Solar Grass Cutter Robot with Obstacle Avoidance

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Abstract:
In this Paper We Have Designed A Grass Cutting Robot Which Can Run Utilizing Solar Energy As Source And Have The Faculty To Evade The Obstacles, Here We Used Arduino Uno Micro Controller Board Predicated On The Atmega328p As The Main Micro Controller And A Ultrasonic Sensor To Detect And Eschew The Obstacles And A And A Motor Driver Circuit To Drive The Wheels Of The Robot, Here We Utilize Simplified Version Of C++ Language As The Programming Language For The Operation Of Arduino Uno Micro Controller Board.

Index Terms: Micro Controller ATMEGA 328p, Ultrasonic Sensor, L293D Motor Driver IC

I. INTRODUCTION

In Subsisting System the Gas Or Petrol Engines are Utilized for the Working of the Grass Cutting Machines, But in our Design we are Made A Grass Cutter Robot Which Works by giving Solar Energy as the Source and the Main Drawback Of The Subsisting System is it need a separate person to operate the Robot, to surmount this draw back we are designing the Robot with Automatic Obstruction Detect and Avoidance by Utilizing the Ultrasonic Sensor, for the Programming of the Arduino Microcontroller Board we utilized the Arduino Software and Simplified Version of C++ Language as the Programming Language to Indite the Code.
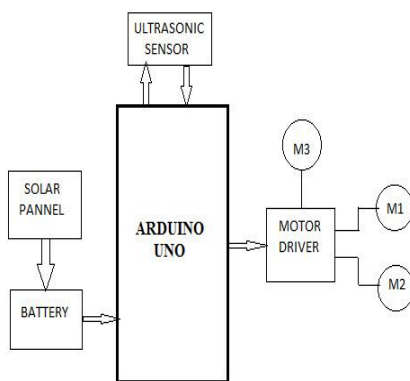
II. BLOCK DIAGRAM

Figure.1.Block Diagram

The block representation of our project is shown above. It contains several blocks such as Micro Controller, Battery, Solar Panel, Ultrasonic Sensor and Motor Driver IC Solar panel unit is utilized to charge the Battery which supplies Power to the Controller that organizes all the components in this Project.

III. DESCRIPTION

Arduino Uno R3: The micro controller board used in our design is Arduino Uno, it is an open source platform used for building the electronic projects, it has both physical board and has own unique simplified programming language and has the endless possibilities such as we can interface several sensors, actuators like motors, here we did not required any dumper kit to dump the program in to the board Coming to the specification of Arduino Uno micro controller board, it uses Atmega328p-pu as the main micro controller, the operating voltage of the board is 5v, the recommended input voltage and limit input voltage is 7v-12v and 6v-20v.It consists of 14 digital input/output pins, 6 PWM digital input/output pins and 6 analog input pins, the dc current obtained from input/output pins is 20ma, and from 3.3v pin is 50ma.In the case of Arduino programming environment it containing a text editor for writing code and a text console and a tool bar with buttons for common functions and a series of menus, here the Arduino software connects the Arduino hardware to upload programs and communicate with them, We can use bread boards to create our circuits. Arduino software consists of some libraries just like other platforms, they provide extra functionality for use in sketches, we can download or create the libraries by our own. Given below. By exploring the property of symmetry of the transform, the remaining coefficients are calculated.
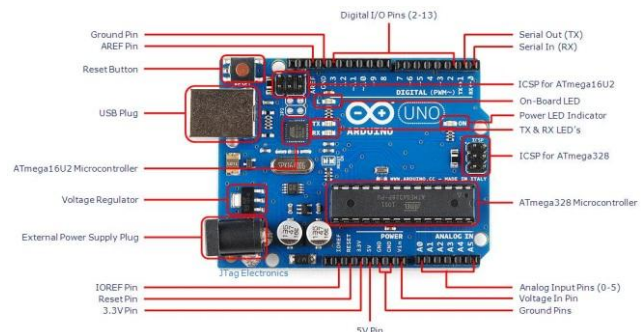

Figure.2. Arduino Uno R3

Atmega328p-pu: It is the main Micro Controller used in Arduino Uno Micro Controller Board. It is a product of Atmel and most Advanced chip it is a 8-bit micro controller based on the CMOS Technology, it has the 32k of flash memory, 1k EEPROM, 2k of internal SRAM, it contains 6-channel 10-bit A/D converter, 3 flexible counters and has the operating voltage of 1.8v-5.5v and it Achieves 1 million instructions per second, the maximum operating frequency of at mega 328p is 20mhz and has the 24 external interrupts. The AT mega 328P provides the features like 32k bytes fin-system program Mable flash with read-while-write capabilities, 1kbytes EEPROM, 2kbytes SRAM, 23 general purposei/olines, 32general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, a serial programmable USART, a byte- oriented2-wireseria linter face, an SPI serial port, a6-channel10-bit ADC (8channelsin TQFP and QFN/MLF packages), a programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The idle modes stops the CPU while allowing the SRAM; timer/counters, USART, 2-wire serial interface, SPI port, and interrupt system to continue functioning. The power-down mode saves the register contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset. In power-save mode, the asynchronous timer continues to run; allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC noise reduction mode stops the CPU and all I/O modules except a synchronous timer and ADC, to minimize switching noise during ADC conversions. In standby mode, the crystal/resonator oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption.
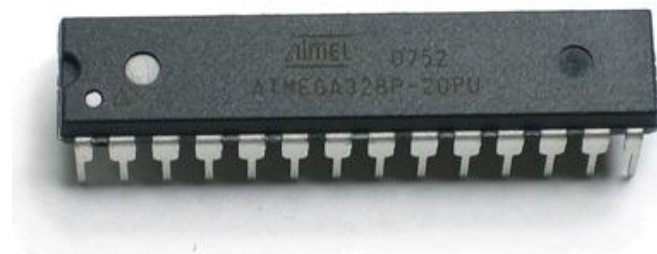
Figure.3.Atmega328p-pu

ULTRASONIC SENSOR:

The Ultra sonic distance sensor provides precise, non-contact distance measurements from about 2cm to 3meters. It is very easy to connect to Micro Controllers, propeller chip, orarduino, requiring only one i/o pin. The sensor has amale3-pinheaderused to supply ground, power and signal. The header may be plugged into a directly into Solder less Bread board, or in to a Standard 3-Wire Extension Cable. The sensor detects objects bye matting a short ultra sonic burst and then" listening" for the echo. Under control of a host micro controller, the sensor emits a short 40 KHz burst. This burst ravels through the air, hits an object and then bounces back to the sensor. The sensor provides an output pulse to the host that will terminate when the echo is detected hence the width of this pulse corresponds to the distance to the target.
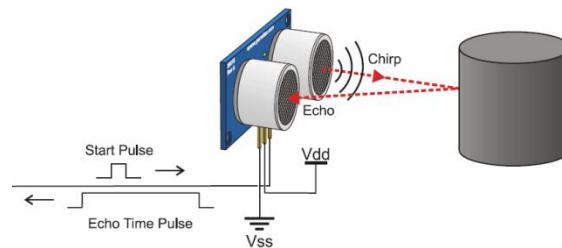
Figure.4.Ultrasonic Sensor:

L293D MOTOR DRIVER IC: L293D is a typical motor driver which allows dc motor to drive. L293D is a16 pin IC which can control motors simultaneously in any direction. We can control two dc motors with a dual H-bridge motor driver Integrated Circuit. it works on the concept of H-bridge. In single L293D chip there are two H-bridges inside to rotate two dc motor independently.

DC MOTORS &BATTERIES: For the working of the robot wheels we used the 150 rpm geared dc motors, the voltage limit of these geared dc motors is 5v-12v which can be connected to the arduino micro controller board through the Motor Driver IC.
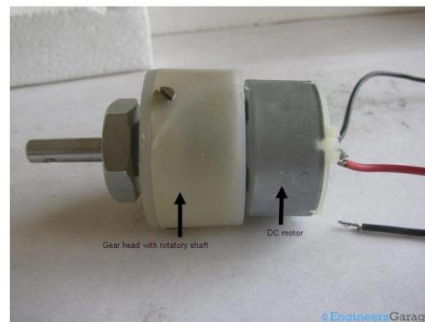
Figure.5. Dc motors &batteries

Lithium Ion Battery is used to supply the power for the rotation of the Motors, the specifications of the Battery is 12V voltage and 2amp ampere hours.


Figure.6. UB1280

SOLAR PANEL: Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating, single solar module can produce only a limited amount of power; Most installations contain multiple modules.

A photovoltaic system typically includes an array of photovoltaic modules, an inverter, and a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.

Figure.7.solar tracking mechanism

HARDWARE KIT
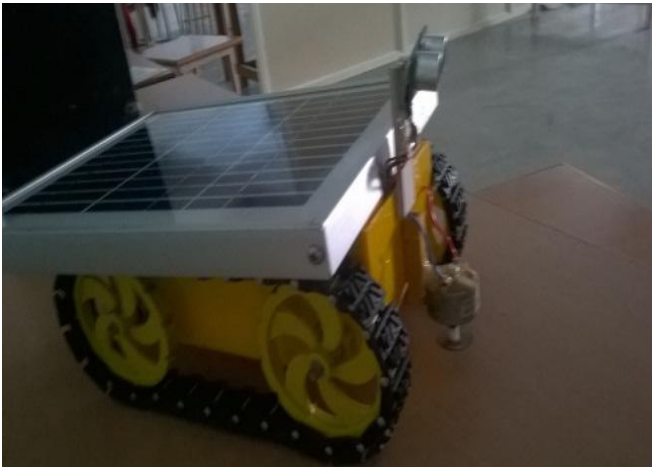
Figure.8.Hardware Kit

IV. RESULTS AND DISCUSSION

By Switching On The Potency Button The Motors Rotating In Forward direction and The Grass Cutting Motor Withal Activates, The Blade Which Is Fine-tuned To The Grass Cutting Motor Cut The Grass, If Any Obstruction Comes In The Way Then The Ultrasonic Sensor Detects The Impediment And Sends The Signal To The Microcontroller Then As Per The Given Program The Micro Controller Transmute The Rotation Of One Of The Motor Then Two Motors Rotates In Antithesis Directions With Each Other Then The Impediment Is Evaded.

V. CONCLUSIONS

By our design determinately we conclude that the Solar Grass Cutter Robot with Impediment Avoidance plays very key role in these days because to reduce pollution due to gas and petrol engines, it reduces the jeopardy for the users.

VI. FUTUREWORK

Size can be reduced to make it compact, Efficiency can be amended by incrementing the battery capacity, More sensors can be incorporated for precise results and ameliorated automation Programming can be enhanced to make the contrivance perform different operations.

VII.REFERENCES

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