Solar Powered Remote Operated Lawn Mower

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Abstract- *This paper presents lawn mower which is totally based on solar panel with remote sensing. In this device we use Arduino board to do all the programming of this device even the slidest movement of wheel. An Ultrasonic sensor is used to detect the location of obstacle and to inform the arm to respond. The system uses 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 an ATmega328 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 ultrasonic sensor monitors it and the microcontroller thus stops the grass cuter motor so as to avoid any damage to the object/human/animal. Microcontroller then turns the robotic vehicle off until it gets clear of the object and then moves the grass cutter in forward direction again. The lawn mower made with solar panels which will come handy in sunny days and are environment friendly.*

Keywords- ATmega328 Microcontroller, Lawn Mower, Remote sensing, Ultrasonic Sensors.

I. INTRODUCTION

Now a day's pollution is a major issue for whole world. Pollution is manmade and can be seen in own homes. In case gas powered lawn mover's due to the emission of the gases it is responsible for pollution. Also, the cost of the fuel is increasing. Hence it is not efficient. In order to overcome these problems, we have thought about the device, which can be performing its functions without causing any of these problems. a device cut grass automatically with little human intervention driven by a robotic vehicle, this uses the renewable source of energy for its operation like solar energy. This project aims at developing a portable solar operated grass cutting device, as there is power shortage. So we have decided to make a solar energy operated device. This device will help in building of Eco-friendly system. Current technology commonly used for cutting the grass is by the manually handled device. So we are trying to make a daily purpose robot which is able to cut the grasses in Lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. This project is more suitable for common man as it is having much more advantages i.e., no fuel cost, no pollution and no fuel residue. This system is having facility of charging the batteries while the solar powered grass cutter is in motion. It can be operated in night time also, as there is a facility to charge these batteries in day light.

II. LITERATURE SURVEY

1]Solar Powered Autonomous Grass Cutting Robot

Author: **Professor Rohini P. Onkare , Pradnyadevi Jagannath Pawar, Ketaki Kiran Hulgeri , Sanket Dasharath Gurav**

Published in: 2018

This paper proposes a system in which this system will also operate on a battery that will also be charged through solar energy rather than using any external power. In this IR sensors are also used to detect any object/human /or animal while cutting the grass so to avoid them. The main objective of this Solar Powered Autonomous grass cutter is that the user can specify the area that is to be cut and also the height of grass as per there requirement by using the IR remote.

2]SOLAR BASED AUTOMATIC GRASS CUTTER

Author: Singh Suraj,Salve Rahul Rajendra, Bangar mamata Pandhari, U.V.Patil

Published in: 2019

This paper proposes the lawn mower concepts as the Husqvarna Auto Mower and Solar Mower work independently. A boundary loop wire holds the automated grass cutter to the lawn and a search loop ensures that it returns to the docking station for battery recharging.The boundary loop is also laid out around trees and surfaces of the lawn which will not be cut. The lawn mower changes direction

if it touches garden furniture, a tree or other solid objects, yet is able to cut under bushes and hedgerows.

3]IOT Based Grass Cutter with Solar Pannel

Authors:Mamtaj Alam, Virendra Vikram Singh, Chandan, Vivek Yadav

Published in:2019

This paper purposes the lawn mower concepts is that a prototypical Simulated BlocklyArduino-based Programming Learning Tool (SimBA-PLT), has been developed to facilitate the hardware programming learning. The coding process of hardware programming learning can be visually programed using Blockly and virtually operation using the simulation, and the action of the hardware can be actually controlled using the translated Arduino program.

4]Arduino-based Wireless Motion Detecting System

Authors:Siti Syaidatul Syazlina Mohd Soleh, Mohamad Md Som, Mohd Helmy Abd Wahab, Aida Mustapha, Nurul Ain Othman, Mohd Zainuri Saringat

Published in:2018

This paper purposes the system application could detect movements within specified distance and sends out data or notifications to the users through the application installed. The system application was also developed to help users track movements using the Arduino platform that has been connected to users' smartphone using Wi-Fi network.

Motivation

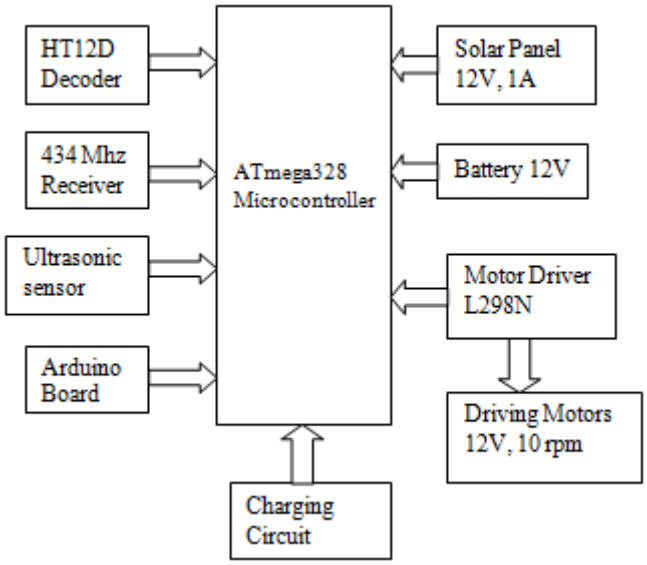
The advent of electric motors and small sized SOC's motivated us to implement and develop a lawn mower. The purpose is to avoid energy crisis and reduces the human efforts, operating cost, maintenance cost and time is being lost during a job which is naturally redundant.

Problem Statement

Nowadays lot of energy is wasted for mowing lawn in different areas and also takes lots of human effort for the work. In the current situation, as it becomes burden to maintain the lawn or gardens. Classical grass cutters with heavy engines create noise pollution and local air pollution due to the combustion in the engine. Motored powered engines requires periodic maintenance such as changing the engine oils etc. In rural areas, there will not be a skilled person to operate the application. The IOT based lawn mower may sometimes cause network problem like some software will not support the applications.

III. METHODOLOGY

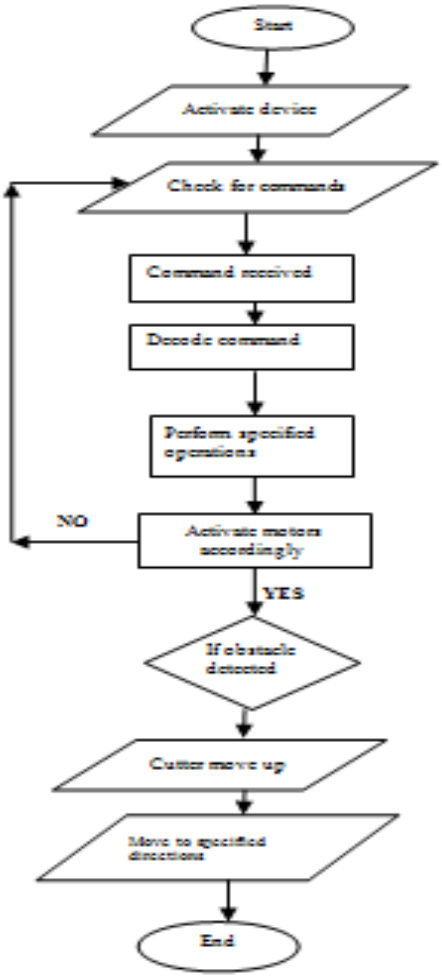
The proposed system is a lawn moving robot which will have four wheels. Two wheels on the left side and two wheels on right side all the four wheels will be powered with four 10 rpm,12v dc geared motors. This motor will be controlled by the signal coming from the microcontroller ATmega 328. The user sends control signals to the equipment with the help of a remote device.



The remote has button controls for navigation and mowing control. These inputs are encoded by HT12E encoder and transmitted as 434 MHz wireless commands through a transmitter. The commands sent by the remote are received by the 434 MHz receiver and are decoded by HT12D decoder. The decoded signals are read by the Arduino. The Arduino send control signals to motor drivers in order to navigate the equipment. The cutting process is also controlled through another motor driver. The grass cutting motor will be a high-speed dc motor powered with a 300rpm a cutting blade will be attached to its rotating shaft. The cutting height of the grass will depend on the position of the motor. This motor can be move up & down using another DC motor which will be having a high torque but low speed. rack & pinion arrangement will be used to do this. These two motors will have required greater current. These motor drivers receive power from the battery and deliver that to the motors based on control signals from the Arduino. The battery powers all the components and is charged from solar panel through a charging circuit. A solar panel (5W, 12V,1A) will be placed

on the top of the robot so that it can take energy directly from sun. These solar panel consist of photovoltaic cells which generates voltage depending upon the incident solar rays on the panel. These generated energy is stored in rechargeable battery (12V) this will also give mechanical stability to the robot. Battery will work about 4hrs when it is fully charged. At the night time when there are no sun rays that time this battery will give power to the robot.

FLOWCHART



The design flow of the solar powered remote operated lawn mower is explained above. The lawn mower powered by solar energy that also avoids obstacles and is capable of grass cutting with a help of human interaction using remote. The lawn mower works on the basis of user commands and get initialized to do the grass cutting task. If the obstacle is detected it get moves up and the move towards the user specified directions. Movement of lawn mower in any direction is controlled easily and cutter is fixed which is operated by user. Arduino IDE software is used to do all the programming and to control all the movement of device such as up down movement of cutter, rotation of the cutter. This device is cheaper that many other grass cutters available in market in these days.

IV. CONCLUSION

Our project is more suitable for a common man as it is having much more advantages i.e. no fuel cost, no pollution and this can be operated by using solar energy. This system is having facility of charging the batteries while the solar powered grass cutter is in motion. We can also reduce various forms of pollution such as air pollution and noise pollution. Electricity is saved as we utilize solar energy that is renewable source of energy.

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