MULTIPURPOSE AGRICULTURE ROBOT USING LORA

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ABSTRACT: **In excess of 70% of the population in India choose agribusiness as the primary occupation. In earlier days, farmers use traditional equipment to perform various activities in agricultural field that are difficult to handle. Farmers are facing many problems with old traditional equipment's, so agricultural system in India should be advanced to reduce the efforts of the farmers. There is need for finding the new ways to develop the efficiency of the agricultural tasks. In agricultural field, robotics plays an important role in helping farmers. In this paper, it is presented about that a single robot that perform multiple agricultural tasks. This proposed work aims at design and development of the robot for the operations such as seed sowing, Grass cutting and pesticide spraying. Battery is used for robot movement where battery gets charged using solar energy and this robot is operated using Lora which sends the signals to the robot for required mechanism. Lora (Long Range) is a new technology used for long distance communication. This increases the efficiency of seed sowing, pesticide spraying and grass cutting and also problem encountered in manual planting will be reduced.**

Index Terms-Agriculture, Robot, Lora, battery, solar panel.

I. INRODUCTION

Agriculture is the backbone of India. In India, Agriculture's history dates back thousands of years and defined by various climates, cultures and technologies. In order to bring down the efforts of the farmers in India agricultural system should be advanced. India has huge man power and manual planting is very popular in Indian villages where time consumption is more in manual planting. A manual work in farm requires heavy time & leads to more pollution. Automation technologies were used in agriculture field in order to overcome the major problems in India; such as availability of skilled labors, rising of input costs, lack of water resources and crop monitoring. Robot is mainly designed to perform the operation such as seed sowing, grass cutting and pesticide spraying. All the processes are advance to modifying the mechanism in farming which works automatically without the man power requirement. The system uses basic components like Solar panel, DC motor, Battery, Relay, Motor driver, Relay driver, Lora Module and micro controller. The complete process is controlled by microcontroller. Lora (Long Range) is a low power wide-area network protocol developed by semtech, USA. It is based on spread spectrum modulation techniques obtained from chirp spread spectrum technology. It was developed by cycles of Grenoble, France and acquired by semtech, the founding member of LORA alliance. It enables long-range transmissions with low power consumption. It can achieve data rate from 27 Kbps to 0.3 Kbps depending upon the spreading factor. Along with the technology development, there comes a challenge in implementing advanced technology in agricultural field. A good and relevant plan has to be developed for handling and processing a very large agriculture land.

II. RELATED WORKS

A survey has been done on the where farmers are facing many problems with manual process. As there are no well-organized equipment's to support the farmers. Modern techniques are need to be implemented.

Ranjitha B and Nikhitha M N [1], Solar powered autonomous multipurpose agriculture robot using Bluetooth/Android application. In the agricultural field operations such as seed sowing, grass cutting, ploughing was performed. Old traditional ways are very tough and the tools used for those operations are not comfort to handle. So, the agricultural system should develop in order to reduce the manpower and time. The main aim of this work is to design and development of robot where whole system is powered by solar energy. The robot is solar powered hence it is renewable

energy source. Robot is operated using Bluetooth which send signal for further operation. Arduino microcontroller is used to control the complete system. The main interest of the robot is to reduce the involvement of mankind but using Bluetooth, robot can be operated only for small distance.

S. Umarkar and Anil karwankar [2], this team developed automated seed sowing agribot using Arduino. Presently, changes in the environment of agricultural production is high in focus and demands. Thus, farmers have to use the advanced technology for cultivation tasks. This team aims at developing a system that minimize the cost of working, reduces digging time and seed sowing operation by using solar energy. Those solar panels are fixed to capture solar energy which will be converted into electrical energy that charges the battery, which gives the required power to shunt DC wound motor. Ultrasonic sensor and digital compass sensor were used with the help of the WI-FI interface operated on android application for the robotic movement. The innovative idea of this paper is that, the agribot perform different operations related to farming but also look up all the activities related to operation of agribot like obstacle detection, battery voltage and panel voltage and compass sensor output. This will reduce the dependency on labor. There are so many seed sowing methods, some are cost effective but more man power is required as well.

S. Kareem Ulla, and E. Prajwal [3], this team developed a GPS based Autonomous Agriculture Robot. This system is very helpful to farmers in the basic operation of seed sowing. This machine is very simple in the mode of operation. Total yield percentage is increased effectively. There can be reduced labour problem. As compared to seed sowing process by manual method and tractors, time and energy required for this robot is less. Also, there is less amount of seed wastage. The main drawback here is, it consists of only single mechanism.

Amer et al [4], a prototype for a multi-purpose agriculture robot to perform multi tasks was developed by this team. Robot can travel in all directions via its hexpad body structure and mechanism. Through Wi-Fi their robot is connected to the world, its on-board laptop connects to a Wi-Fi signal. The robot is connected to other robots and correlate tasks using Wi-Fi connection. The drawback of this robot is its Wi-Fi dependence. As the result, robot is limited to a small area where the Wi-Fi signal is available. This is an example of how deficiency of infrastructure and support would provide an agriculture robot impractical, no matter how good its design and performance are. In this work, it would be unsuitable to initiate Wi-Fi connections in the open fields, as Wi-Fi routers and cables would be revealed to the elements, power and high cost of maintenance.

III. PROPOSED SYSTEM

Transmitter section

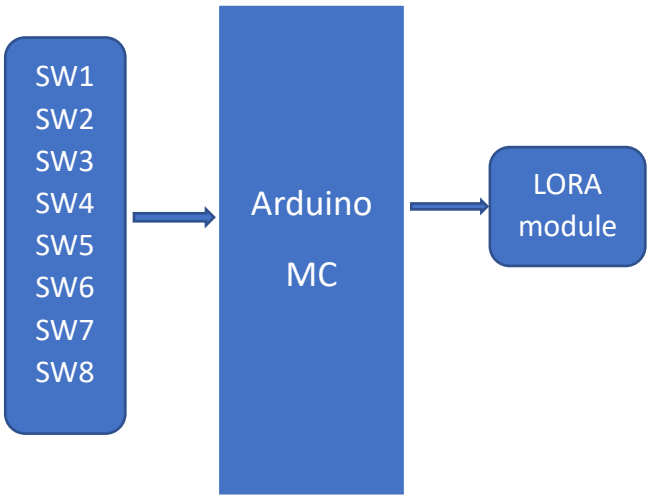

Fig 1. Block diagram of transmitter section

Receiver section

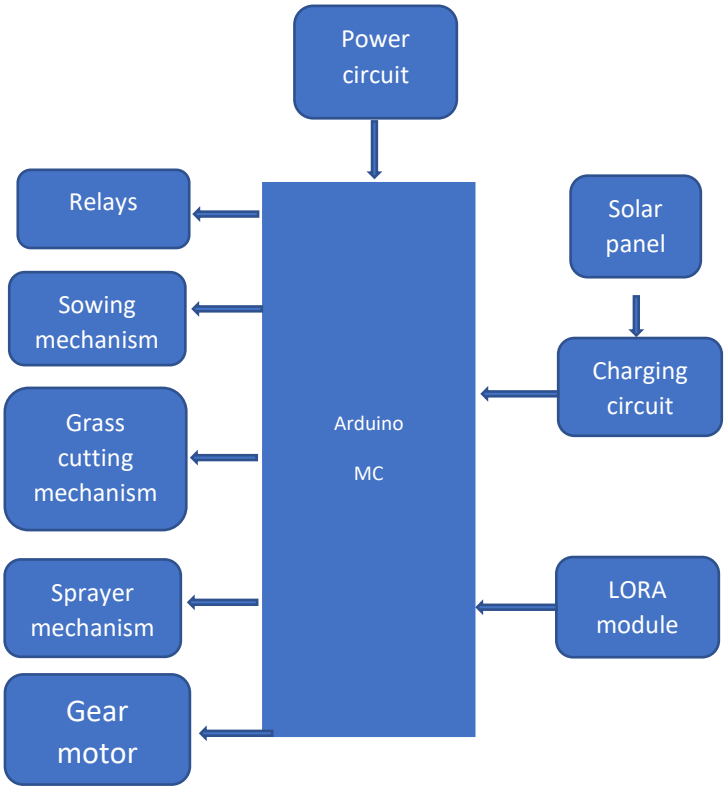

Fig 2. Block diagram of receiver section

Block diagram consists of Arduino micro controller, relays, motors, LCD for display and also LORA technology for communication between the Remote Control and the Robot. It is an Autonomous agricultural Robot. As soon as the users press the start button the robot will starts moving in the forward path. The robot starts moving in the forward direction after few distance it stops and then it starts sowing with the help of a mechanism designed along with grass cutting mechanism and spraying mechanism based on the requirement. There are Relays to control the different mechanisms that are designed as per the requirement. Through this arrangement the seeds are being dispensed in the soil, Unwanted weeds are cut and also pesticides can be sprayed. Until the user does not switches off the circuit the same series of steps continues. All these processes are displayed on LCD. The automated agricultural robot has significant potential to increase productivity. The structure handles the battery and the hardware mounted on robot which is able to execute every operation skillfully and victoriously. All the information collected from robot sent to receiver and controlled successfully. As we can perform multiple operations in a single system it grants an efficient system.

Table I: comparison of sowing techniques.

SR No.	**Parameters**	**Manual**	**Sowing using robot**
1.	Man power	More	Less
2.	Sowing technique	Manually	Automatically
3.	Adjustable seed distance	No	Yes
4.	Wastage of seed	Moderate	Less
5.	Time required	More	Less
6.	Alarm and display	No	Yes
7.	Pollution	No	No
8.	Energy required	High	Less

IV. CONCLUSION

The multipurpose agriculture robot gives an advance method to sow the seed, cut the grass and spraying the pesticide with less efforts. Robot can improve the quality of our lives and increase the opportunities for future mankind to create an advanced model for the improvement of farmers. The main concern of this paper is about the problems that are facing in agricultural field and bring about the solution by designing and developing the multipurpose agriculture robot. Compared to traditional methods the machine requires less human power and less time, so if we manufacture it on a large scale its cost gets significantly decreases and we hope this will assure the partial thrust of Indian agriculture. Due to the growth of industries the people moved to cities so the availability of the labour is decreasing and the demand for stipend will also increase which becomes unaffordable for the land owners. A robot is designed to reduce the man power which makes the work easier for farmers. The robot is operated for the movement and mechanism needed using the charged battery that gets charged using solar energy. Human can be replaced by the proposed robot to some extent to perform the operations such as seed sowing, grass cutting and pesticide spraying that can be operated for long distance using the lora technology. This work got an important role in reducing the labor problem and also save more time which is the main need of today's farming in India.

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