SOLAR BASED GRASS CUTTING ROBOT

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Abstract: -*Power consumption now becomes very essential for future. Solar grass cutter is a very useful device which is very simple in construction.A Solar grass cutter is a machine that uses blades to cut a lawn at an even length. Even more devloped devices are there in every field. It is used to maintain lawns in gardens, schools and other places etc. We have made some changes in the existing machine to make its application easier at minimum cost. Our main aim in pollution control is obtained through this. We have also added IP camera for live streaming and GPS for location tracking.This robot can be controlled manually and automatically by setting modes from an android application.Unskilled operation can operate easily and maintain the lawn very fine and uniform surface look. In our project, —Solar grass cutter‖ is used to cut the different grasses for the different application.*

Keywords: - Solar Panel, Ultrasonic sensor, NodeMCU,

I INTRODUCTION

Due to the continuous increase in the cost of fuels like petrol diesel and the effect of emission of gases from the burnt fuel into the atmosphere, this necessitated the use of the abundant solar energy from the sun as a source of power to drive a Grass Cutter.

That time is not far when all energy sources will be consumed so alternative sources can be utilized such as solar energy to avoid an energy crisis in the future. A solar panel contains cells and designed to produce electricity by capturing sunlight and does not make any pollution like fossil fuels and nuclear energy. Solar grass cutting robots are convenient to cut grass and cost-effective because of cordless electric mowers and cutter powered of solar that lasts a long time and have low running costs.

A solar powered Grass Cutter was designed and developed, based on the general principle of mowing. The designed solar powered Grass Cutter comprises of direct current (D.C) motor,IP Camera for live streaming,GPS for location tracking, a rechargeable battery, solar panel, a stainless steel blade and a Android application to control the entire system. Cutting is done by the BLDC motor which provides the required torque needed to drive the stainless steel blade.

It is a Android controlled solar grass cutter controlled by android application installed on Smartphone. This project is made of four wheel robotic vehicle driven by four separate DC motors. At the front side of robot grass cutting mechanism drove by high rpm BLDC motor. As a roof to this robot solar panel is mounted at top. On chassis PCB and battery is mounted. This robots motion forward, backward, left turn, right turn and grass cutter on/off is controlled by android application.

We have implemented two modes in this project,i.e Automatic mode and manual mode.In automatic mode ,first we need to set checkpoints according to that it will operate automatically.Ultrasonic sensors are used to detect obstacles, if any obstacle is found in front of the robot while traveling; it avoids the barrier by taking a right/right turn or stop automatically, thereby preventing the collision.In manual mode we need to operate the grass cutting robot manually by using and android application.

II. LITERATURE SURVEY

[1]Design and Implementation of Autonomous Lawn Mower:

This paper[2]shows how to extend the design of currently used lawn mowers and to improve the capabilities of standard robotic lawn mowers as well as assuring cost efficiency.This self-propelling lawn mower design is comprised of remote control and autonomous capability that is user friendly so most consumers will be able to use this device. It is safe to use, as well as efficient because it electric powered and cordless. With these objectives mentioned, the paper says that the self-propelling electric robotic lawn mower is environmentally friendly.

[2]A GPS-aided Autonomous Lawnmower". 4th Annual Autonomous Lawnmower Technical report.

A Global Positioning System (GPS) assisted autonomous lawnmower was researched by Newstadt et al.[2] in order to develop a hybrid and potent lawn mower. The system is made up of the following components: modified differential global positioning receiver and chassis system, wheel encoder, advance control system, digital compass and safety system. Coupled with these are acoustic sensors and laser systems for obstacle detection enablement. The path planning was achieved through control software via remote base station for examining purposes.

III. EXISTING SYSTEM

The grass cutter usually operates with the help of fuels (diesel). The pesticide sprayer, alphabet printer, grass cutter are available as separate machines. Mostly the machines are manually operated or remote controlled.

A. Disadvantages of Existing System :-

- It causes noise and air pollution.

- They are heavy weight machines.

- Causes injury to the operators.

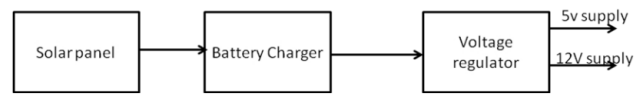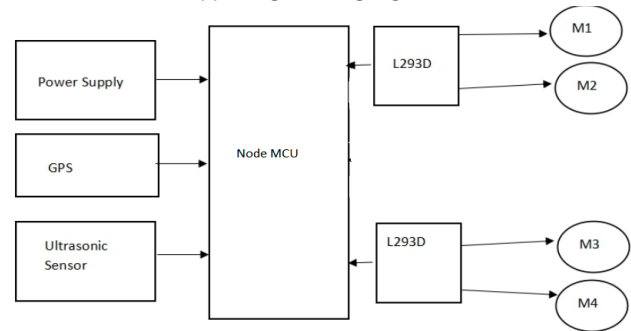- Time consuming.

- Manual operation or remote controlled.

IV. PROPOSED SYSTEM

In our proposed system,It is a combination of automatic and manual solar powered grass cutter which is incorporated with ultrasonic sensor for object detection and avoidance mechanism, Motor is used for movement purpose to move front and back. IP camera is used for live streaming over wi-fi and GPS for location tracking.And an Android application to manually control the grass cutting robot.
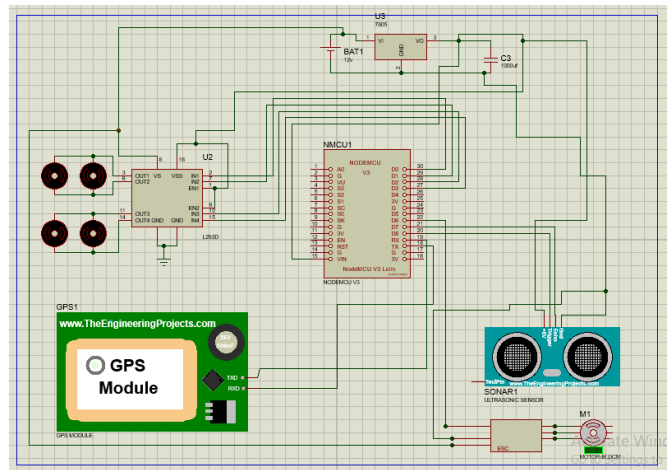
A. Advantages of Proposed System :-

- The grass cutter is light weight.
- It is easy to carry from one place to another.
- It requires very less human intervention.
- It causes no injury to the operator.
- It produces less noise.
- It causes no air pollution.

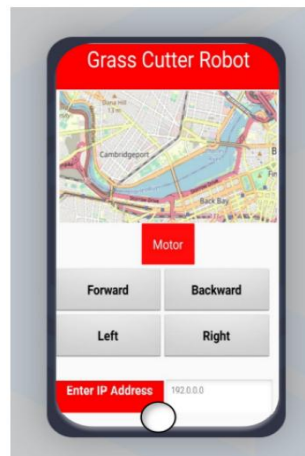- Time consumption for cutting the grass is less.

V. ARCHITECTURE

VI. ELECTRONIC CIRCUIT

VI. SOFTWARE DESIGN

APP SPECIFICATIONS

- **Two Modes:-**
1) **Automatic**
2) **Manual**

- **Forward,Backward Button**
- **Left,Right Button**
- **Blades ON/OFF Button**
- **IP Address Box-To get Location**
- **Robot ON/OFF Button**

A. Android Mobile Application

MIT App Inventor is a visual programming drag and drops platform for designing and development of fully functional android mobile application. App Inventor's user interface is consists of two parts:a Designer for selecting the components of the app and a BlocksEditor for setting the operations and working for the application. App Inventor's building blocks are simple user interface contains elements such as buttons, labels, list pickers, images, etc.,linked with the mobile device's features (Bluetooth, texting, NFC, GPS, etc.) Therefore, the fundamental structures of this drag and drop enabled app developer to efficiently manage the functionalities of this portable, touch-enabled sensing devices.By concentrating on the device's services, App Inventor presents an automatic programming metaphor.

VII. TEST RESULTS

The following results have made from this project:

- The set of motors are used for the movement of the grass cutter.

- An ultrasonic sensor avoids obstacles and provides safety to the cutter.

- This device is more safe to handle than more manual bulky machines.

- The device requires human effort only to ON the robot and hence reduces the labor cost.

- The device cuts the grass in short span of time and it is also time saving.

- This device reduces the risk of workers getting hurt while operating the manual operating grass cutter.

VIII. CONCLUSION

In this article, a design scheme for android mobile application system for controlling a grass cutting robot having solar energy capability based on Arduino has been explained,which is programmed to respond to events (based on the touch arrow buttons with Android mobile application as described above) and to make corresponding actions.

The proposed project presented with mainly two operational modes in which the system is using a mechanism of controlling the grass cutting robot based on touch arrow buttons (grass cutter moves similarly to the direction of the button presses).

In this sytem it is presented that the proposed systems have capabilities to identify the obstacles in front of the grass cutting robot.

As a lesson learned, we confirm that the introduced systems can be easily implemented under real conditions at great-scale in the future. Meanwhile, the proposed grass cutting robot system have the advantages such as user-friendly, low-power consumption, low-cost approach, easy to use, simple and the system is less in size, so the little space is needed to adjust in hardware circuits.

Besides, the proposed prototype is highly robust against unforeseen problems and can be easily extended further in the hardware section, and multiple applications can be attached to reduce the personal effort of upgrading.

Our paper entitled Manufacturing of solar powered grass cutter is successfully completed and the results obtained are satisfactory. It will be easier for the people who are going to take the project for the further modifications.

This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. This will give much more physical exercise to the people and can be easily handled.

IX. FUTURE SCOPE

- The project can be extended for providing proper turning after detection of objects and cut the grass that are present behind the object without taking an U-turn.

- The grass are mowed to even heights and by using two ultrasonic sensors to detect objects on both sides.

- Reduction of power consumption,

- Collection of the fallen grass after cutting and Efficient detection of objects can also be considered.

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