Analysis On Multitasking Based Solar Powered Robot System

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ABSTRACT

The main objective of making this robot is to supply farmers with an affordable, compact, multi-use robot. It's a multiple task Robot uses solar energy in different operations, including the cutting, sprinkling, plouging and seeding of grass, fertilizer and pesticide in farms. The ultrasonic sensor also includes an obstacle detection sensor to indicate the user. It also gives an indication of Beep Sound on the robot side. The direction to move the robot is recommended. We have two control systems in our project, namely field control and robot control. When controlling the soil moisture, temperature and humidity on the field, appropriate sensors are used, the field is controlled by appropriate actions and the information is updated by an application to the farmer. Crop robbery by human beings and animal attacks in the farmland lead to severe farm losses. We can use PIR sensors and use an image processing technique to detect intruder detection in agricultural fields. In general, in agricultural fields, fire occurs naturally, which is inflamed with sunlight or heat. Therefore, we design a fire extinguishing system in the field very soon. The robot control has a camera that allows a live field view so that we can monitor everything while it performs its basic operations. The entire robot and the manual control mode by the farmer can then be switched to the automated mode for complete control over the farm. In order to control pest and weed attacks on the field, the robot sprays pesticides and weeds. In addition, the solar panel above the vehicle can recharge the battery. This ensures that the energy source is environmentally friendly and prevents the vehicle from being charged frequently

Keywords
Solar panel, Microcontroller, control systems, PIR sensor, solar panel, microcontrollers

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Introduction

Ploughing could not easily be carried out in the early days of cutting grass. It was uncomfortable to move the grass cutters and plough powered by a standard motor. In old models, an engine-operated grass cutter created at the same time noise pollution and air pollution. Although solar electric grass cutters and ploughs are environmentally friendly, they can be uncomfortable.

Electric grass cutter are dangerous as well as engine powered plough, and not easy for everyone to use. Solar-based multi-task agricultural robot is a solar-powered robot that cuts grass, plugs and sows by a high-speed engine. As its name implies ‘multitasking’, so along with grass cutter it also provides fertilizer and pesticide spraying, ploughing and sowing.

The system uses 12V batteries to drive both the movement of the vehicle and the engines used in all four operations. In addition, a solar panel is used to charge the battery so that no electricity supply means are needed to charge the battery externally. The grass cutter motor, ploughing motor, seeding motor vehicle motors and even a motor to which a fertilizer tank is connected are interfaced with PIC18F4520 which controls the working of all the motors. Here five relay modules are used one for operating all motors. It is also interfaced to a wireless protocol called ZigBee through which the vehicle is commanded to go forward, backward, left and right to perform recommended operations.

Overview

Control and monitoring are based on the internet of things, which enables the current status of the field to be monitored and controlled via internet from everywhere in the world.

We have two control systems in our project, namely field control and robot control.

The ground moisture is sensed by the appropriate sensors when controlled on the field and the information is updated to the farmer via an app.

The robot control comes with a camera for a live field view

We are using ultrasound sensor for robot navigation and obstacle avoidance.

The entire robot and the manual control mode by the farmer can then be switched to the automated mode for complete control over the farm.

In order to control pest and weed attacks on the field, the robot sprays pesticides and weeds.

The solar panel above the vehicle can recharge the battery.

This ensures that the energy source is environmentally friendly.

Literature Review

Not only more productive farms and agricultural processors are needed for a competitive agriculture sector, but also a more efficient agricultural distribution system. This especially applies to the Philippines as a thousand-island archipelago of which only a few are as large as possible to produce farms that save on processing. Thus, the Philippine agriculture is far more fragmented and vulnerable to the

inefficiencies and vagaries of the country's distribution system than Vietnam or Thailand or the Peninsula of Malaysia. The state of the Philippine agricultural distribution system is familiar with lamentations; that is, bringing maize from Bangkakh to management from Cotabato is cheaper than bringing maize from Cotabato to Manila. A fragmented agrarian economy is illustrating this familiar lamentation.

Almost 70 percent of Indians are agriculturally dependent. Globalization in the agricultural system is less than in other areas. Therefore, progress in this field must be made. It is not a replacement for the idea of robotics (farming conditions maintained by good machinery). Several engineers in the past have built driverless tractors, but they do not need to flourish because they have no flexibility in maintaining the complexity. Agricultural automation technology develops mainly through decreasing labor forces, which is a common phenomenon in the developed world. The reasons why food quality needs to be improved. A daily farming is now automated and automatic machinery and robots are commercially available. For the design of a robot, one has to take two considerations into account, which are precision and environmental conditions for the robot to work in order to automate farming. The robot should move in immediately and be able to alter the distance between seed drop in order to perform the seeding procedure. The soil moisture content can influence the digging process; process sensors should be selected to complete according to the working conditions of the environment.

Almost 70 percent of Indians are agriculturally dependent. Globalization in the agricultural system is less than in other areas. Therefore, progress in this field is necessary. The idea of robotic farming (farm environment maintained by good machinery) is not a substitute. In the past, many engineers developed driverless tractors but they didn't have to flourish because of the flexibility to maintain their complexity. Agricultural automatic technology is mainly driven by decreases in labor power, a common phenomenon in the developed world. There are reasons why food quality should be improved. A daily farming is now automated and automatic machinery and robots are commercially available. For the design of a robot, one has to take two considerations into account, which are precision and environmental conditions for the robot to work in order to automate farming. The robot should move in immediately and be able to alter the distance between seed drop in order to perform the seeding procedure. The soil moisture content can influence the digging process; process sensors should be selected to complete according to the working conditions of the environment

.**Table 1** Comparison of proposed model with same model available in market

Sr. No.	Old Model	Proposed Model
1.	This system is controlled by using only one controller i.e Arduino.	In this system two controllers are used one for robot and another one for remote.
2.	To select the particular function of robot manual switches are use they are built on Robot body.	Remote is use for controlling the function and moving the robot for particular direction joystick is use.
3.	There is no obstacle detector.	Ultrasonic sensor is use to detect the obstacle and buzzer use for indication.
4.	Human can drive the robot.	Robot itself moves only functions are selected through the user.
5.	Rechargeable battery use for power supply hence electricity required for charging the battery.	Solar powered rechargeable battery use for power supply hence the electricity charges are reduced.

Methodology

This multipurpose agricultural robot is designed for farming and lawn purpose. Our machine can operate wirelessly and can be controlled manually, perform various functions as well. In this project, we require solar panel, charge controller, battery, sprinkler, relay, IR sensor, blades for grass and plant cutting. This machine performs all the functions stated above, with the help of push buttons. We have utilized solar energy as a source to battery which will supply power to equipment. This machine make move with the runner wheels operated by remote and ideal wheels help the robot to do complete movement.

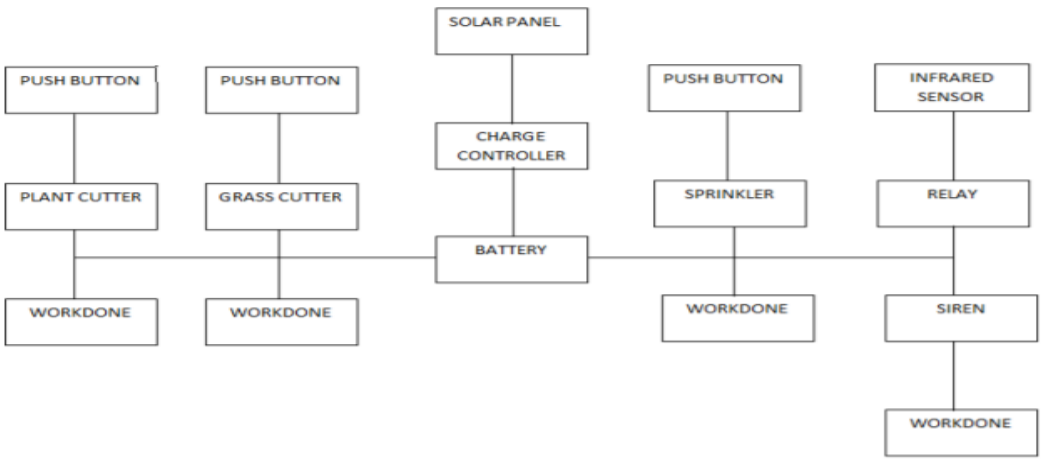

Fig -1: Block diagram

.As shown in the block diagram, solar panel receives solar energy from Sun and store in battery. These battery supply powers to the equipment are sprinkler, IR sensor, grass cutter and plant cutter and are operated by remote. This project costs approx. Rs.8, 860. In future this machine can be made to work wireless. As the proposed system is a prototype model, more functions can be inserted to it to work efficiently. In wireless model, IR sensor can be rotated 360 degree to detect the obstacles by placing it in the middle of the farm. It is a single, multifunctional machine can be the remedy against the tremendous labor work done by farmers.

The robot also measures the farm's temperature and humidity to monitor the area. PIR (passive infrared sensor) is used by the field control to detect the movement around the field. However, a more reliable setup to identify the intruder is necessary for theft or intruder detection. In order to detect and identify the intruder and to warn the farmer, the image is recorded and analyzed. The system also ensures that no warning is given when the farmer or another authorized person comes on the spot.

i. Motion Control

Four DC gear engines (12V) can be used for motion control purposes. The driver circuit can be connected to the dc motors. The low input signal is converted into high input signal by the motor driver. For high torque, the dc gear engine is used. The raspberry pi, which in turn drives the motor, controls the motor driver. The picture processing algorithms can be used autonomously by the
locomotion. They can also be controlled manually in app.

ii. Seed sower

In this section, we are designing and manufacturing a fully automated sower that works when the user turns on the sower button in the application. It has a collector in the shape of a funnel that leads the seeds to a wheel. The engine is linked to the shaft containing a little bracket to powder seeds on a wheel. The sower begins to implant seeds into the ground when the switch is enabled. That ensures that seeds on the field are implanted evenly.

iii. Harvester

A rotational blade cuts the crop while the bot is moving. It is a set-up. A high-speed engine is used to run the blade, ensuring that the crop is smoothly cut. This setup is ideal for paddy and wheat for commercial crops.

iv. Monitoring

It has a camera that provides a live view of the field so we can track everything in and around the field while it performs its basic operations. It serves as an eye for IoT device access. For monitoring and controlling the field, additional sensors like humidity, temperature and humidity sensor, PIR sensor and fire sensors are used.

Results And Discussion

Paddy, wheat and other fields are possible for this project. The connected field can be fully controlled and monitored. The farmer can use the internet to control the field from home or anywhere in the world.

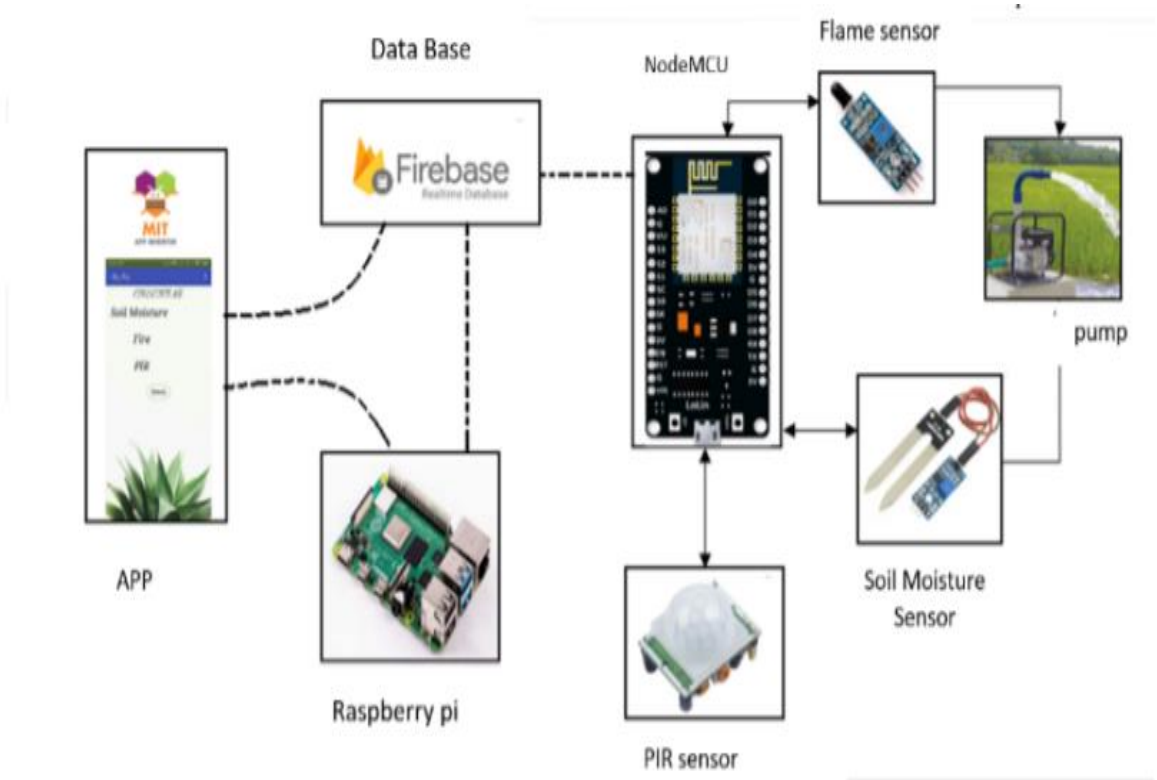

Figure 2: field execution block

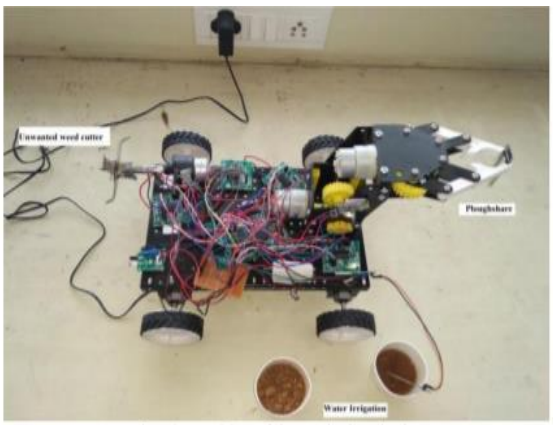

Fig 3: Working of the Agricultural robot.

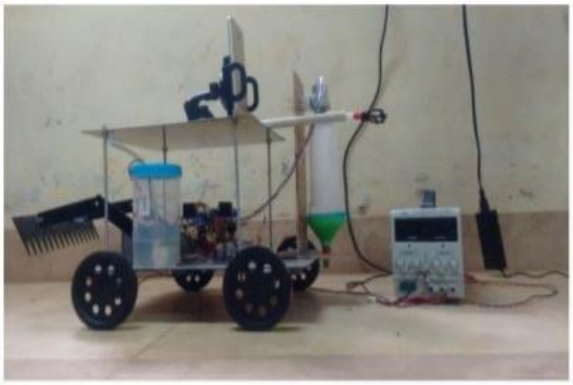

Figure 4: multi-tasking robot

The field execution block (fig: 4) shows how the field control technique is executed. The ESP8266 module that regulates field configuration is the NodeMCU. Three sensors in the field are available - PIR, soil humidity sensor and fire sensor. Field setup information is sent to the cloud and stored in a Google Firebase that is an online database in real time. Both the app and the robot (raspberry pi) can use the values stored in the database to manipulate them further.

Conclusion

The automated robotics machine called "Agro-Bot" is designed to make it easier for farmers to meet food demand. Better results than the manual system are used by the agricultural robot. It is an automated robot that operates on the basis of the field size, seed size and mode. This robot can be controlled with an algorithm for farmers' comfort and interfaced with a difficult board. This robot is expected to change the farming trend from manual to automated in the coming days. Successful implementation and testing for various functions like plugging, seeding, grass cutting and water spraying was carried out by the multi-tasking agricultural robot. It was developed using C programming to integrate agricultural robot. Multi-tasking agricultural robots have the advantage of reducing human intervention, ensuring adequate irrigation and efficient use of resources

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