

LAWN MOWER

The solar based automatic grass cutter

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Abstract: to overcome human efforts solar grass cutter is invented. It automatically cut the grass at particular height and covers all the area where the grass is present; due to solar energy used it reduces the growth of population. The most plus point of this lawn mower is it does not required any person to operate it as well as no need to know the good knowledge of the machine

IndexTerms - component: arduino, motor driver module, dc motor, solar panel, ultrasonic sensor

I. INTRODUCTION

The goal of this project is to design an autonomous lawnmower that safely and effectively moves an area typical of a homeowner's yard.

Instead of relying on infrared sensors to detect obstacles in the mowing field, ultrasonic sensor will be used. The most important difference will be in the control algorithms.

The control algorithms will be based on machine learning techniques. This will allow the mower to recognize objects and to avoid them. They will also allow the mower to "learn" how to move as a human would. Also will allow the mower to know where it is in the moving area.

II. LITERATURE REVIEW

A Solar grass cutter is a machine that uses sliding blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens, home etc. Rapid growth of various high-tech tools and equipment's makes our jobs done comfortable and sophisticated.

The project aims at fabricating a grass cutting machine system which makes the grass cutter based motor running through solar energy. For designing of Automatic Lawn Cutter we referred various literature, papers etc. The self- powered Design objective is to come up with a mower that is portable, durable, easy to operate and maintain.

It also aims to design a self-powered mower of electrical source; a cordless electric lawn mower. The heart of the machine is a battery-powered dc electric motor. It is also useful method for our lawn mower.

III. AIM AND OBJECTIVES

AIM

According to height of the grass automated grass cutter will used to cut the grass at particular height. This will reduce the human efforts as well as due to use of ultrasonic sensor it will also find the particular area where the cutter works properly.

PROBLEM STATEMENT

To detect the particular height of grass available in the lawn. The projects mainly focused on to make clean the area were the unwanted grass will be cutted at particular height. The proposed work finds the grassed area and cut the grass by use of the high power dc motor with sharp bled.

OBJECTIVES

1. To make human life easy.
2. Identification of the area where the max grass founded.
3. Implementing high power solar panel to get sufficient dc power for the working.

IV. BASIC BLOCK DIAGRAM

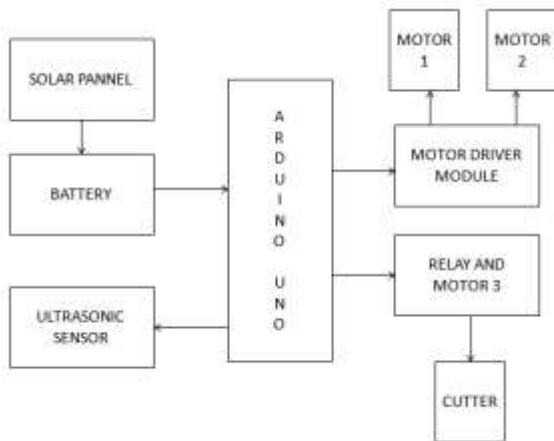


Fig. block diagram of solar lawn mower

BLOCK DIAGRAM AND DESCRIPTION

1) ARDUINO.

The Atmel AVR®core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

The ATmega328/P provides the following features: 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTs, 1 byte-oriented 2-wire Serial Interface (I2C), a 6-channel 10-bit ADC (8 channels in TQFP and /MLF packages), a programmable Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning.

2) SOLAR PANNEL

The TPSK series of solar panel kits come complete with high efficiency multicrystalline solar panel Side of pole/wall mounts, PWM Charge Controller and outdoor rated 12AWG cable. they are ready for quick connection to Tyson Power Systems outdoor UPSPRO™ Systems or any other application requiring solar power. The panels use only the best silicon cells from Germany to provide excellent low light performance and long life (25years).

The rugged aluminum frame and high transparency, low iron, tempered glass withstands high wind, hail and snow loading. The mounts are heavy duty aluminum with stainless steel hardware.

2.1 Features

1. Accommodates 2" to 4.5" dia. Pole or Wall Mount.
2. Certified for up to 110MPH Winds.
3. Output voltage 18 volt (ideal) practically 10% tolerance
And depend upon sun intensity.

3) ULTRASONIC SENSOR (HC-SR04).

3.1 Product features.

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact. measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.

The basic principle of work:

- (1) Using IO trigger for at least 10us high level signal.
- (2) The Module automatically sends eight 40 kHz and detect whether there is a Pulse signal back.
- (3) IF the signal back, through high level, time of high output IO duration is,
The time from sending ultrasonic to returning.

Test distance = (High level time×velocity of sound (340M/S) / 2.

3.2 TIMING DIAGRAM

The Timing diagram is shown below. You only need to supply a short 10uS Pulse to the trigger input to start the ranging, and then the module will send out An 8 cycle burst of ultrasound at 40 kHz and raise its echo.

The Echo is a distance object that is pulse width and the range in proportion. You can calculate the range through the time interval between sending trigger signal and Receiving echo signal. Formula: $\mu\text{S} / 58 = \text{centimeters}$ or $\mu\text{S} / 148 = \text{inch}$; or: the Range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms Measurement cycle, in order to prevent trigger signal to the echo signal.

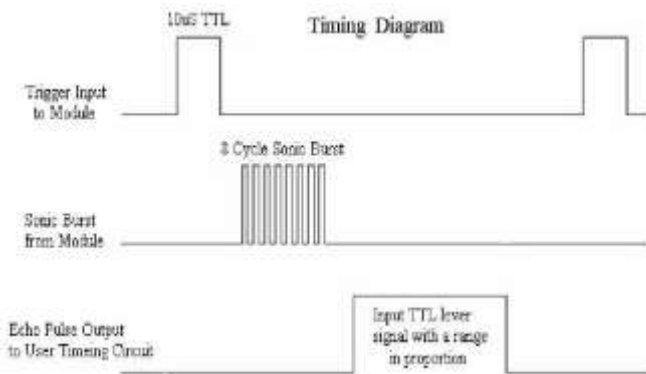


Fig. timing diagram of ultrasonic transmitter and receiver.

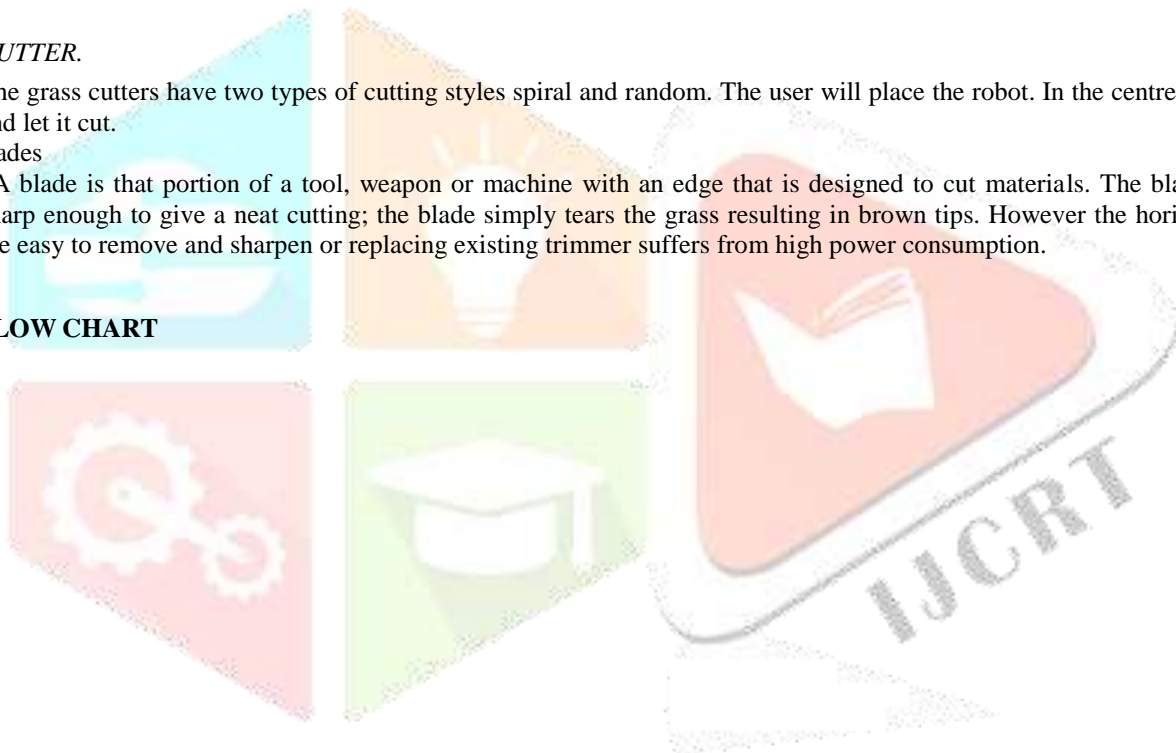
3) CUTTER.

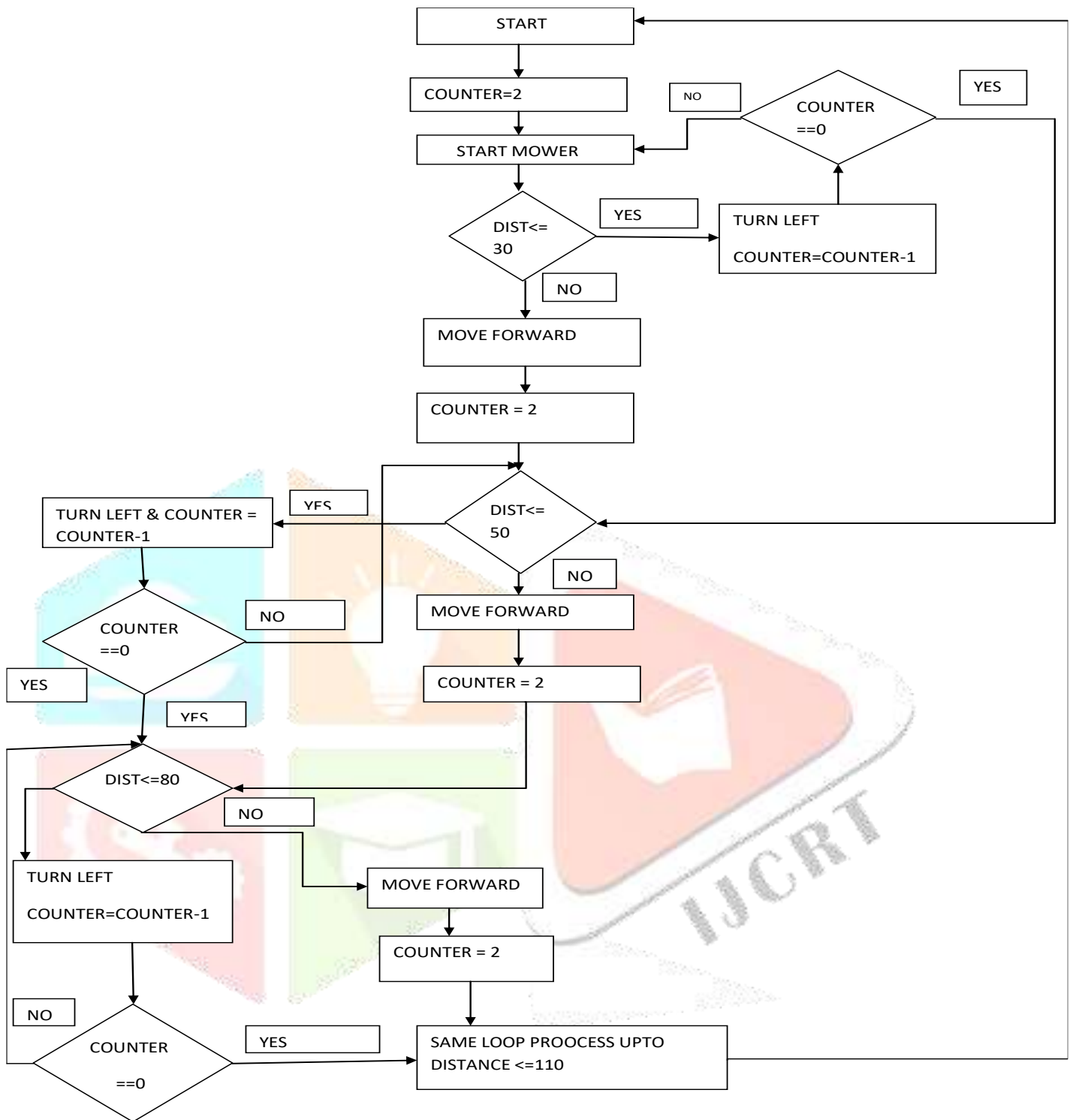
The grass cutters have two types of cutting styles spiral and random. The user will place the robot. In the centre of their lawn and let it cut.

3.1 Blades

A blade is that portion of a tool, weapon or machine with an edge that is designed to cut materials. The blade is seldom sharp enough to give a neat cutting; the blade simply tears the grass resulting in brown tips. However the horizontal blades are easy to remove and sharpen or replacing existing trimmer suffers from high power consumption.

V. FLOW CHART





VI. WORKING OF LAWN MOWER

6.1 WORKING PRINCIPLE

The basic working principle of the lawn mower is that, it senses the distance if the distance is sufficient then it starts to cut the grass. Else it will find another path to cut the grass present in the lawn.

6.2 WORKING

1. Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement in such a way that it can receive solar radiation with high intensity easily from the sun.
2. These solar panels convert solar energy into electrical energy as studied earlier. Now this electrical energy is stored in batteries by using a solar charger.

3. The motor is connected to the batteries through connecting wires .Between these motor driver is provided. It starts and stops the working of the motor.
4. This power is also connected to arduino and sensor circuitry which move the lawn cutter in particular direction as command installed in it.
5. From this motor, the power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass.

VII. ADVANTAGES, DISADVANTAGES & APPLICATIONS

7.1 Advantages

1. High conversion efficiency.
2. Has less moving parts.
3. Less space required.

7.2 Disadvantages

1. The motors in cordless cutter lend to be less powerful than gasoline motors of the same total weight.

7.3 Applications.

1. for homemade garden.
2. For kids ground
3. All nursery gardens
4. For may be agriculture purpose

VIII. CONCLUSION AND FUTURE SCOPE

8.1 Conclusion

In this project, the work done on lawn mower will meet the challenge of environmental production and low cost of operation since there is no cost for fueling. This lawn mower has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used. The machine's capacity is adequate for its purpose. The machine has proved to be a possible replacement for the gasoline powered lawn mowers. We are developed "Automatic Lawn Cutter" by using Arduino and for this we are using battery hence it works automatically.

8.2 Future Scope

The work projected in this paper can be further improved by incorporating the some more modifications to obtain better results. Design of blades should be done based on types of grass is used to cut.

IX. REFERANCES

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