SOLAR POWERED MULTIPURPOSE AGRIBOT USING ANDROID PHONE

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Abstract

In India nearly about 70 percentage of people are depending on agriculture. Numerous operations are performed in the agricultural field like seed sowing, grass cutting, ploughing etc. The present methods of seed sowing, pesticide spraying and grass cutting are difficult. The equipment's used for above actions are expensive and inconvenient to handle. So the agricultural system in India should be encouraged by developing a system which will reduce the man power and time. This work aims to design, develop and design of the robot which can sow the seeds, cut the grass and spray the pesticides, this whole system is powered by solar energy. The designed robot gets energy from solar panel and is operated using Bluetooth /Android App which sends the signals to the robot for required mechanisms and movement of the robot. This increases the efficiency of seed sowing, pesticide spraying and grass cutting and also reduces the problem encountered in manual planting Keywords: Agriculture, autonomous, grass cutting, pesticide spraying, robot, seed sowing, solar powered

Introduction

The history of agriculture spans thousands of years, and various climatic conditions, cultural traditions, and technological advancements influenced and shaped its growth. The agricultural system therefore should be improved to lessen the farmers' labor. The model created to mechanically plant seeds and spray Using pesticides and cutting the grass. Automation is required for safety and health of workers especially when worker have to perform harmful duties. Some of the previously developed robotics applications are Crop Seeding it involves autonomous precision seeding combines robotics with geo mapping. Crop Monitoring and Analysis is provided by drone companies like Precision Hawk offers farmer combined packages which include robotic hardware and analysis software. Other applications are Fertilizing and irrigation system, Crop weeding and spraying system, Autonomous tractors, Picking and harvesting system. The prototype is an example of modern technology for enhancing agricultural processes, including planting seeds, trimming grass, and applying pesticides based on robotic support.

Main features of Indian Agriculture

Agriculture is the main occupation. It provides employment to nearly 61% persons of total population. It contributes 25% to national income. Dependence on monsoon: Agriculture in India mainly depends on monsoon. If monsoon is good, the production will be more and if monsoon is

less than average then the crops fail. As irrigation facilities are quite inadequate, the agriculture depends on monsoon. Labour intensive cultivation: Due to increase in population the pressure on land holding increased. Land holdings get fragmented and subdivided and become uneconomical. Machinery and equipment cannot be used on such farms.

Under Employment

Due to inadequate irrigation facilities and uncertain rainfall, the production of agriculture s less; farmers find work a few months in the year. Their capacity of work cannot be properly utilized. In agriculture there is under employment as well as disguised unemployment.

Small Size of Holdings

Due to large scale sub-division and fragmentation of holdings, land holding size is quite small. Average size of land holding was 2 to 3 hectares in India while in Australia it was 1993 hectares and in USA it was 158 hectares.

Traditional Methods of Production

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Low Agricultural production

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Dominance of Food Crops

75% of the cultivated area is under food crops like Wheat, Rice and Bajra, while 25% of cultivated area is under commercial crops. This pattern is cause of backward agriculture.

Major Challenges Faced by Indian Agriculture
Stagnation in Production of Major Crops

Production of some of the major staple food crops like rice and wheat has been stagnating for quite some time. This is a situation which is worrying our agricultural scientists, planners and policy makers. If this trend continues, there would be a huge gap between the demand of ever-growing population and the production.

High Cost of Farm Inputs

Over the years rates of farm inputs have increased. Farm inputs include fertilizer, insecticide, pesticides, HYV seeds, farm labour cost etc. Such an increase puts low and medium land holding farmers at a disadvantage.

Soil Exhaustion

Soil exhaustion means loss of nutrients in the soil from farming the same crop over and over again. This usually happens in the rain forest.

Agriculture is a very important sector in Indian economy. Most of the livelihood in India depends on agriculture. As the knowledge-based farm labours are less, the requirement for them is high and their wages are increasing. Traditionally farming is done by human being with the help of bullock carts, tractors and tillers etc. The main problem in agricultural field includes lack of labor availability, lack of knowledge regarding soil testing, increase in labor wages, wastage of seeds and more wastage in water. The idea of applying robotics technology in the field of agriculture is very new. In agriculture, the opportunity for robot-enhanced productivity is more and the robots are appearing on farms in various guises and in increasing numbers.

Solution

In recent years there are many agricultural robots which can perform only single or dual tasks. We are improving the robot by designing a agricultural robot for spraying water, seeding, mulching and cutting operation. More than 42% of the total population in the world has chosen agriculture as their primary occupation. In recent years, the development of autonomous vehicles in agriculture rational and adaptable vehicles. In the field of agricultural autonomous vehicles, a concept is being developed to investigate if multiple small autonomous machines are more efficient than traditional large tractors and human force. These vehicles should be capable of working round the clock all year round, in most weather conditions and have the intelligence embedded within them to behave sensibly in a semi-natural environment over long periods of time, unattended, while carrying out the useful task. There are a number of field operations that can be executed by autonomous vehicles, giving more benefits than conventional machines.

Existing System

Many agriculture operations are automated nowadays and many automatic machineries and robots available commercially. Some of the major operations in farming which are under research and automation are seeding, weeding and spraying processes. When it comes to designing a robot for automating these operations one has to decompose its idea into two considerations which are agriculture environment in which robot/system is going to work and precision requirement in the task over traditional methods. Based on this for seeding process, considerations which are taken into account in terms of environment are robot must be able to move in straightway properly on bumpy roads of farm field, soil moisture content may affect the soil digging function, sensors to be selected for the system must be chosen by considering farming environmental effects on their working.

Literature Survey

The automation in the agriculture could help farmers to reduce their efforts. The vehicles are being developed for the processes for Ploughing, seed sowing, Grass cutter, Sprinkler. All of these functions have not yet performed using a single vehicle. In this the robots are developed to concentrate in an efficient manner and also it is expected to perform the operations autonomously.

This idea implements the vehicle to perform the functions such as ploughing, seed sowing, grass cutting an water spraying. Energy required for this machine is less as compared with tractors and agricultural instrument pollution is also a big problem which is eliminated by using solar plate. As there are no efficient equipment's to aid the farmers. There is a need for new techniques to be implemented. Three mechanisms are implemented in the designed robot unlike the robots designed previously. This work also throws light on the future scope of robots

Implementation of Algorithm

The flow chart explains the algorithm of automated seed sowing, grass cutting and pesticide sprayer robot using Bluetooth /android app.

Algorithm for the robot is as follows
Step 1 : Start.
Step 2 : power on.
Step 3 : Bluetooth ready.
Step 4 : forward command received-robot move forward.
Step 5: backward command received-robot move backward.
Step 6 : left command received-robot move left.
Step 7 : right command received-robot move right.
Step 8 : seed command received-seed motor on.
Step 9 : sprinkler command received- sprinkler on.
Step 10 : grass cutter command received- grass cutter on.
Step 11 : stop.

Working of Agribot

Four DC motors are used for driving the four wheels of vehicle. These four motors give the directions like forward, backward, left and right For these directions of movements we used two DPDT switches. If we have press two switches at a time front side, then the robot will move forward. If we have to press two switches at a time back side, then the robot will move backward direction. If we have to press one switch is front side and another switch is back it will make a turn. If you do not press any switch the robot should be in stable condition. V-shaped arms for Agrobot are used, closing of which will dig the soil and opening of it will release the soil to cover the pit. DC motors of arms and wheels are directly connected to DPDT switches to enable them rotating in both clockwise and anticlockwise direction. Seed tank and water tank are connected for storage of seeds and water respectively. A DC motor is connected for rotating wheel mechanism to drop the seeds. Submersible entirely waterproof DC water pump is used for pouring the water.one more DPDT switch is required for performing both seeding and watering operations. Input of crop type is given manually by selecting one of the four input switches. We are using an X principle while connecting the DPDT switch. This principle gives the both directions to the motors when we are using throwing two directions.

Results

The planned robot will simultaneously carry out the tasks of seeding, applying pesticides, and cutting the grass. Heat from the solar panel turns sunlight into power. The charging circuit receives this electrical energy. In order to provide pulsed voltage and prevent reverse current, the charging circuit will operate in accordance with the maximum power point tracking (MPPT) protocol. To charge the battery, the pulsed voltage is applied. Voltage sensors are used to manage the battery's charge. Due to its bidirectionality, the battery can charge and supply voltage to the Arduino simultaneously. High pass filtering is used to feed the voltage source with continuous oscillation into Arduino. All separate mechanisms receive voltage feed via the channel relay. The DC motors that power the robot are driven by the motor driver.

Conclusion

To carry out difficult farming activities including seed sowing, grass cutting, and pesticide spraying, an autonomous multipurpose agricultural robot is created. Two different sized seeds are to be sown using this work. Reduced human interaction and effective resource use are two advantages of robots. Since the robot is solar-powered, renewable energy is being used. Android apps are used to carry out the tasks. Innovative equipment for grass cutting, spraying pesticides, and spreading seeds has a big impact on agriculture. Farmers can save a lot of money on labour and more time by adopting this advanced job.

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