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FABRICATION OF GRASS CUTTING MACHINE USING RF TECHNOLOGY

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ABSTRACT

The present technology ordinarily used for trimming the grass is by exploitation the manually handle device. In this paper we have automated the machine for trimming the grass. The device consists of linear blade that is operated with the assistance of the motor the facility offer for the motor is by exploitation battery. This project is associate degree autonomous garden tool which will enable the user to the flexibility to chop their grass with lowest effort. Unlike different robotic field mowers on the market, this design requires no perimeter wires to maintain the robot within the lawn. The project summarizes and reviews different technological development for making efficient and cost effective lawn mowers. The lawnmower is a machine to make cutting grass process easier. The lawnmower movement will be controlled using RF module.

KEYWORDS: RF Technology, Automatic, Grass cutting machine

INTRODUCTION

Nowaday's pollution is a major issue for whole world. Pollution is manmade and can be seen in own homes. In case Gas powered lawn mowers due to the emission of gases it is responsible for pollution. Also the cost of fuel is increasing hence it is not efficient. So the Solar powered grass cutters are introduced. Solar powered lawn mower can be described as the application of solar energy to power an electric motor which in turn rotates a blade which does the mowing of a lawn. But the cost of those grass cutters is high. But our automatic grass cutter is consisting of rechargeable battery.

This design is alternative for environmentally hazardous gas powered grass cutter. Hydrogen powered lawn mower has been operated without major interruption during the past fourteen years. The commercial model was originally running on gasoline and was adapted to hydrogen by making small adjustments to the carburettor and by installing a hydrogen reservoir containing solid-state metal hydrides. During the evaluation period the only maintenance work was changing the lubricating oil of the engine once a year, and reactivating the metal hydride powder by external heating after an accidental inlet of air into the reservoir. And also it will be the alternative for solar powered automatic grass cutter because its cost is more. So, automatic grass cutter using rechargeable battery is economically helpful for user. By using this automatic grass cutter user can the cut the grass of the required area by giving input by using keypad. Also the height of grass can be specified by adjusting the height of blades. The main objective of this grass cutter is that the grass in the lawn must be mown with less effort. The other objective is that the automatic grass cutter has to differentiate between grass and concrete while monitoring its surroundings continuously.

We wanted an ultrasonic sensor to detect if the grass cutter was heading into an object. Safety is the main concern while designing the grass cutter. As it has blades we wanted our grass cutter not to be in operating mode if it was being held in the air by the user. Knowing that the user would be randomly holding the grass cutter we needed a sensor to detect orientation. The accelerometer was hence

used in grass cutter so that it will not operate when user hold it. An automatic grass cutter will relieve the consumer from mowing their own lawns and will reduce both environment and noise pollution. An automatic lawn cutter that will help the user to cut the grass in their lawn with less efforts. The different sensors are used it will detect and avoid objects and humans while mowing.

The main objective of this automatic lawn cutter is that the user can specify the area that is to be mown and also the height of grass as per there requirement by using the keypad. This design contains a microcontroller like ATmega 328P, multiple sensors, Solar Panel, Battery, Inverter, etc. This project provides a design method of an automated lawn mower, whose task is to cut grass whilst following a specified pattern with no need of user interaction. This task is expected to be made possible by using sensors to provide a microcontroller with measurement of distance. The device is expected to determine the path to follow, as shown in Figure later, calculate its position and stop upon completion of its tasks. The project aims to produce a machine which would relieve people from a regular task of cutting grass in their garden. Automated lawn mowers are presently available to the public, e.g. (Robomow, 1998), but the low spread of these devices is mainly due to the cost which start at £918.13 (Mowermagic, 2011). The goal of this project is therefore to produce a similar device with similar (if not better) performance, at a significantly lower cost. The present report will provide an understanding the sensor selection process, an analysis of the microcontroller to be used and the relevant functions it has to execute, a study of the relevant motors used and a system overview. For this progress report some areas are incomplete.

REVIEW OF LITERATURE

***Basil Okafor et all (2013) [1]*:** The design objective is to come up with a mower that is portable, durable, easy to operate and maintain. It also aims to design a selfpowered mower of electrical source; a cordless electric lawn mower. The heart of the machine is a battery-powered dc electric motor. It comprises of a system of speed multiplication pulleys which drive the cutting blades and the charging unit comprising of a 12V alternator and a lift mechanism meant to alter the height of cut. This is achieved by means of a system of v-belt pulleys with minimal slip effect; collapsible blades to reduce the common problem of wear. The use of collapsible blades and incorporation of an alternator for recharging the battery make the design unique such that no engine is involved. Performance test gave a cutting efficiency of 89.55% with 0.24kN human effort. Thus, the machine is considered highly efficient and is readily adaptable to different cutting conditions.

Tanimola et all (2014) [2] Due to the continuous increase in the cost of fuel 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 lawn mower. A solar powered lawn mower was designed and developed, based on the general principle of mowing. The designed solar powered lawnmower comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. Mowing is achieved by the D.C motor which provides the required torque needed to drive the stainless steel blade which is directly coupled to the shaft of the D.C motor. The solar powered lawnmower is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for mowing. The battery recharges through the solar charging controller. Performance evaluation of the developed machine was carried out with different types of grasses. The machine was found to have an efficiency of 93% and a field capacity of 1.11 × 10 -4 ha/hr. No significant difference was observed with the height of grasses at 5% confidence level.

K.Yvon et all (2013) [3] have present a hydrogen-powered lawn mower which was adapted from a commercial model running on gasoline. The necessary modifications include adjustments to the carburetor and the installation of a hydrogen reservoir containing about 5 kg of a metal hydride powder. Hydrogen is obtained by desorption of that powder at ambient temperature and 2–20 bar pressure. The

reservoir is rechargeable at a hydrogen pressure of about 25 bar within less than 1 h. One charge lasts about 40 min. corresponding to about 800 m2 of cut lawn. The engine shows a reduced noise level and no tendency to backfiring. The prototype has run successfully for more than 1 year.

PROPOSED SYSTEM
3.1 ARCHITECTURE

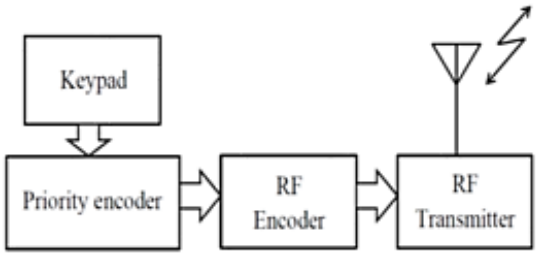


Fig. 1 System Architecture

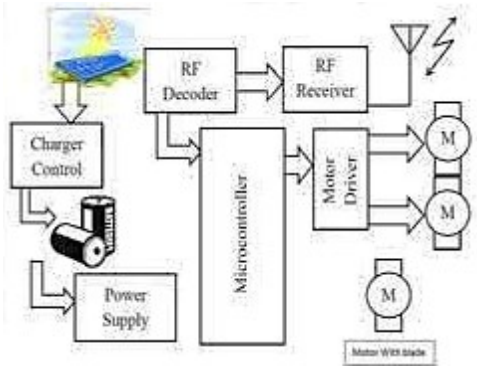


Fig. 2 Block diagram of Solar Based Wireless Grass Cutter

3.1.1 Transmitter:

- **Power supply:** The remote uses 9V battery to power the transmission of signal for movement of motors as well as the grass cutter motor.
- **Keypad:** It consist of eight key's in which four are used for moment of robot (i.e. left, right, forward and back) and four are used for future purpose i.e. if any new things or any sensors are added in system for controlling them these are available.
- **Priority Encoder:** 9-input priority encoders accept data from nine active LOW inputs and provide a binary representation on the four active LOW outputs. A priority is assigned to each input so that when two or more inputs are simultaneously active, the input with the highest priority is represented on the output. The devices provide the 10-line to 4-line priority encoding function.
- **RF Encoder:** We are using RF Module as wireless media. Signal is given from keypad which consists of buttons. RF Encoder will encode the 4bit data/signal given from keyboard; Encoded in a single bit output at encoder and transmitted to the receiver.
- **RF Transmission:** Here a single bit data is transmitted to the receiver and as per data operation will occur.

3.1.2 Receiver

- **Solar system with control charger:** We are using a solar panel to charge the battery so that there is no need of charging it externally. Our system requires 1 amp current and 12 volt voltage for this we

are using 20 watt solar panel. For controlling back current or safety of solar cell we are placing charge control.

- **Power supply:** It consist of battery about 15 volts for storing energy from solar system. This is applied to regulator for further operation.
- **Arduino (microcontroller):** It is heart of our system. The entire periphery is interfaced with controller for movement of system. An Arduino board consists of an Atmel 8-, 16- or 32-bit AVR microcontroller with complementary components that facilitate programming and incorporation into other circuits. An important aspect of the Arduino is its standard connectors, which lets users connect the CPU board to a variety of interchangeable add-on modules known as shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²C serial bus—so many shields can be stacked and used in parallel. Official Arduino have used the megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A handful of other processors have been used by Arduino compatibles. Most boards include a 5 volt linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the on board voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash Memory, compared with other devices that typically need an external programmer. This makes using an Arduino more straightforward by allowing the use of an ordinary computer as the programmer.
- **RF Receiver:** Here a single bit data is received from the transmitter and as per data operation will occur.
- **RF Decoder:** We are using RF Module as wireless media. Signal which is received at RF receiver then decoded in 4 bit format at RF Decoder. And operations will occur.
- **Motor Driver:** It is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

3.2 SYSTEM FLOW

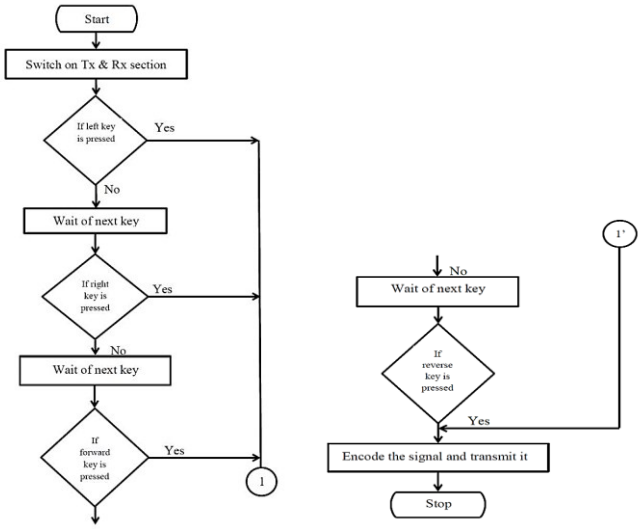


Fig. 3 Transmitter system flow

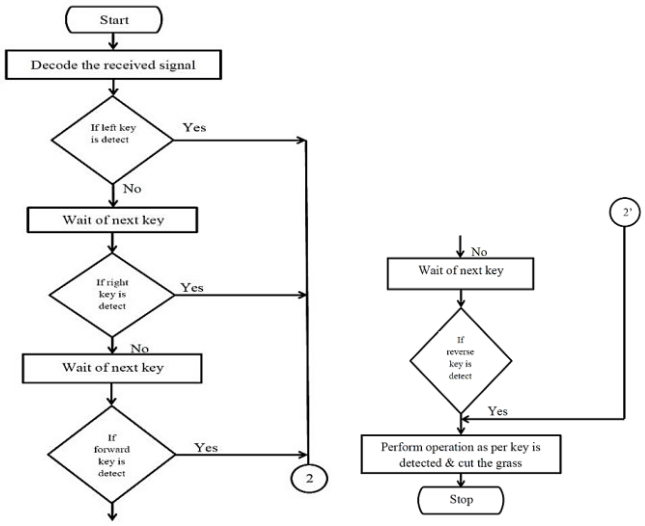


Fig. 4 Receiver system flow

IMPLEMENTATION

We are successfully completed this project that is automatic lawn cutter. The robotic vehicle will mown in forward direction automatically to cut the grass uniformly and also calculate the distance of obstacle. If any obstacle is present, it takes deviation towards right direction. After the obstacle is cleared the vehicle moves forward direction automatically to cut the grass. The working flow is as follows

- Working principle of the grass cutter is providing a high-speed rotation to the blade, which helps to cut the grass.
- The blade will get kinetic energy while increasing the rpm.
- The cutting edges are very smooth and accurate.
- Also, Electric Grass Cutting Machines are much easier to be used in garden, lawn and grass fields.
- In order to enhance the beauty of home-lawns and gardens, Grass cutting machines are the best available option in the industry.

With the help of a lawn mower which is a machine with revolving blades to help us cutting lawns at even length, people can easily maintain and beautify their lawns and gardens without any hassle. Now-a-days, there are plenty of options starting from the simplest push along mower to the most advanced electric grass cutting machine

Fig. 5 Automatic Grass cutter

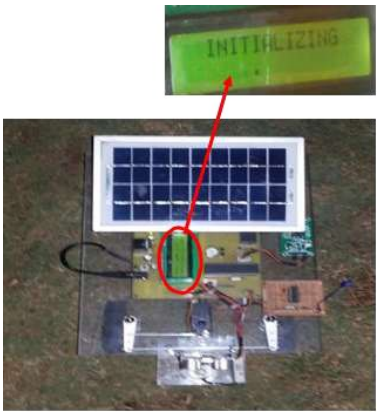
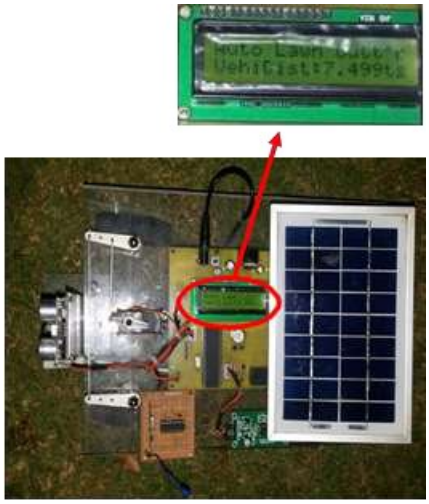


Fig. 6: Initialization message is displayed when vehicle turns on.



V. CONCLUSION

A grass cutter which is simply called as lawn mower becomes very popular today. The main advantage of this developed protocol is, it does not affect farmer health by any means and also and now it is necessary for cleaning gardens. It is used for various applications. If the component having good material properties, load carrying capability then it certainly enhance the performance of the grass cutter. The cutting effectiveness of the blade can be increased by improving slice to push and obtain good strength. Furthermore, there should be minimum welding joints in the design The lawn mower project is designed to reduce the time and manual labour required for lawn clearing. The use of physics and AI helps by increasing the potency of the work done. The use of RF Module makes this lawn mower more pollution free and cost effective. The concept of controlling the lawn mower by RF Module solves the requirement of man's presence near the mowing site. The smart lawn mower design is achieved minimum working time, minimize the price, minimum energy consumption, and mixed operation mode. In future a grass assortment box may be mounted.

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