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IOT BASED LAWN CUTTER

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Abstract

A good lawn around your home not only enhances your quality of life, but also improves the value of your home and helps the environment by filtering the air and water that passes through it. But also these benefits do have some disadvantages however. Grass requirements are cut regularly. Healthy lawns need proper maintenance system, which are created by regular cutting at proper frequency and height. Un-cut grass is a invitation for diseases and other sickness that carry bugs, beetles, dragon flies etc. Cutting down involves physical effort and time, not to mention the maintenance and cost of a lawn mower. So in this proposal I am going to design a smart brush cutter which does the work using IoT as well as saving time and physical effort for the fellow humans.

Keywords: Smart Brush Cutter, Automatic Brush Cutter.

1. Introduction

A brush cutter or clearing saw or brush saw is an agricultural tool or powered garden which is used to other foliage, small trees and trim weeds not accessible by a rotary mower or lawn mower. Different blades can be inserted to the machine for certain purposes. It is a power unit that holds it close to the body, a pole that transmits electricity, and a rotating cut head to the power unit at the opposite end of the pole. In this project, I am going to design a smart brusher which runs on electricity that too from a solar panel and it is upgraded with a smart system of controlling the path by means of IoT device.

Internet of things (IoT) technology vehemently used for the lower error rate and it is flexibility for using higher data transmission [1].The advanced demand in the recent decade is the lawn machinery, and people are eagerly needs for the lawn cutter [2]. [3] A device which is used to cut the grasses and other plants growing on the ground is termed as Mower. Outdoor robots such as mower are used in various applications and are formulated to prevent the clobber

and accidents [4]. There are various types of mowers are available say electric lawnmowers, petrol lawnmowers, push lawnmowers etc. [5] In this method we are using a mower in which the cutter is located at the centre of the robot.[6] Due to brush cutters, every year there are many number of accidental death and severe injuries. In order to reduce that smart brush cutter is proposed in the below project. This would contribute for the safety of agriculture and efficiency of humans and all the living beings around the society. [7, 8]For the past few years, main source of power is by non-conventional energy whereas nowadays it runs under PV module [9]. From the PV module it consist of ripples and distorted DC power which is not directly given to the motor or load, thus it needs a charge controller to buck or boost the voltages given to the system for the proper functions. It works under two modes of operation one is online (i.e) runs under solar power and another is battery mode which charges from the solar panel [10]. It inhibits the safety of the agriculture and would contribute the maximum productivity of the mower [11, 12]. From the proposed system it consists of intelligent microcontroller, sensor system, motor driver and working mechanism which runs the whole architecture [13]. For the location based grass mower used tracking based rangefinder which has proper trajectory and position viable to the obstacles and can be avoid malfunctions to the humans [14].

For the conventional cutter was provided by two or four stroke engine. In this proposal, Automatic obstacle detecting brush cutter based on camera and arduino is developed and presented. The following paper is sequenced as follows: The proposed system is discussed in section 2. In section 3 discussed the architecture of system. The system results and discussions are given in section 4. The conclusion is given in the last section.

2. Proposed System:

To prevent the severe injuries taking place during lawn maintenance, to reduce the physical effort of the humans and also to create a healthy environment in our country, we have proposed smart cutter using mobile phone based on IoT which runs using a solar panel. The Proposed Project consists of Arduino UNO, DC Motor, camera sensor, Solar Panel, connecting wires etc. Inhere Arduino is a controller which controls all the sensors or peripherals which are connected to it [15]. Solar Panel is connected with a battery from where the supply to Arduino UNO is fed, the battery keeps getting charged using the solar panel. Camera is used to get full framed snaps from which we can used to view the grasses and its path which is available in the sensor. Therefore camera sensor acts as an input to the Arduino UNO. And all the three motors are interfaced with the Arduino UNO as an output. Based on the input of the camera sensor, Mode of operation of the motors gets varied. Motor 1 is used as a Cutter. Motor 2 & Motor 3 are used for locomotive purposes (Wheels of the Kit).When there is no obstacle in its path, then kit is free to go so all the motors are in running condition. If a obstacle is detected then kit has to make a change in its direction that is u-turn if necessary therefore Motor 1 and Motor 2 are in Off condition (Motor 1 is off so that blade will be in off condition depending on the users command & Motor 2 is turned off so that kit may turn left or right vice versa). And it can be

controlled through user mobile phone by using Wifi module we can access the motor direction depending on grass grown in the lawn. The user can access the data from the cloud. Below table is shown just to get a idea of how it's working during defined conditions. It can be altered or changed based on the user's requirements. Table 1 Mode of Operations are shown below

Motor 1 (Cutter Blades)	**Motor 2 (Left Wheel)**	**Motor 3 (Right Wheel)**	**Status**
Based on users command	ON	ON	Moving Forward
Based on users command	OFF	ON	Turning Left
Based on users command	ON	OFF	Turning Right

Table. 1 Mode of Operations

3. System Architecture:

This system helps us by reducing the physical efforts of humans, where the lawns are trimmed automatically. At the same time the project runs by the solar power provided by the sun this reduces the use of petrol engines which will adversely reduces the amount of GHG gases in the environment. Below fig shows the system architecture for our proposed model. In the below Fig 3.1 System Architecture of proposed system is shown

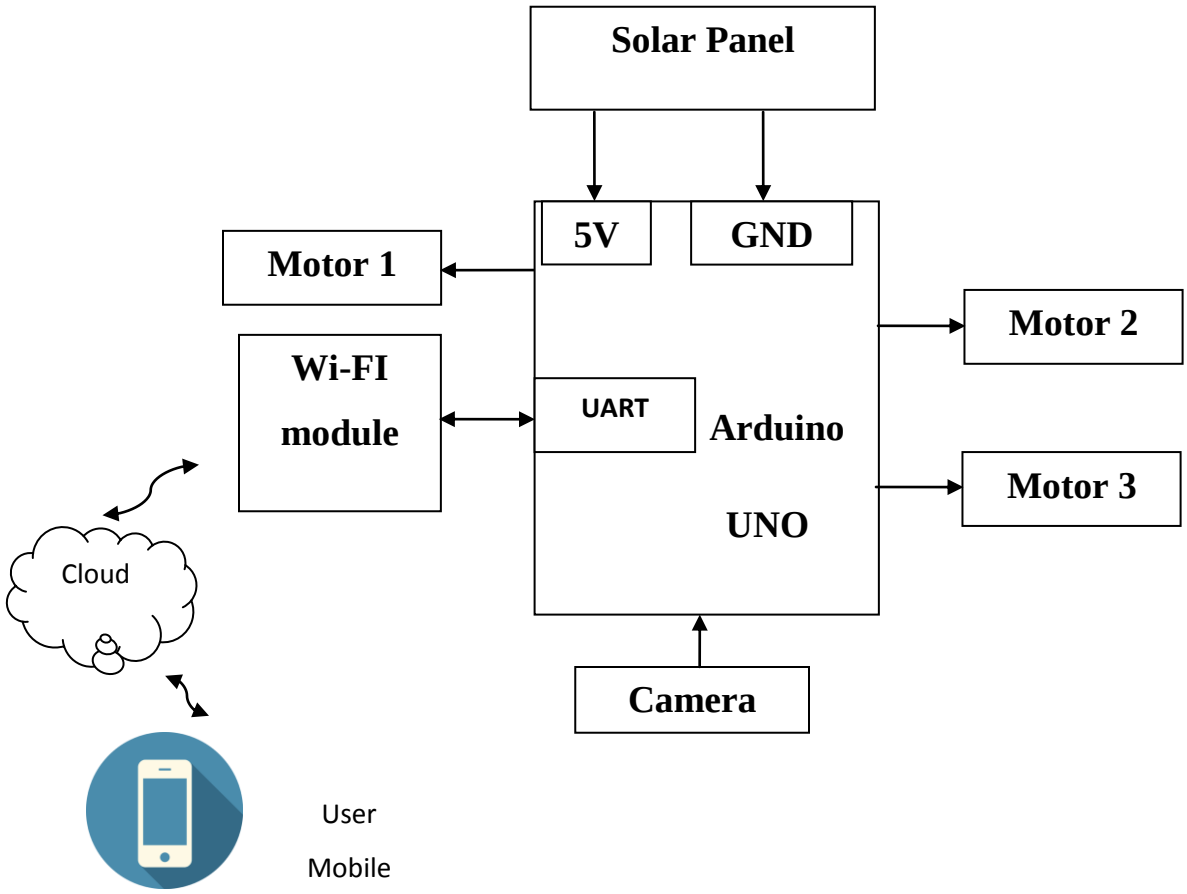

Figure. 3 System architecture of Smart Brush Cutter

Solar Panel:

Solar Panels generate electricity with the use of sunlight as the prime source of energy. Photovoltaic (PV) module constitutes of a photovoltaic solar cells which are available in various wattages and voltages. Thus it generates and supplies solar electricity in residential, Industrial and commercial applications. Fig 3.1 shows the picture of Solar Panel.

Figure. 3.1 Solar Panel

Arduino UNO:

It's an open source microcontroller based on the controller Microchip. The microcontroller is a key element in all embedded systems, control and automation processes. It functions as a single chip microcomputer and is connected to a processing unit, memory, input output devices, timers, data converters, serial port [15]. ATmega328P and arduino IDE is the software for fusing source code in the hardware and it is widely available in the market. It is equipped with many numbers of analog i/p and o/p pins (6 pins) and also with digital i/p and o/p pins (14 pins). Fig 3.2 shows the picture of Arduino UNO.

Figure. 3.2 Arduino UNO

- Input Voltage: 7 to 20 Volts
- Operating Voltage: 5 Volts
- Analog Input Pins: 6
- DC Current for 3.3V Pin: 50 mA
- SRAM: 2 KB

- Clock Speed: 16 MHz
- Digital I/O Pins: 14 (of which 6 can provide PWM output)
- Flash Memory: 32 KB of which 0.5 KB used by boot loader
- EEPROM: 1 KB
- Microcontroller: Microchip ATmega328P
- Length: 68.6 mm
- DC Current per I/O Pin: 20 mA
- Weight: 25 g
- Width: 53.4 mm

Camera:

In this image sensor it provides the major operation of a camera. It provides full framed or windows 8 bit snaps via Serial Camera Control Bus (SCCB) interface. And it captures upto 30 frames per second. To get a full stable image we should neglect the common flash or electrical contamination of image sources. The main advantage is it is mechanized with 3.3V CMOS (Complementary metal oxide semiconductor). And it is a 0.3 mega pixel of digital camera provides basic operation of the sensor. Fig 3.3 shows the picture of camera.

Figure. 3.3 Camera

Wi-Fi Module:

The wifi module is integrated with TCP/IP protocol which can access the arduino microcontroller using wifi network. And it is essential for using IoT devices to get a data in mobile phone. Fig 3.4 shows the picture of wifi module.

Figure. 3.4 Wi-Fi module

DC Motor:

DC Motor is a machine which is used to convert electrical energy into mechanical energy. These forces are produced due to magnetic fields. Almost all the DC motors have the same mechanism which may be electronic or electromechanical or to periodically change its direction by changing the current flow inside the motor. Fig 3.5 shows the picture of D.C Motor

Figure. 3.5 D.C Motor

4. Results and Discussions:

In this proposed system, I have developed a smart brush cutter to do the lawn maintenance process automatically and also to prevent severe injuries caused due to it. All of the sensors are connected to the Arduino UNO. The proposed project is verified and output is crosschecked successfully. So here we have attached a camera sensor which view the obstacle and conveys to the Arduino UNO by mobile phone. Based on the image in the camera, the user can gives instruction to the D.C Motor based on the signal from the sensor mode of operation is chosen. Refer Table 2.1 for Mode of Operations

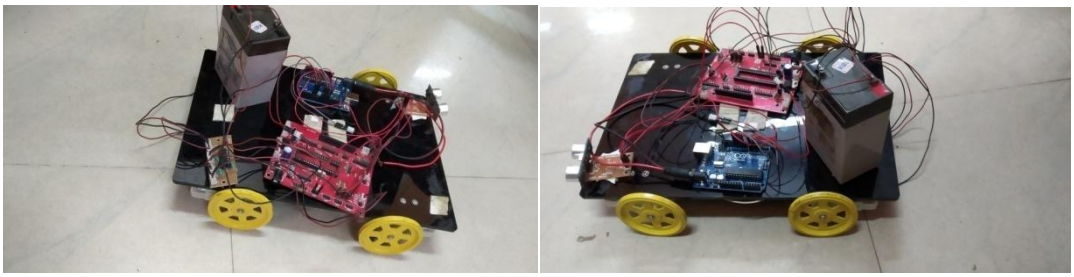

Figure. 4 Hardware Setup of the System

5. Conclusion

Thus the design of the above proposed system is used to prevent severe injuries during the lawn maintenance and also toiling efforts of a person is reduced drastically. The obstacle can be detected easily using a camera senor and the path of the mover is changed by the user thereby avoiding accidents. The objectives are thus achieved; by implementing this smart mover in our society even the senior citizens or nonagenarians can make access over it, So that they need not to depend on anyone.

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