**SOLAR POWERED AUTONOMOUS MULTIPURPOSE AGRICULTURAL ROBOT**

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**ABSTRACT**

Agriculture began thousands of years ago and always plays a crucial as well as a progressive role in developing the nation’s economy. India is the second largest country based on the aspect of production output. There are some traditional methods such as seed sowing, grass cutting and pesticide spraying which are basically expensive and even time consuming. So, the agricultural system in the country needs an active encouragement in order to increase the production of resources with more conscious developments and projects resulting in less manpower and less consumption of time. Focusing on the main root, this project comes into light with the development of a robot that can be a long-term solution for the outbreak of maintaining all the tasks like seeding, ploughing and watering without any manpower. Digging into the root it is also encrypted with a soil sensor that can actively check the moisture in the soil. Tuning out the power backup it is embedded with rechargeable solar panels which constitute to low maintenance cost. In order to give the command and control the regular security, growth and service an android application is being developed with the help of software components like embedded C to represent a strong

connection with ESP32[microcontroller]. For providing massive bidirectional currents a L293D motor driver is also installed which is always ready to manage the high inductive loads. Going out with the flow there is also a DC motor which intensifies the force based on electromagnetic nature using six different parts which can create and manage loads at high efficiency with a smooth torque.

This robot gives an advantage of working in any condition in the agriculture sectors. Based on the instructions which are passed, the robot can rapidly increase the efficiency, productivity, quality as well as the consistency of the product. As long as there is a ray of sunshine this robot can be deployed anywhere since it is solar powered which can also lead to local job creation in fixing out the panels and boosting out the economy of the country. This robot powered machine also helps each and every farmer in the country by reducing the labour cost and even time can be saved.

**KEY WORDS:** Solar panel, Rechargeable battery, Microcontroller (ESP32), Soil sensor, L293D motor drivers, DC motors.

**1. INTRODUCTION**

We all know that Agriculture is the basic source for living species and 70% of our country depends on this to survive. We must understand and value farming and the way it’s done. Many methods have been exposed in the development of Agriculture and today our project helps in a technical method by using a robot. This robot is fast and the operation is easy, it also reduces the time and labour work. Human involvement is very less and the process will be done in a clear way. Here the robot gets energy from the solar panel and does all the work which is operated using wifi, which sends the sign to the robot, and for this we need to write a programme to operate. We use ESP232 which is low cost and low power with integrated wifi and Bluetooth. We also use a solar moisture sensor which is used to measure the moisture content and when the soil is dry it senses and The L293 is a 16-Pin Motor Driver IC, it is used to drive motors and can run two DC motors at a same time. This DC motors are categorised in many ways depending on its size and types. Basically, this is the combination of embedded systems, this embedded systems are controlled by microcontrollers or processors. Today lot of industries are using this systems for process control. This controls many devices nowadays and being so advance and common use. To save costs, embedded systems are frequently used and it has cheap microcontrollers**.**

**2. LITERATURE REVIEW**

As there are no efficient equipment’s to aid the farmers. There is a need for new

techniques to be implemented. Once the idea was formulated, design options were

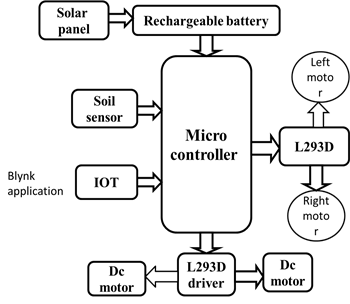
finalised. **Saurabh Umarkar and Anil Karwankar**, The process of seed sowing is a key component of agriculture field. For many crop varieties, high-precision pneumatic planting has been developed for a wide range of seed sizes, resulting to uniform seed distribution in seed spacing along the travel path. Wifi is used as receiver. Main disadvantage of the system is robot moves in only one direction. Whenever there is obstacle power supply is automatically turned OFF.

**M.D. I. Sujon, R. Nasir and Jayasree Baidya**, The agricultural researcher determined the effects of various seeding techniques and machines and also different rates of oil seed rape application on establishment of seed emergence

plant and final yield of grain. The robot will perform farming using analogy of ultrasonic detection in order to change its position. The main disadvantage of this system is, it does not work well on all types of soil.

**H. Pota R Eaton, J Katupitiya and S D Pathirana,** This concludes that bullock drawn planting becomes a necessity to sow as skilled sowing workers are almost decreasing. Planting distance and plant population are acute factors in maximizing the yield of crops. In this Microcontroller 8051 is used for communication between the input and output devices. The main drawback of this model is, it consists of only one mechanism. **S. Kareemulla, K Shaik, E Prajwal, B Mahesh, V Reddy**, The system benefits farmers in the basic operation of seed sowing. This machine’s operating mode is simple. It is possible to increase the total yield percentage effectively. Labour problem can be reduced. As compared to the manual andtractor based sowing time and energy required for this robot machine is less. Also wastage of seed is less. The disadvantage of model is, it consists of only one mechanism.The above research papers helped to understand the different aspects posed by the research on the agricultural robot. The robots designed in the above literature **s**urveys have many issues with movement of the robot and grass cutting. These problems are effectively addressed in this work. Three mechanisms are implemented in the designed robot unlike the robots designed previously. This works also throws light on the future scope of robots.

**3. IMPLEMENTATION**



Solar powered autonomous robot is constructed by programming the hardware components for ploughing, seeding, pesticide spraying and watering. The solar powered autonomous agricultural robot is placed on the ground, then the robot is controlled by giving the controls through an android mobile application. The commands are already available in the application we have to connect it through the esp32 module. The commands for controlling the motor inorder to move forward, backward, left and right. The robot also stops as soon as an obstacle is detected and the error message is shown in the android application. The controls for seeding, ploughing and watering are also available in the application. The soil sensor checks for the moisture in the soil, if the soil is dry the water is sprayed which is also indicated through an LED. The solar panel is used as a power backup for the robot.

**4. CONCLUSION**

The objective of this paper has been achieved

which was developing the hardware and

software for solar powered autonomous

agricultural robot. From observation it clearly

shows that it is easy to use, reduces man

power, accurate, precise, time efficient and

user friendly. The solar powered autonomous

agricultural robot has been developed

successfully and the functions of the robot can

be controlled precisely. This solar powered

autonomous agricultural robot is expected to

overcome problems such as physical work

which requires a lot of energy, wastage of

water as it doesn’t water the soil unless it’s

necessary and it is not just suitable for small

fields but also works just fine in larger lands.

By using this robot, farmer can save more time

and also reduce lot of labour cost.

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