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AUTOATIC GRASS CUTTING MACHINE USING SOLAR PANEL

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ABSTRACT-

The fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need of any human interaction. The system uses 6V batteries to power the vehicle movement motors as well as the grass cutter motor. We also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to a pic18 series of microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cutter motor to avoid any damage to the object /human/ animal whatever it is. Microcontroller then turns the robotic as long as it gets clear of the object and then moves the grass cutter in forward direction again.

INTRODUCTION

The smart grass cutter system puts forth a completely automated lawn mower mechanism. The robotic vehicle is equipped with a grass cutter blade that allows for grass cutting at high RPM. The system has a smart functionality that allows it to cover the complete area of a lawn or garden by detecting corners using ultrasonic sensor and moving in a right/left manner in order to cover the entire area. This efficient system uses a microcontroller based circuit in order to achieve this functionality. It is a battery operated system that uses 2 batteries. One battery is used to run the vehicle movement DC motors and the other one is used to power the grass cutter motor. Also the system uses a solar panel to demonstrate the charging of vehicle movement battery. The microcontroller operates the vehicle movement dc motors as well as the grass cutter at the same time as monitoring the ultrasonic sensors. The microcontroller smartly operates the dc motors using the motor driver IC to achieve desired movement based on ultrasonic inputs. The system also uses a gyro sensor in order to achieve perfect 180 degree turns to achieve complete lawn/garden coverage. Thus thissystem allows for fully automated grass cutting system without the need for any human intervention.

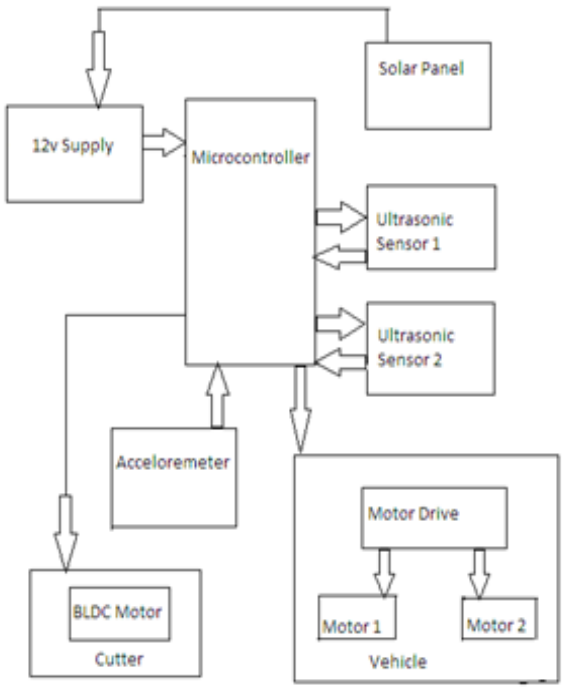
LITERATURE REVIEW

For the manufacturing of a solar grass cutter we referred various literature, papers etc. The review of previous method used given below: The first lawn mower was invented by Edwin Budding in 1830 just outside Stroud, in Gloucestershire, England. Bedding‟s mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830. In the United States, gasoline powered lawn mowers were first manufactured in 1914 by Ideal Power Mower Co. of Lansing, Michigan, based on a patent by Ransom E. Olds. Ideal Power Mower also introduced the world's first self-propelled, riding lawn tractor in 1922, known as the "Triplex." The roller-drive lawn mower has changed very little since around 1930. Gang mowers, those with multiple sets of blades, were built in the United States in 1919 by the Worthington Mower Company. Two Victa mowers, from 1958 and 1968 respectively, are held in the collection of the National Museum of Australia. The Victa mower isregarded as something of an Australian icon, appearing en masse, in simulated form, at the opening of the Sydney Olympic Games in 2000.

In this lawn mower uses an solar based energy source, which is easier to use, more advantageous comparing to other energy source especially for gas based source of power .But our lawn cutter is based on solar because this energy is a renewable energy source and it is easy to work. So we made solar powered lawnmower. . In this project we have automated the machine for trimming the grass. The device consists of linear blade which is operated with the help of the motor the power supply for the motor is by using battery. The battery can be charge by using power supply and solar panel.

DESCRIPTION

BLOCK DIAGRAM



BLOCK DIAGRAM DESCRIPTION

The lawn mower or grass cutter is made up of an induction motor, a battery, an alternator, three collapsible blades, and a link mechanism. The power and charging system comprises of an alternator which charges the battery while in operation. The DC motor forms the heart of the machine and provides the driving force for the collapsible blades. This is achieved by the combined effect of mechanical action of the cutting blades and the forward thrust of the mower. The system is powered by an electrical switch which completes the circuitcomprising the induction motor and the battery. The ultrasonic senor is finding the path to avoid the obstacles and machine damage.

HARDWARE DESCRIPTION

SOLAR PANEL

A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting structure. A photovoltaic module is a packaged, connected assembly of solar cells.

The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 320 watts. The efficiency of a module determines the area of a module given the same rated output - an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module.

A single solar module can produce only a limited amount of power; most installations contain multiple modules.

ULTRASONIC SENSOR

An ultrasonic sensor transmit ultrasonic waves into the air and detects reflected waves from an object. They typicallyoperate by generating a high-frequency pulse of sound, and then receiving and evaluating the properties of the echo pulse. In reflection mode (also known as “echo ranging”), an ultrasonic transmitter emits a short burst of sound in a particular direction. The pulse bounces off a target and returns to the receiver.

BATTERY

The batteries are used as a storage device for solar energy which can be further converted into electrical energy. The only exceptions are isolated sunshine load such as irrigat ion pumps or drinking water supplies for storage, for small units with output less than one kilo watt. Batteries seem to be the only technically and economically available storage means. Since both the photo- voltaic system and batteries are high in capital costs, it is necessary that the overall system be optimized with respect to available energy and local demand pattern.

MICROCONTROLLER FEATURES

- High current sink/source 25mA /25mA
- Three external interrupt pins
- Timer0 module: 8-bit/16-bit timer/counter with 8-bit programmable prescalar
- Timer1 module: 16-bit timer/counter
- Timer2 module: 8-bit timer/counter with 8-bit period register (time-base for PWM)
- Timer3 module: 16-bit timer/counter
- Secondary oscillator clock option - Timer1/Timer3
- Two Capture/Compare/PWM (CCP) modules.
- CCP pins that can be configured as:
- Capture input: capture is 16-bit,maximum resolution 6.25 ns (TCY/16)
- Compare is 16-bit, max. resolution 100 ns (TCY)
- PWM output: PWM resolution is 1- to 10-bit, maximum PWM freq
- @: 8-bit resolution = 156 kHz
- 10-bit resolution = 39 kHz
- Master Synchronous Serial Port (MSSP) module, Two modes of operation:
- 3-wire SPI (supports all 4 SPI modes)
- I2C Master and Slave mode
- Addressable USART module: Supports RS-485 and RS-232

DC MOTOR

DC motors can operate directly from rechargeable batteries, providing the motive power for the first electric vehicles. Today DC motors are still found in applications as small as toys and disk drives, or in large sizes to operate steel rolling mills and paper machines.

DC motors are configured in many types and sizes, including brush less, servo, and gear motor types. A motor consists of a rotor and a permanent magnetic field stator.

The magnetic field is maintained using either permanent magnets or electromagnetic windings. DC motors are most commonly used in variable speed and torque.

Motion and controls cover a wide range of components that in some way are used to generate and/or control motion.

ADVANTAGES

Flexible Pick and Place: One of the main advantages of is flexibility. Robots are easily programmable. They are able to accommodate multiple changes in product shape and type. In addition, robots provide a high level of movement flexibility.

Increase Consistency with Pick and Place: robot systems have the ability to improve product quality and cycle time. Quality is improved because of this regularity.

Space-Efficient: Because they are designed with compact bases, pick and place robots are ideal if you are looking to conserve floor space.

Robots Maximize Safety: Pick and place applications can be physically demanding.They are

labour intensive, repetitive, and monotonous. Depending on the weight and size of a part, moving it from one place to another can be very demanding work. Pick and place robots are unaffected by the stresses of the application. They are able to work without taking breaks or making mistakes. Easy to move from one place to another place. Compact size and portable.

Operating principle is simple.Non-skilled person also operate this machine

APPLICATION

For cricket ground.

It is used to remove the unwanted grass which is present on the cricket ground so as to slip the ball properly.

For gardens.

It uses sliding blades to cut lawn at an even length. It is use for leveling the gardens.

For all play grounds.

CONCLUSION

Robotics is very vast field which comes with different combinations of technology this will helps to reduce the human effort and gives maximum efficient output for the work, Nowadays lot of energy is wasted for mowing lawn in different areas of the world and also takes lots of human effort for the work. The main aim of this project is to make a solar powered automated robotic lawn mower system which will helps to mows the lawn in different design with lesser human effort. Advantages of this system are used components are of low cost so and in bulk production and adding of few more sensors doesn‟t makes any difference.

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