Solar Based Agriculture Robot

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Abstract - As the population grows, so does food production, which requires better cultivation in the form of proper use of seeds, water and minimal use of labor. Nowadays, the agriculture sector is transforming into a technology where agricultural robots are used to save time and energy that is wasted for repetitive farming tasks, automation in farming process, etc., thus becoming useful. The agricultural robot is basically designed for multi-tasking such as sowing, plowing and sprinkling water. These are four-wheeled vehicles that are controlled by ATMEGA328P microcontroller as the main controller, IR sensor to detect obstacles and Bluetooth to control all tasks remotely, the power is provided by solar panel which is environmentally friendly. The purpose now is to develop smarter machines that are intelligent enough to work in unmodified or semi-natural environments.

Keywords **– Solar, IR Sensor, ATMEGA328P, Agricultural tasks, Bluetooth model.**

I. INTRODUCTION

In India almost some people are dependent on agriculture. Globalization in the agricultural system is less comparable in other areas, so it is necessary to bring progress in this area, the goal of the development of agriculture automation technology is the dwindling labor force, the reason is the need to improve the quality of food nowadays, agricultural operations are automated, and there are also commercially available automatic machines and robots for the design of the robot and two aspects need to be considered which are the main task requirement and the environmental conditions in which the robot has to work in agricultural operations. This Agro-Bot mainly performs three main functions in the agricultural field, i.e. plowing, sowing seeds and spraying water. These things are interfaced with ATMEGA328P and motion control programming. In the field of agricultural autonomous vehicles, the machines would be more efficient than traditional large tractors and human power. These vehicles should be able to operate 24 hours a day all year round, in most weather conditions. Moreover, such a system can have such an environmental impact if it can reduce the use of chemicals and high energy consumption, such as diesel and fertilizers, by better following stochastic requirements.

In developing countries like India, agriculture is the primary occupation. But currently, people's involvement in agriculture is declining for various reasons. It is increasingly important to improve efficiency and productivity in agriculture. We can perform various farming tasks using this project. Despite the extensive mechanization of agricultural areas in some parts of the country, most agricultural operations, a large number of parts are carried out by humans using simple tools and implements such as wooden plough, sickle, etc. There is little or no use of machinery. , sowing and sprinkling. This is especially the case for small or marginal farmers. The result is a great waste of manpower and lower returns per head of labor. For this, farming operations need to be mechanized, ultimately the wastage of labor can be eliminated and farming is convenient and efficient. We believe that some progress will be made by applying this agricultural area. Currently, agricultural practices in India are neither economical nor sustainable, and Indian yields for many agricultural commodities are low. Some farmers do not know technology in agriculture. Raise yields that not only alleviated hunger levels, but also freed the human population from the nutritional barrier to further growth, so continued growth requires further improvements in agriculture. So we need to find new ways to improve in the agriculture sector and make our country a better place to leave, India is an agriculture based country which is totally dependent on it so agriculture yield is 1/3rd of our national income.

II. PROBLEM STATEMENT

Traditional agricultural practices are highly dependent manual labor that is not only time-consuming but also requires a significant amount of physical effort. To solve this problem, there is a need to develop a solar-based agricultural robot that can perform various tasks in the field such as sowing seeds, sprinkling water, plowing with minimal human intervention.

Therefore, the challenge is to design and develop a solar-based agricultural robot that can perform various field tasks autonomously, effectively, efficiently, and sustainably to increase agricultural productivity and profitability while minimizing environmental impact.
can help in a rescue operation. By providing an effective and timely response, these systems can save lives, reduce injuries and mitigate the economic costs associated with accidents.

III. GOAL AND OBJECTIVE

1. To reduce the workload of farmers and ensure the efficient operation of the system and ultimately save time.
2. Use environmentally friendly energy, i.e. solar panel.
3. It is supposed to be controlled in centralized mode, so it can be controlled remotely.
4. Farmers can easily customize a budget-friendly solution.
5. To deal with and ensure proper passage in any weather.

IV. METHODOLOGY

A. Methodology of Problem Solving.
The Agri-Bot is basically based on a solar panel and works only on this because the energy received in the bots comes from solar energy, which is a renewable form of energy. While the Agri-Bot is performing its respective tasks, if an obstacle is hit, the bot will notice it, flash an LED to signal that it has identified the obstacle, and stop moving there. Also, by using this Agri-Bot, human intervention becomes minimal and most of the farming work can be done through an automated process.

System Diagram

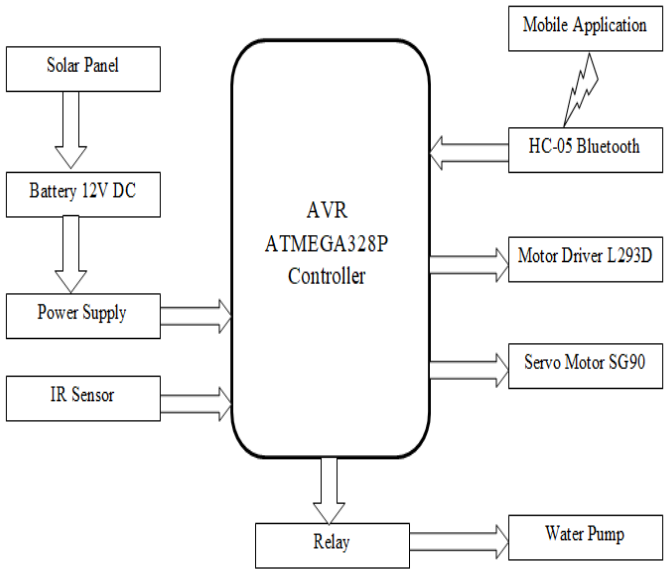

Fig. Block Diagram

The image above describes similarly:

ATMEGA328P Controller: The controller is the heart of the model which controls the operations like input output operations, connected sensor, solar panel, battery and execute commands.

Solar panel: The task of the solar panel in our project is basically to save electricity by using renewable resources.

Battery 12V DC: The battery is used to store backup energy, which may be taken from the solar panel.

IR sensor: The sensor is supposed to detect an obstacle if it encounters it.

Relay: Controls the model by switching to On/Off.

HC-05 Bluetooth: Bluetooth is used to remotely control the model through a centralized device.

B. Expected Result

1. The robot is expected to rotate adequately in all directions and perform efficiently.
2. The energy stored in the solar panels is expected to respond when needed.

3. The sensor should function properly whenever it encounters obstacles and react back.

4. Seed sowing, plowing and water sprinkling must be carried out by the robot whenever it receives commands to do so.

V. FUTURE SCOPE

A solar-based agricultural robot could have a beneficial future scope as it combines the benefits of renewable energy and robotics to overcome the challenges of agriculture.

Solar agricultural robots can be equipped with sensors and cameras to collect data on soil moisture, nutrient levels and crop health. This data can be used to create field maps, allowing farmers to make informed decisions about where and when to apply fertilizers, water and pesticides. This can help farmers optimize crop yields while reducing inputs and environmental impacts.

Crop monitoring and maintenance: Solar-based agricultural robots can be programmed to monitor crops and perform maintenance tasks such as watering, fertilizing and weeding. This can save farmers time and money and reduce the need for manual labor.

Autonomous harvesting: Solar farming robots can be programmed to harvest crops autonomously. This can be especially useful for crops that require delicate handling or are difficult to harvest by hand. Autonomous harvesting can also help reduce labor costs and increase efficiency.

Environmental Monitoring: Solar-based agricultural robots can be equipped with sensors that can monitor environmental factors such as air quality, temperature, and humidity. This can help farmers better understand their environment and make informed decisions about planting and harvesting.

Overall, the future of solar farm robots looks promising, with the potential to change the way we farm and address some of the most pressing challenges facing agriculture today.

VI. CONCLUSION

Solar-powered agricultural robots have huge potential to revolutionize agriculture by combining the benefits of renewable energy and robotics. These robots can collect data on soil and crop health and work enormously, reducing the carbon footprint of food in agriculture, adapting to different crops and fields, and becoming increasingly cost-effective overtime.

Overall, the future of solar farm robots looks bright and we can expect to see the anticipated innovation and progress in this area. By harnessing renewable energy and robotics, we can create a more sustainable and efficient agricultural system that meets the needs of farmers, consumers, and the planet.

VII. REFERENCES

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