Automated Grass Cutter Robot Based on IOT

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ABSTRACT

Automation is rapidly growing in the present technology. So automation plays a vital role in the agricultural field which is helpful for the farmers. In the earlier days, the grass cutters used were manually handheld devices. Because of this, there was pollution and loss of energy as they used gas and petrol engines. So the old grass cutters need to be replaced by automated ones, where the system will work for guidance and obstacle detection using battery as a power source. And it used Arduino UNO microcontroller board as the main controller of the system, Ultrasonic sensor for object Detection, a NODE MCU for Wi-Fi connection, a linear blade for cutting the grass, and a motor drive for the wheels of the Robot. This is fully automated and renewable energy based project.

Keywords: Robot, Automation, IOT, MCU

I. INTRODUCTION

Nowadays, pollution is the major issue in the universe. In case Gas powered lawn mowers due to the emission of gases it is responsible for pollution. Also the cost of fuel is increasing hence it is not efficient. Traditionally, lawn mowers are often clunky pieces of machinery that involves a lot of strength and energy to use. These present and high-tech grass cutters however, have been creatively designed to make the whole landscaping process much simpler and easier for the user. From robotic lawn mowers that can incredibly cut the grass for you to those that are cleverly powered by solar energy, these convenient and easy-to-use grass-cutting devices make straightening up your lawn more pleasing. The Grass Cutters use cordless electric mowers, trimmers and blowers powered by clean renewable energy generated by solar panels mounted on our trucks and trailers. We also use reel push mowers for smaller hard to access areas like pathways and parks. There's no oil, and no pollution. Just clean air, less noise, and green grass.

The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. We wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object. Safety is the main concern while designing the lawn cutter. As it has blades we wanted our lawn cutter not to be in operating mode if it was being held in the air by the user. Knowing that the user would be randomly holding the lawn cutter we needed a sensor to detect orientation. The accelerometer was hence used in lawn cutter so that it will not operate when user hold it. An automatic lawn cutter will relieve the consumer from mowing their own lawns and will reduce both environmental and noise pollution.

Fig 1 : Grass Cutter Robot

II. SYSTEM BLOCK DIAGRAM AND DESCRIPTION

Working:

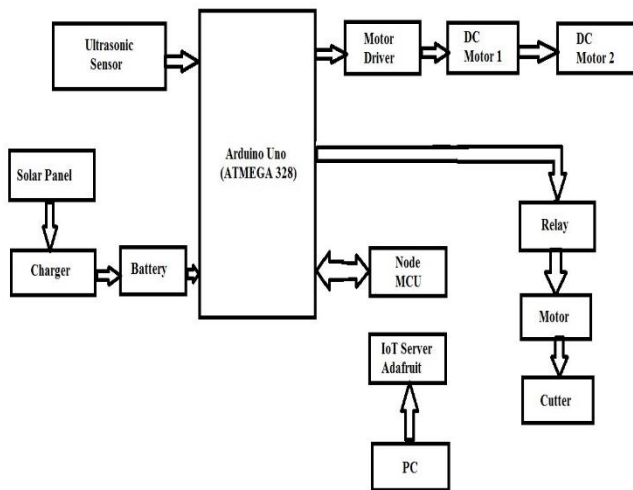The design contains a microcontroller, ultrasonic sensor, DC motor, node MCU all these

Fig 2. Block Diagram of Automated Grass Cutter

Robot Based on IoT together combined we get a grass cutter robot. I used only an ultrasonic sensor to detect if the robot was heading into an object. Safety is the main concern when designing a robot with blades. Determining where to place our sensors is crucial to the overall effectiveness of our design. The microprocessor must be in the robot to protect it from the natural elements. Ultrasonic sensor will be mounted directly in front of the robot for maximum detection. Batteries are use for power generation for the robot movement sand the battery is rechargeable. Node MCU is used as Wi-Fi model to connect the system to the internet. There is a need for Ad fruit

server login for creting toggle feeds for the robot such as forward, reverse, left, right and motor ON.

will perform the gate controlling action with the help of a servo motor[1].

HARDWARE DESCRIPTION:

Arduino Uno:-

Arduino is brain of overall system. Arduino is single-board microcontroller intended to make building interactive objects or environments more accessible. Introduced in 2005, the Arduino's designers sought to provide an inexpensive and easy way for hobbyists, students, and professionals to create devices that interact with their environment using and actuators. Electronic devices are becoming compact, flexible and cheap that are capable of doing more function as compared to their predecessors that happened to cover more space, turned out costly with the ability to perform fewer functions. Arduino Uno is a very valuable addition in the electronics that consists of USB interface, 14 digital I/O pins, 6 analog pins, and Atmega328 microcontroller. It also supports serial communication using Tx and Rx pins.

There are several I/O digital and analog pins placed on the board which operates at 5V. These pins come with standard operating ratings ranging between 20mA to 40mA. Internal pull-up resistors are used in the board that limits the current exceeding from the given operating conditions. However, too much increase in current makes these resisters useless and damages the device.

In this project, Arduino Uno is used to interface with all of the hardware used in this project, such as the cutter, ultrasonic sensors, node mcu, solar panel etc.
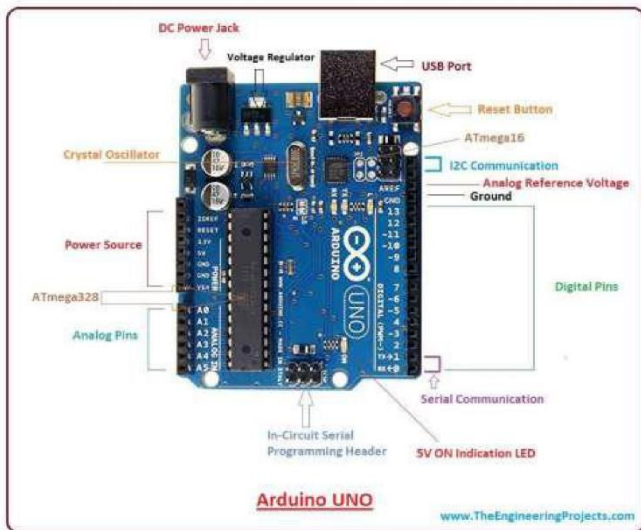
Fig 3 : Arduino Uno

Node MCU:

Node MCU is based on ESP8266 NodeMCU development board which is a true plug-and-play solution for IOT projects. Node MCU is an open source IoT platform and runs on the ESP8266 Wi-Fi SoC from Espressif Systems. The term "Node MCU" by default refers to the firmware rather than the dev kits. ESP8266 Core for the Arduino IDE can be used if you would like to program your Node MCU from the Arduino IDE[7].
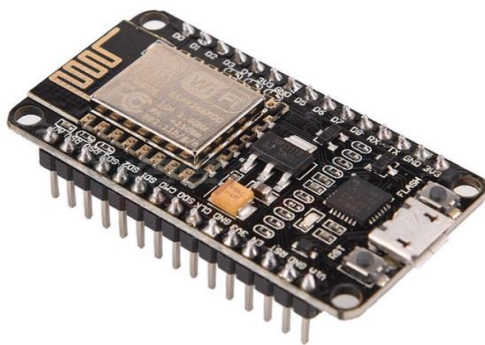

Fig 4 : Node MCU

DC Motor:

Two DC automobiles are related between 12V power supply and two PWM output pins of Arduino, which adjusts the rotation pace of motors based on distinct duty cycles. Due to the fact that Arduino outputs a maximum of forty mA contemporary, two transistors are used to enlarge the current to the size that is sufficient to motors[3]. A DC motor is any of a class of rotary electrical machines that converts direct present day electric strength into mechanical power. The maximum not unusual types depend upon the forces produced by magnetic fields. Almost all types of DC vehicles have a few inner mechanism, either electromechanical or digital; to periodically exchange the course of contemporary flow in a part of the motor. DC automobiles were the first type extensively used, since they may be powered from present direct-modern lighting fixtures power distribution systems. A DC motor's pace may be controlled over a wide range, the usage of both a variable deliver voltage or by way of converting the energy of present day in its subject windings. Small DC cars are utilized in equipment, toys, and appliances. The general motor can perform on direct present day however is a lightweight motor used for transportable energy tools and appliances. Large DC cars are used in propulsion of electrical cars, elevator and hoists, or in drives for metal rolling generators. The advent of power electronics has made alternative of DC motors with AC motors feasible in many programs.

A DC motor relies on the fact that like magnet poles repel and unlike magnetic poles attract each other. A coil of wire with a current running through it generates a electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°. A simple DC motor typically has a stationary set of magnets in the stator and an armature with a series of two or more windings of wire wrapped in insulated stack slots around iron pole pieces (called stack teeth) with the ends of the wires terminating on a commutator.

Fig 6 : DC Motor

Ultrasonic Sensor:

Fig 7 : Ultrasonic sensor HC-SR04

The ultrasonic module, HC-SR04, is chosen for the project. It has 4 pins, which are 5V pin, ground pin, trigger pin and echo pin. The ultrasonic sensor has an ultrasonic transmitter and ultrasonic receiver. Its center frequency is 40KHz with1KHz tolerance. The ranging distance is from 2 cm to 400 cm and the resolution is upto 0.3 cm. The effectual angle of this sensor module is less than 15 degrees and its measuring angle is30degrees. The trigger input pulse width is 10 µs.In this project, the ultrasonic sensor is used to measure the Distance of object[2].

Software Requirement:
Tool
Arduino IDE

Programming language Used
Embedded C/C++

ADVANTAGES

- Proposed system will avoid death of compact size and portable
- No fuel cost
- easy to move from one place to another
- Less wear and tear
- Non-skilled person can also operate

APPLICATIONS

- playgrounds
- house gardens
- small farms
- nurseries

III. CONCLUSION

Robotics is very vast field which comes with different combinations of technology this 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. So this project is a package of energy saving and time saving grass cutting machine with minimum human monitoring and cost. It is eco-friendly mower which uses renewable source of energy. This system finds its application where grass cutting is required to be done on large scale which is time consuming and costly in nature.

IV. REFERENCES

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