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MULTIPURPOSE AGRICULTURE ROBOT BY USING SOLAR

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Abstract— This paper represent the design, fabrication, and development of solar operated agriculture robot. The robot can dig the soil, feed the seed, leveler to close the soil, and pump to spray the fertilizer. These all system works on battery and solar power. We here use an microcontroller circuit along with GSM modem, a DC motor, LCD display and required circuit to make this system. Approximately 50% of people in India work in agriculture sector. In this agriculture sector there is a lot of field work such as digging, harvesting, sowing, weeding, etc. And spraying is also an important operation in agriculture. Which to be perform by the farmer, to protect the crop form the pest, funguses and any other diseases. It is concept of investigating multi-purpose small machine which is more efficient than the large tractors and human forces. Due to this purpose we design and developing such a system with the following feature. Harvesting is the first step in farming after the completion of this step land is ready for the seed sowing, spray pump is used to spray the fertilizer.

Keywords—Solar Panne;DC Motor; Battery;GSM Kit.

I. INTRODUCTION

The agricultural has always been the backbone of India's sustained growth. As the population of India continues to grow, the demand for produce grows as well. Hence, there is a greater need for multiple cropping in the farms and this in turn requires efficient and time saving machines[1].

The idea of applying robotic technology in agriculture is very new. In agriculture the opportunities for robot enhanced productivity are immense and the robot is appearing on the farm in increasing number. We can expect the robot performing agriculture operation autonomously such as mechanical weed control, digging, weeding, seed sowing, and spraying.

The automation in agriculture could help farmers to reduce their effort and their working time.The automation in agriculture field could be more effective and efficient as compare to tradition methods of farming. So our focus will be on reduce labor cost, daily working hours, environmental all impact and safety issues and most important is to reduce farmer's effort.

II. LITERATURE REVIEW

This paper has set out a vision of how aspects of crop production could be automated in the future. Although existing manned operationscan be efficient over large areas there isa potential for reducing the scale of treatments with autonomous machines that may result in even higher efficiencies. The development process may be incremental but the overall concept requires a paradigm shift in the way we think about mechanisation for crop production that is based more on plant needs and novel ways of meeting them rather than modifying existing techniques[1].

This paper has presented the requirements and progress made towards achieving a future precision autonomous farming system. The system proposed is a relatively complex, although structured and hierarchical one, consisting of systems within systems. Importantly, there is a need to introduce strict structure into the system, aiding in autonomous operation. In turn autonomous operation further strengthens and maintains such structure. Another issue emphasized is the importance of integrating farm system, or Precision Agriculture, requirements, with robotic solutions for autonomous farming.

Central to this idea was the proposal of the implementation of the PFDS and PADS, and their strong interaction. The PFDS is primarily used for relaying spatial accuracy information for machinery navigation, while the PADS are used to communicate the agronomy information about, and requirements of, the crop[2].

The paper has presented that the requirements and progress made towards achieving a future precision autonomous farming system. The assembly is developed for cultivating ploughed land automatically i.e. no man power required. The project has consists of two different mechanism. The first mechanism contains making an assembly of vehicle and its motion, where as second mechanism is preparing a seed bed on ploughed land. The microcontroller is used to control and monitoring the process of system motion of vehicle. It is controlled with help of DC motor and servo motor. This system also detect obstacle present in path of the vehicle by infrared sensor. It is also used for sensing turning position of vehicle at the end of land. Because of no man power requirement and high speed of operation, it has scope for further expansion[3].

In agriculture the use of robots enhances the productivity and reduces the human effort and cost. The automation of various agricultural activities by robots are envisioned. It has been described that the present robot can perform better and can automate more than one work simultaneously. This robot can be effectively used by the farmers. In future this robot can be enhanced with some more cognitive capabilities and also to take appropriate actions even in the absence of the farmers. It can be induced with human interaction and also learning from experience[4].

III. OBJECTIVE

The objective of this paper is to present robotic model which is easily operates agriculture operation.

- Now a days it is necessity of automation in agricultural field to reduce the farmers efforts & labour cost

- To perform all operation. Like weeding digging seed sowing & spraying at a single time hence increase production & saves time.
- The farmer can operate robot very easily.
- Large amount of work completes in less time.
- For battery charging solar energy is to be used. The rays of the sun can be used for solar power generation.

IV. METHODOLOGY

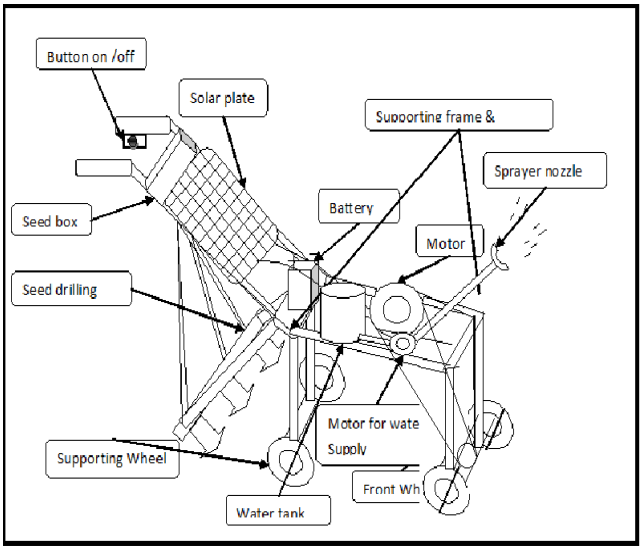

Fig. Schematic block diagram of solar operared multipurpose agriculture robot

The aim of our project is design and develops a multipurpose robot, which is used to reduce time and human effort. The operations are carried by a robot are harvesting, digging, seed sowing and leveling to close the soil and also sprayer to spray a fertilizer. These all operations are performed by using the battery and solar power.

- The frame of robot is made of Mild Steel (MS). The four wheels are connected to the frame, which are driven by using a DC motor.
- The front of frame harvester rotor is connected and this rotor is rotate by using DC motor.
- On the middle of frame three diggers are connected to dig the soil. The nut and bolt arrangement is used in the robot, by using nut and bolt up and down position of digger is done.
- Funnel is used to store the seeds. Three hoses are used to connect funnel and digger, into the hoses seeds are flow down with the help of low speed motor.
- At the end of frame the leveler is connected by using leveler the seeds are close in the soil.
- Sprayer is used to spray the fertilizer on the crops. Pump is used to spray the fertilizer and the pump is operated on the DC motor.

V. MATERIALS USED

A. Solar Plate

Max. Power:- 40 Watts
Max. Power Voltage:-17.7 V
Max. Power Current:- 2.26 A

B. DC Motor

Quantity:- 3
Voltage Required:- 12V
Speed:- 40 Rpm
Type:- Wiper motor, Fogging motor

C. Battery

Current : 7.5 Amp
Voltage Required : 12V

D. GSM Wireless Kit

We here use an microcontroller circuit along with GSM modem, a DC motor, LCD display and required circuit to make this system.
This system first allows user to configure a number from which to receive commands in configuration/settings mode.
The system thus allows to control DC motors over large distances.

VI. WORKING

A. Weeding Operation:-

Weeds are plants that growing places where they are not wanted. The can be cause damage because the crop is not ventilated well. And there is more chance on fungal attack.
A small rotor on which the curve shape blades are mounted to remove the weeds from soil.This rotor is operated by using a DC motor.
Weeding refers to the removed of weeds. Weeding only affects the soil minimally, which is beneficial to clear huge amounts of plants. Weeding is generally done manually rather than with mechanized equipment and also done regularly.

B. Digging Operation:-

There are three digger are used in digging operation. The diggers are mounted on the middle of the frame. Digger mechanism is used to digging and seed sowing. All the diggers are adjustable the diggers are connected to the frame by nut and bolt arrangement.
Holes are produced on the diggers. The funnel and diggers holes are connected by using the hoses.

C. Seed Sowing Operation:-

Seed sowing is the process of planting seed. Tradition method of seed sowing based on assumption of seed to seed sparing & depth of placement which is not efficient & it required lot of timed effort to. Some time it results in backache of farmer.

D. Spraying Operation:-

Spraying of pesticides is an important task in agriculture for protecting the crops from insects. Farmers mainly use hand operated or fuel operated spray pump for this task.
This conventional sprayer causes user fatigue due to excessive bulky and heavy construction.
Due to that reason we design and fabricate a model that is basically trolly based solar sprayer.

VII. FUTURE SCOPE

With fully automated farms in the future, robots can perform all the tasks like seed sowing, spraying, monitoring of pests and diseases, harvesting, etc. This also

enables the farmers to just supervise the robots without the need to operate them.
In future the robot also runs on PLC and SCADA with fully automation.

VIII. CONCLUSION

In agriculture, by using the solar operated multi-purpose robot. We can easily reduce the farmer efforts and time.
The machine required less man power and less time compared to traditional method. We hope this will satisfy the partial thrust of Indian agriculture.
So in this way we can overcome the labour problem that is the need of today's farming in India.

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