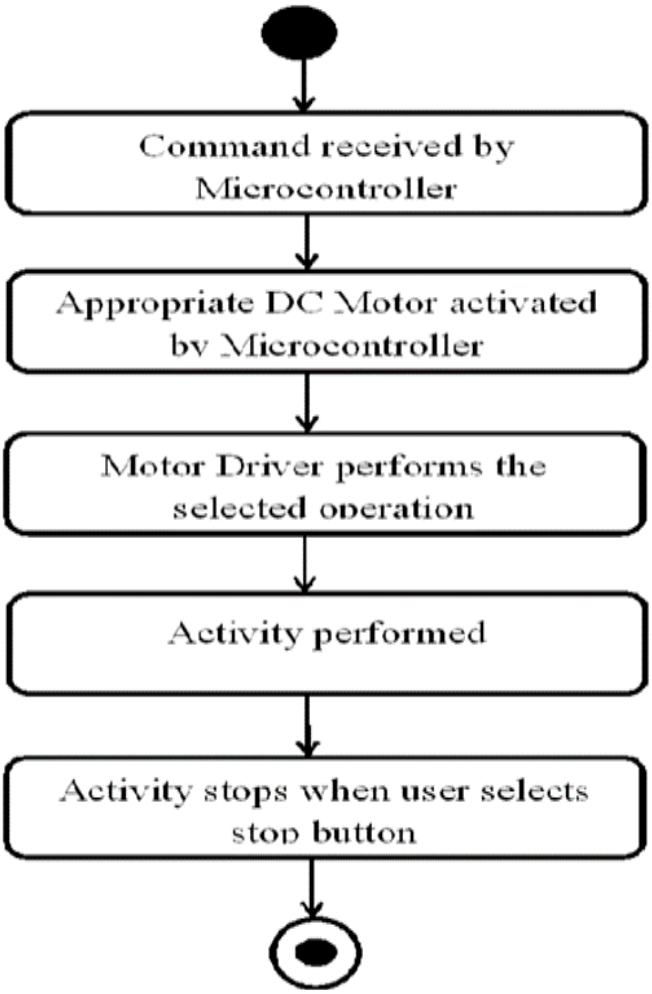

Fig. Activity Diagram at Agrobot.

As illustrated in the figure, the Bluetooth receiver at the Agrobot receives the ID (Identifier) passes by the user and passes the message on to the Microcontroller. Appropriate DC Motor that has to be activated is deduced by the Microcontroller. The Motor Driver activates the corresponding motor and performs the selected operation. The Agrobot now waits for the stop signal to be received in order to stop functioning.

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V. FLOW CHART

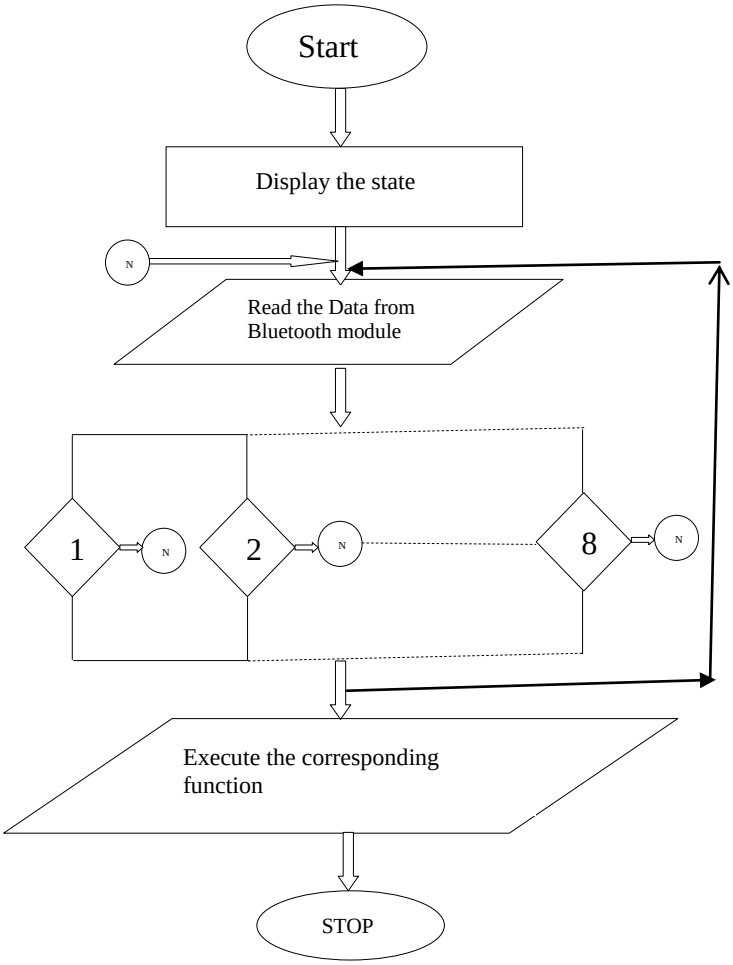

Fig. Flow chart

VI. ADVANTAGES

a. A single man can operate this robot.
b. Multipurpose operation.
c. Labour problem can be reduced.
d. It does not require frequent maintenance for this robot.
e. Energy required for the operation is free of cost i.e. solar.

VII. DISADVANTAGES

a. Cost is high.
b. Solar energy required only in summer season.

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VIII. APPLICATIONS

a. Sugar cane cutter.
b. Pesticide sprayer.
c. Drier

IX. FUTURE SCOPE

As far as future enhancements are concerned, this project has ample scope. As an extension to this initial prototype many sensors can be added to detect obstacles and make the robot smarter .A camera can be installed on the Agrobot and the application can be modified in order to display the field with a 360-degree view on the app as the robot moves. New technologies like ZigBee, Wi-Fi, IOT and Wi-Fi Smart can be used to have a large connectivity range. A pesticide sprinkler can be added along with a sensor that detects the quantity of pesticide required.
Automatic irrigation system can be mounted on the front side of the frame. System is human power hence we try to developing as an exercise machine. The whole system can be made by using solar system can be used to light a bulb.

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