Proceedings of the International Conference on Intelligent Computing and Communication for Smart World (I2C2SW-2018)
14-15 December 2018

Automatic Solar Powered Grass Cutter Incorporated with Alphabet Printing and Pesticide Sprayer

M. Manimegalai
Department of ECE
Kongu Engineering College
Erode, India
maniimegalaii@gmail.com

V. Mekala
Department of ECE
Kongu Engineering College
Erode, India
magii.anuece@gmail.com

N. Prabhuram
Department of ECE
Kongu Engineering College
Erode, India
prabhuramn4186@gmail.com

D. Suganthan
Department of ECE
Kongu Engineering College
Erode, India
suganthanv.16ece@kongu.edu

***Abstract*—Lawn maintenance provides aesthetic pleasure to people. The maintenance of lawn can be done with the help of lawn mower. The operation of the lawn mower is very difficult. The automatic grass cutter provides less human intervention. It operates with the help of solar power. Because of this, no pollution is caused. The grass cutter is incorporated with alphabetic printing and pesticide sprayer. The sound produced by the cutter is very low so, it can be used in silence zone areas such as hospitals, educational institutions.The grass cutter is incorporated with alphabet printing mechanism in grass. Alphabet printing is cutting of grass in the shape of alphabets. The pesticide sprayer is also attached with the grass cutter. All these machines are available as separate machines which requires more space and the cost for buying separate machines will be more. The main advantage of our project is to reduce the space, cost and man power required.**

Keywords—
Lawn,Grasscutter,sensors,Arduino,Motor,SolarPanel,Blades

I. INTRODUCTION

The automatic solar powered grass cutter is used to cut the grass with less human intervention. Ultrasonic sensor is used to detect the objects in the path of the cutter. When an object is detected, the grass cutter avoids the object by turning to the left in its first detection and right in its second detection of the object. ARDUINO UNO is used to control the complete operation of the grass cutter. The alphabet printing is nothing but cutting of grass in the shape of alphabets. The LCD screen is used to display the direction of moving of the mower. Solar panel is connected to thebattery of 12V and 7amp. 12V supply is given to ARDUINO UNO board and power supply board. 5V supply is given to ultrasonic sensor, LCD, motor driver and the keypad. The height of the grass to be mowed can be adjusted by adjusting the height of the blades. Pollution caused by this grass cutter is nil as it does not use any fuel for its operation. It doesn't cause any injury to human while operation. It is easy to move from one place to another and requires less space for operation.

II. LITERATURE SURVEY

A. Design and Implementation ofAutonomous 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.

B. Smart Solar Grass Cutter Robot for Grass Trimming:

Grass cutter moving with engine produces large noise. This causes noise pollution. So, it cannot be used in silence zone area such as hospitals, educational institutions, courts. This paper tells about reducing the noise in the grass cutting machine so that it can be used in silence zone areas.

C. Turbo Mower

The machine moves extremely quick on ground and on grass. The deck conforms to all current safety standards by means ofa moving flap that opens in case oflong grass and closes to prevent any objects from being thrown out of the machine from its way.

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.

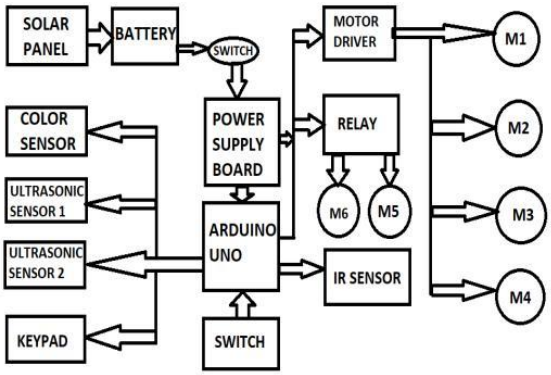
A. Disadvantages of existing system

- It causes noise and air pollution.
- Cost for buying separate machines is too high.
- Space occupied by these separate machines is too high.
- They are heavy weight machines.
- Causes injury to the operators.
- Time consuming.
- Uneven cutting of grass.
- Manual operation or remote controlled.

IV. PROPOSED SYSTEM

In my proposed system a combination of automatic 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 which is also used for alphabet printing.



A. *System design*

Fig. 1. System Design

A keypad is interfaced with arduino in which by pressing the key we can select the alphabet to be shaped in the grass. Meanwhile when we need to spray pesticide in the grass to kill insects it can also be done parallel.

B. *Flowchart for the functioning of the robot*

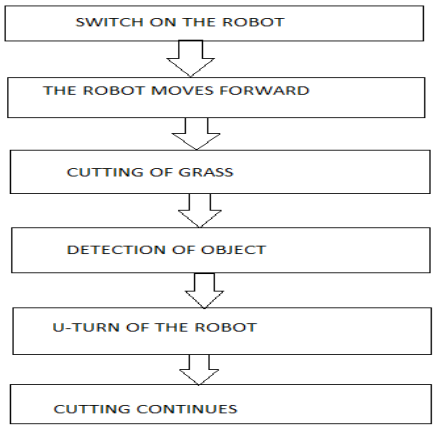


Fig. 2. Flow Chart *for the functioning of the robot*

C. *Advantages of the 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.
- The space occupied by this machine is very less.
- The cost for the machine is very low.
- Time consumption for cutting the grass is less.

V. RESULTS

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.

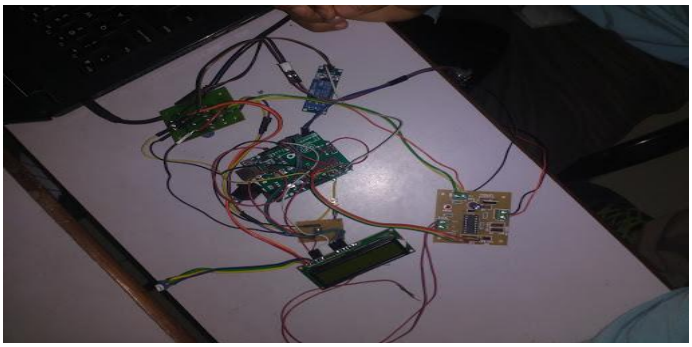


Fig. 3. Circuits connection

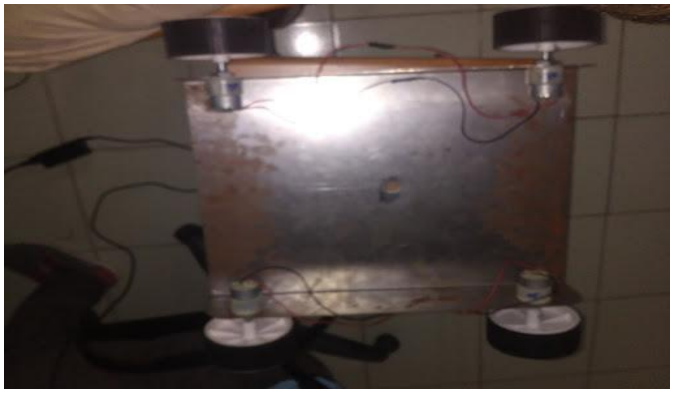


Fig.4. Frame body and wheels

Fig. 5. Setup for Field Test 1

The test was first conducted with 30rpm motor that is connected with the blade. The cutting of blades doesn't rotate with the sufficient speed to cut the blades. Because of slow speed of cutting motor the grass gets struck between the blades and the robot wobble and doesn't move properly.

Fig.6.Setup for Field Test 2

The field test was conducted with 1000rpm blade motor to increase the rotating speed of the blade to cut the grass of greater height. So the grass cutter can cuts the grass properly. The motor used in second field test is Johnson motor.

S.no	Particular	Solar based grass cutter	IC Engine grass cutter
1.	Pollution	No	High
2.	Fuel	No fuel consumption	Fuel is a major factor
3.	Friction	Greatly reduced	High
4.	Cost	Low	High
5.	Maintenance	Low	High
6.	Load carrying capacity	Low	High

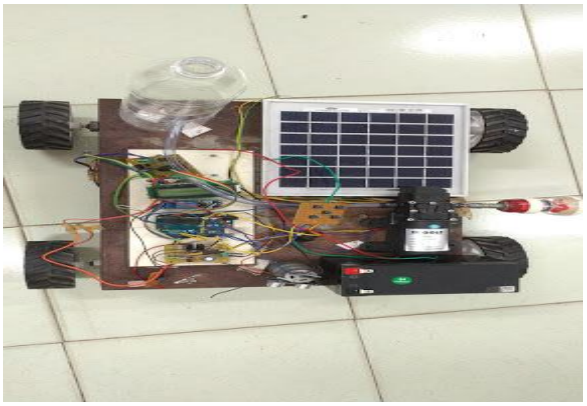


Fig. 7.Cutting the grass in the shape of letters in smooth fields

Fig. 8. Display of Distance travelled

Fig.9. Cutting of grass in the field

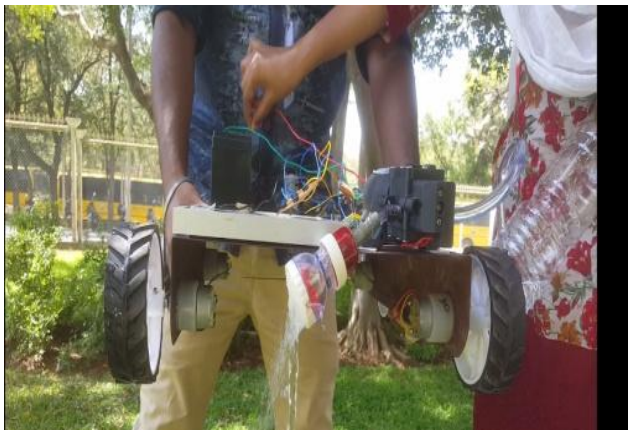


Fig. 10. Spraying of water/Fertilizers in the fields

Fig. 11.Final Setup and Output

Advantages:

- 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.
- The space occupied by this machine is very less.
- The cost for the machine is very low.
- Time consumption for cutting the grass is less.

VI. CONCLUSION

Grass cutting is time consuming job and requires lot of labors for maintain. The cutting of grass in the shape of alphabets is more tedious and time consuming manually. The manual pesticide sprayer can cause health hazards to the person who operates it. This problem can be rectified by our automatic solar powered grass cutter.

VII. FUTURE WORK

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. When there are no objects detected in any one sensor the machine turns towards that side. Reduction of power consumption,Collection of the fallen grass after cutting and Efficient detection of objects can also be considered.

REFERENCES

[1] Sivarao, T J S Anand, Hambali, Minhat, Faizul , “Review of Automated Machines towards few Approach in Developing SemiAutomated Grass Cutter ”, International Journal of Mechanical and Mechatronics Engineering IJMME-IJENS, 2010.

[2] Pratik Patil, Ashwini Bhosale, Prof. Sheetal Jagtap , “Design and Implementation of Automatic Lawn Cutter”,International Journal of Emerging Technology and Advanced Engineering , 2014.

[3] Technical Solutions, J. Hammond and R. Rafaels, “Build the Lawn Ranger”, Radio Electronics, June 1990, pp. 31-49.

[4] Ms Lanka Priyanka,Mr Prof J NagarajuMr Vinod Kumar Reddy, “Fabrication of Solar powered Grass Cutting Machine”, International Journal & Magazine of Engineering, Technology, Management and Research ,2015.

[5] E. Naresh, Boss Babu and G. Rahul Automatic Sprayer, International Journal and Magazine of Engineering, Technology, Management and Research, Vol.3, 2016,2348-4845.

[6] http://www.ssiencedirecrt.com/journals/all/grasscutter.

[7] The solar entrepreneur’s handbook,Wise publications