

Solar Powered Seed Sowing Robot

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ABSTRACT— The design and development of the robot that can perform seeding process without any human intervention. The robot developed is capable of making a hole in the soil up to certain depth, placing the seed accurately in same hole and closing the mud. The process is controlled by a microcontroller. The robot developed overcomes the drawback in the traditional method of seeding which includes wastage of seeds, high labour wage, lower utilizations of land etc. by the application of automation and robotics in the field of agriculture it is possible to increase the overall efficiency of the agriculture process and can mitigate effects of labour shortage.

I. INTRODUCTION

Most countries in recent times lack sufficient skilled manpower, notably in the agriculture industry, it has a detrimental impact the growth of developing countries. The primary goal of automation in our country is to reduce manpower; the keyword in all industrial businesses generally refers to electrical, electronic and mechanical components. Automation eliminates a lot of time-consuming manual labour and speeds up production. As a result, it is the moment to automate the sector in order to solve the problem in India, 70% of population is reliant on agriculture.

Agriculture serves to be the backbone of Indian economy. It is very essential to improve the productivity and efficiency of agriculture by providing safe cultivation of the farmer. In the present scenario, most of the cities in India do not have sufficient skilled man power in agricultural sector and that affects the progress of developing country. Therefore, farmers have to use upgraded technology for cultivation activity (digging, seed sowing etc.). Seed sowing Machine which developed so far are operated manually or there is no Smartness of Work done by it expects seed sowing. Manual method includes broadcasting the seeds by hand. Sometimes method of dibbling i.e. making holes and dropping seeds by hand is used. Also, a pair of

bullocks is used to carry the heavy equipment of leveling and seed dropping. So, it's time to automate the sector to overcome this problem.

II. METHODOLOGY

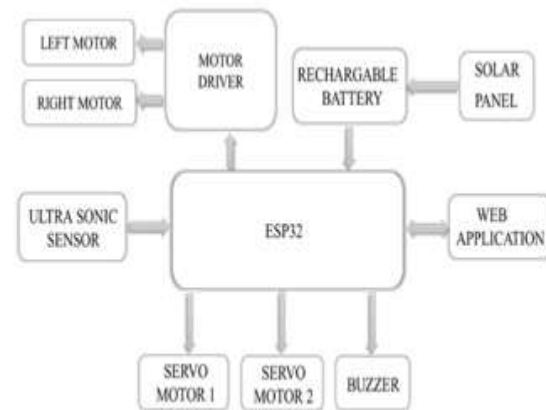


Fig.1. Block Diagram of Solar powered seed sowing robot.

The solar-powered seed-sowing robot is an advanced agricultural automation system designed to enhance efficiency in farming practices. At its core is the ESP32 microcontroller, serving as the central processing unit, orchestrating the functionalities of various components. The motor driver, controlling left and right motors, enables precise movement, allowing the robot to navigate through fields seamlessly. The sustainable operation is achieved through a rechargeable battery powered by a solar panel, harnessing solar energy during the day to power the robot during its tasks. An ultrasonic sensor ensures obstacle detection, facilitating collision-free navigation and enhancing safety in the field.

Integration with the Web Application provides remote control and real-time monitoring, allowing farmers to manage the robot's activities conveniently. Servo motors play a crucial role in the seed-sowing mechanism, ensuring precise and controlled deployment of seeds. Additionally, a

buzzer provides audible feedback, signaling specific events or issues. This comprehensive system combines renewable energy, intelligent navigation, remote monitoring, and precise seed deployment, making it an invaluable tool for modern and sustainable agriculture. The robot contributes to increased efficiency, reduced manual labor, and improved precision in seed sowing, aligning with the evolving needs of contemporary farming practices.

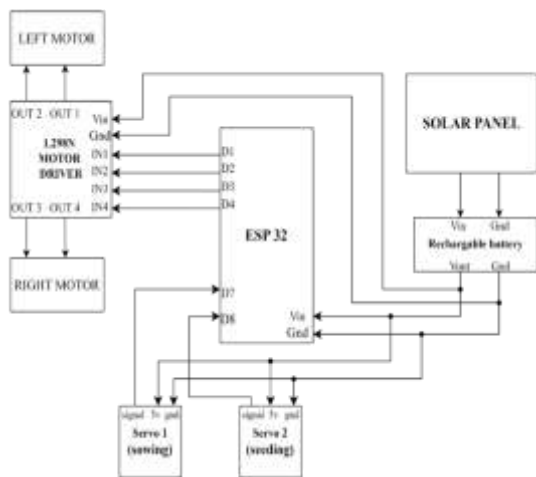


Fig.2. Schematic Diagram of seed sowing robot.

III. RESULTS

This Solar powered robot is used to sow the seeds at regular intervals. This is mainly aimed to make the work easier and effective. It thus helps the farmers to work effectively. This robot can work effectively at any soil. The robot moves with the help of motors that are fixed to the wheels, the motor runs with the help of Li-ion batteries that are fixed. This is an automated robot which is just monitored using the webpage. This robot is guided by the ultrasonic sensors which guide the robot through obstacles and the servo motor helps in sowing the seed at regular intervals. The robot need not be controlled it is an automated robot that is easy to use because it needs only to be monitored. It is user friendly and farmers can easily use these vehicles. This robot mainly emphasizes on sowing the seeds from a remote location without coming in contact with it directly.

The fig shown below is the final output of the project Solar powered seed sowing robot and with all the conditions explained in the sections with respect to components and also software description this Agri bot has been designed and constructed.



Fig .3. Side view of the Agri bot

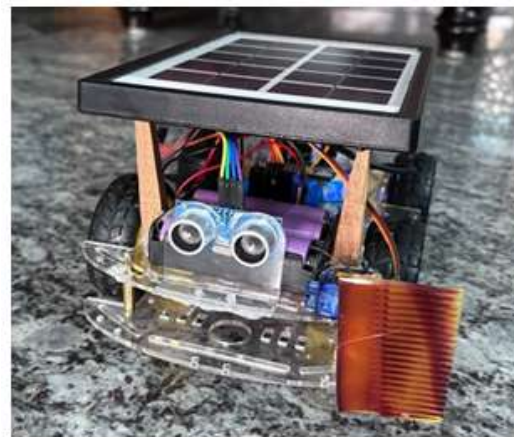


Fig .4. Front view of Agri bot

IV. ADVANTAGES.

- i. **Sustainability:** Utilizing solar power makes these robots environmentally friendly, reducing reliance on fossil fuels and minimizing carbon emissions.
- ii. **Cost-effectiveness:** Solar energy is a renewable resource, leading to reduced operational costs over time compared to fuel-powered alternatives, especially in areas with abundant sunlight.
- iii. **Autonomy:** Solar-powered robots can operate autonomously, requiring minimal human intervention once deployed, which improves efficiency and reduces labour costs.
- iv. **Versatility:** They can be deployed in various terrains and environments, including remote or off-grid locations, enhancing their applicability in diverse settings.
- v. **Precision:** These robots can be programmed to sow seeds with high precision, ensuring optimal seed placement for improved crop yield and resource utilization.

V. CONCLUSION

In conclusion, the solar-powered seed-sowing robot represents a significant leap forward in agricultural automation, integrating advanced technologies to streamline farming practices. Its utilization of the ESP32 microcontroller, motor driver, ultrasonic sensor, and rechargeable battery powered by solar energy ensures efficient and sustainable operation. The integration with the Web Application enables remote control and real-time monitoring, enhancing convenience and productivity for farmers.

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