Design and Modelling of Hybrid Car Without Steering

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Abstract

Transportation has become one of the lifelines for people as important as breathing. To facilitate the Transportation with comfort while driving and achieving utmost flexibility on operating automobiles is the main objective of this Project. And to reduce the pollution and fuel usage is the main aim of the Project. Hybrid Cars run through charged motors instead of engines and fuel. To eliminate steering, a receiver is attached to the Car. And a transmitter which is smaller fits in hand. Car will be operated respected to hand gestures and movements. Speeding up and down is one of the good features in it.

With travel required for daily work activities and better efficiency expected by people, businesses have to work on quality and provide services as quickly as possible. Future of Hybrid Cars looks bright and they might be a possible solution to this problem. With the threat of fossil fuels getting exhausted, the only viable option to do so is by supercharging the use of Hybrid vehicles.

Keywords: Hybrid Car, Transportation, Steering

INTRODUCTION

Hybrid car is where both technologies which include electric motor powered by batteries and conventional gasoline engine are available in a car to obtain maximum power so that it can achieve fuel economy with low emission. One of the main sources from these two acts as a backup in different situations such as it charges battery when hybrid car travel when down the hills. Most of the hybrid cars provide a function to charge their battery by regenerated energy when the driver uses that brake system. Hybrid car will automatically switches between gasoline and batteries in certain situations when necessary.

Driving does not seem to be a tough job for people who can drive and we have cabs, buses, public transport for people who cannot or do not want to drive. Completely autonomous vehicles may seem just around the corner to a few optimistic minds. What artificial intelligence aims to do is make intelligent machines, machines that can do things we only thought humans can, and self-driving cars fall under the large umbrella of tasks to achieve that.

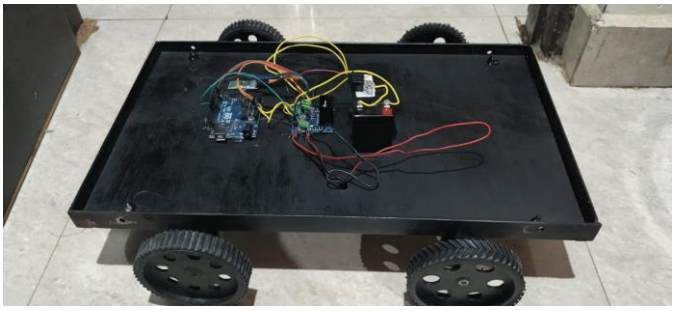


Figure 1. Hybrid Car Without Steering

RELATED WORK

This paper is about controlling a toy car using an android mobile system using wireless technology such as Bluetooth, Wi-Fi. The toy car is constructed using 4 stepper motors and its motor drives and an MCU main chip through which the communication between the car and mobile phone is enabled. As soon as the chip in the car is switched on, the mobile phone and the chip are paired through Bluetooth. Hence, the connection takes place and the communication for the movement of the car is passed through this channel. Using this paper as the reference, the 2 wheeler vehicle is replaced by 4 wheeler and MCU chip by ESP8266 Wifi module. The BT technology used in this paper is also replaced by wifi communication between the wifi module in the car and the mobile APP designed for the car control.

For making the system of Hybrid Car without steering, there are 2 software used as for the coding of Arduino, and for developing app to give the command to the leader vehicle.

For designing of Hybrid Car Without Steering, software plays important role same as that of hardware part. Arduino is used in the system, and Arduino is coded using Arduino IDE software. It is coded in similar language as C/C++ programming language. Another software is required to develop the app for android device that is used to give command to the leader vehicle. Almost all the electronic component requires certain type of software for giving instruction as coding.

The Arduino IDE is software platform/application used in Windows and Linux, for coding purpose and programming language used for coding is C/C++. It is application that is used to program Arduino board according to the need. Arduino IDE is software platform used for coding Arduino, and full form of IDE is "Integrated Development Environment ". An official platform developed by arduino.cc for writing, compiling, uploading code in Arduino board is Arduino IDE. This is an open source software which is compatible for all types of Arduino board and this software has easy access for its installation and compiling code.

In Mobile Phones,Arduino Bluetooth Control is an application that allows you to control your arduino board (and similar boards) via Bluetooth, and so to create awesome and fully customized projects, with the new features available within

the app.

Table 1. List of Electrical Components of Hybrid Car

MAJOR COMPONENTS USED	WORKING
NodeMCU Breakout Board	Wi-Fi module, allows connection withandroid/mobile app.
Arduino Uno	It is a microcontroller board.
Battery	12V, Lithium- ion battery
DC Motor	60RPM 12V
Dual H-Bridge motor driver	Controls motor motion.

1.ARDUINO UNO

It is basically it is microcontroller board. The architecture of this board as; 14 digital pins of IO (input/output) including6 pins that are used for PWM outputs, there are 6 pins of analog input, power jack, USB cable port, quartz crystal of 16MHZ, "ICSP header" and a button for reset. It is used in almost all communications and to control and operate several devices.



Figure 2. Arduino Uno

2.DUAL H-BRIDGE MOTOR DRIVER

The motor driver that basically has 15-lead Milliwatt and PowerSO20 packages with an integrated monolithic circuit. It is designed as high current, high voltage, dual full bridge driver for accepting standard level of TTL logic level and is usedto drive inductive loads like solenoids, relays, DC and stepping motors.

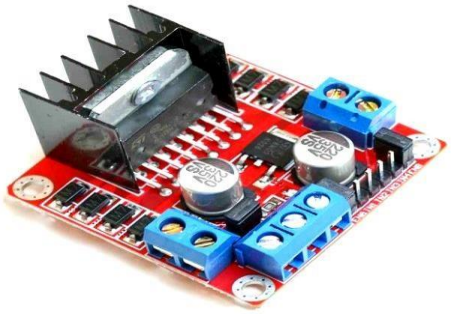


Figure 3. Dual H-Bridge Motor Driver L298

The emitters are connected together of lower transistors for each bridge and the respective external terminal is used for giving connection to an external sensing resistor. So basically, it is a "Dual H-Bridge motor driver" which is used for controlling speed and distance of two DC motor at the same time. The module is used to drive the motor of range between 5V to 35V, and peak current upto 2A.

3.NODEMCU BREAKOUT BOARD

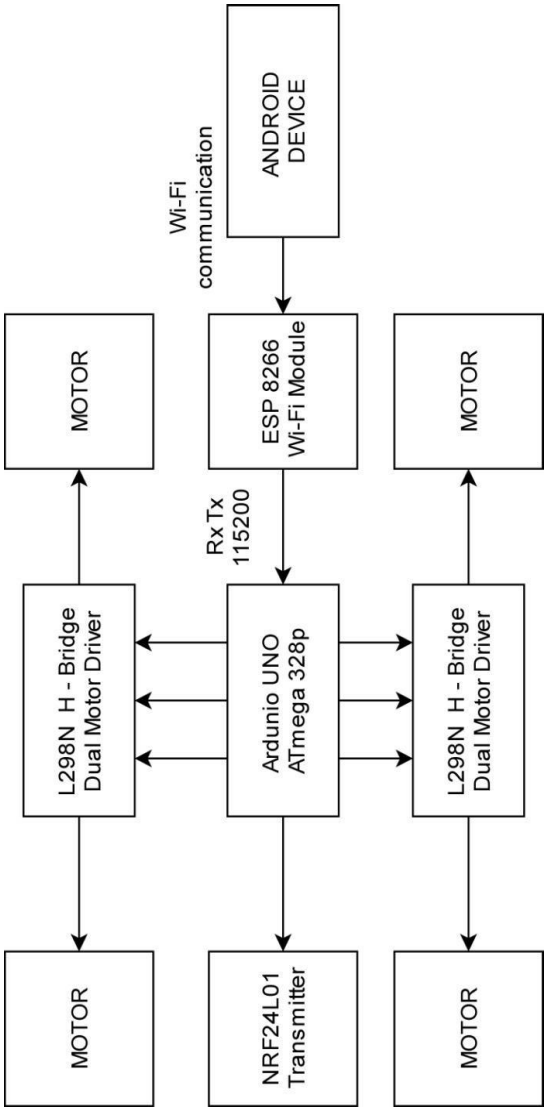
The NodeMCU ESP8266 controls the robot car in open where working of Wi-Fi module is not possible and works in access point mode. It is an open source "IoT platform".

NodeMCU is the Wi-Fi module that is equivalent to the ethernet module. It is the combination of microcontroller with Wi-Fi access station. Because of all these kind of features NodeMcu is very powerful tool for purpose of Wi-Fi networking. With the help of this, it is possible to access station and/or point, hosting web server or uploading or fetching data by connecting to the internet.



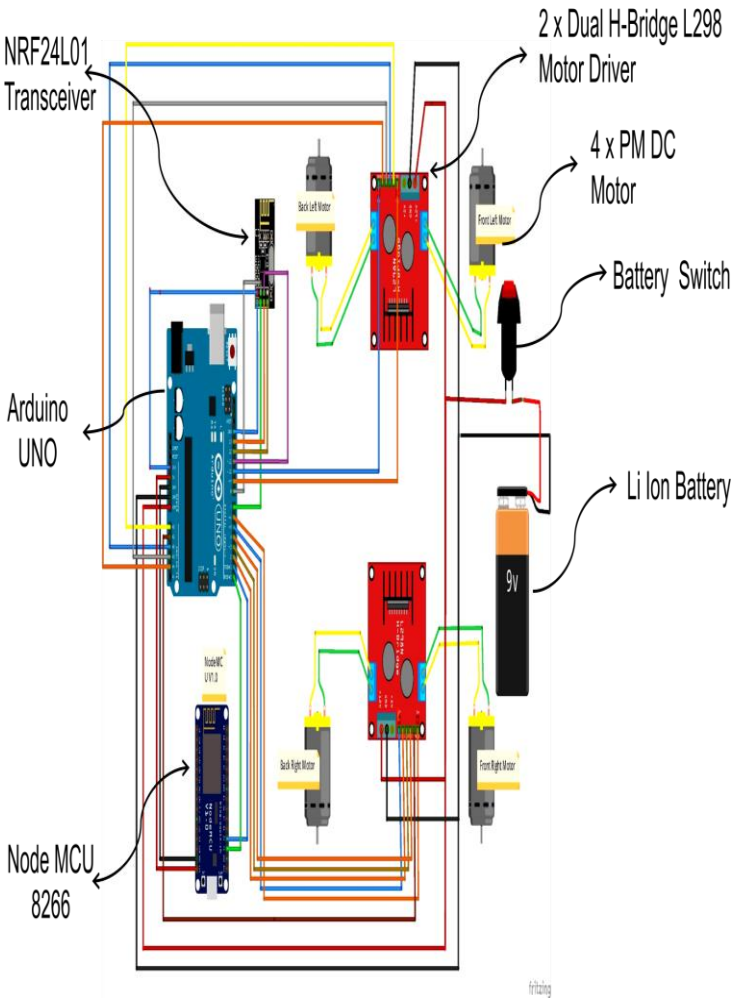
Figure 4. NodeMCU

BLOCK DIAGRAM OF HYBRID CAR WITHOUT STEERING



The basic block diagram of hybrid vehicle is shown in Figure. This block diagram represents the basic working and connections of the hybrid vehicle, where there are 4 motors, one Arduino Uno, dual h-bridge motor driver, nodemcu and android device. When the signal by operator is given to the vehicle by android app which will be connected through Wi-Fi module (Nodemcu) to the vehicle will give the instruction to the motor through the Arduino and motor driver will control the speed and direction of rotation of the motor

CIRCUIT DIAGRAM OF HYBRID CAR WITHOUT STEERING



The circuit diagram of Hybrid vehicle is shown above in Fig it shows the wiring of leader vehicle.Hybrid vehicle is controlled by the android device for controlling hybrid vehicle through Wi-Fi connection.

At first connection is established between android device and NodeMCU used in vehicle, i.e. Wi-Fi connection, then using app in android phone forward/backward/left/right direction is given to the vehicle.

The vehicle has Arduino Uno which is a microcontroller connected between the NodeMCU and motor driver which is coded according to the required speed of vehicle and distance between adjacent vehicles. It has battery of 9V or two batteries each of 3.7V can be used. The battery of 3.7V is preferred for Arduino board.

Table2.List Of Mechanical Components Of Hybrid Car

Part	Specifications
1.Chasis - Cast Iron (L angular Frame)	40cm * 30 cm
2. Tyres - Polymer	10cm dia 5cm width
3. Wooden Sheet	8mm thickness - 39cm * 29cm(to fit in the chasis)

SOCIAL RELEVENCE AND FUTURISTIC APPROACH

Hybrid vehicles have increased capabilities and efficiency to maintain and manage the car. They react smartly to situations such as low battery power, by switching to the gasoline engine. Using the electric motor on lower speeds and while driving around the city will result in huge decrease of amount paid for petrol/diesel filling. When the car runs on the motor, there is zero consumption of fuel, which not only looks good in terms of budget but also provides to a cleaner and zero pollution safer environment. Unlike electric vehicle users who are at times left stranded with not being able to find an electric station for miles, hybrid users don't have to worry about such stations. The dual system switches smoothly from motor to the IC engine when it runs out of charge. While it runs on the engine, the regenerative braking system keeps charging the battery. Maintenance of a hybrid car does not cost more than that of a regular gasoline car. In some cases, the routine checkup costs lower since motor is used more to run on. (Valleydrivingschool.com, 2018) The hybrid variants are very silent vehicles when running on the motor. Hence, making it friendlier when driving around hospitals or schools.

Yet with the touch of modern technology, you can now see cars without steering on the road. There are even some self-driving cars that have no pedals! Today we will learn about some models of self-driving cars that have no steering wheel, no pedals. Since 2019, General Motors has been working on one such car, the Cruise AV.

General Motors has always wanted to build cars that can move smoothly on the road. And they have worked on how to reduce car accidents. About 94% of road accidents are caused by human negligence. Self-driving cars are coming to the market to solve the problem of car parking and speed with the right, right place technology.

RESULTS AND CONCLUSION

After the implementation of overall hardware/software of the project, we have achieved the required outcome. After giving command to the hybrid vehicle by android device it moves accordingly

The app used to give command to the leader vehicle by the operator is user friendly and easy to operate for motion in any direction, we just have to press the same direction logo after connecting it to the Wi-Fi module of the hybrid vehicle

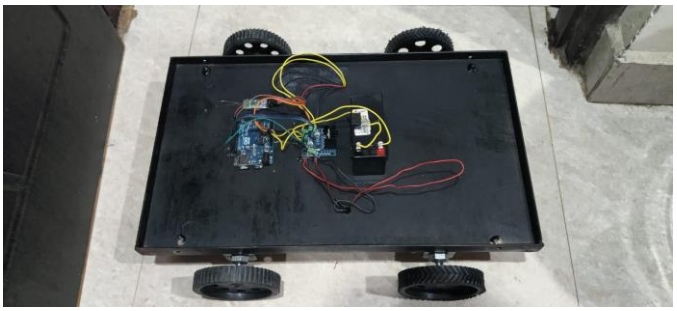


Fig5.Hybrid Car Without Steering Top View

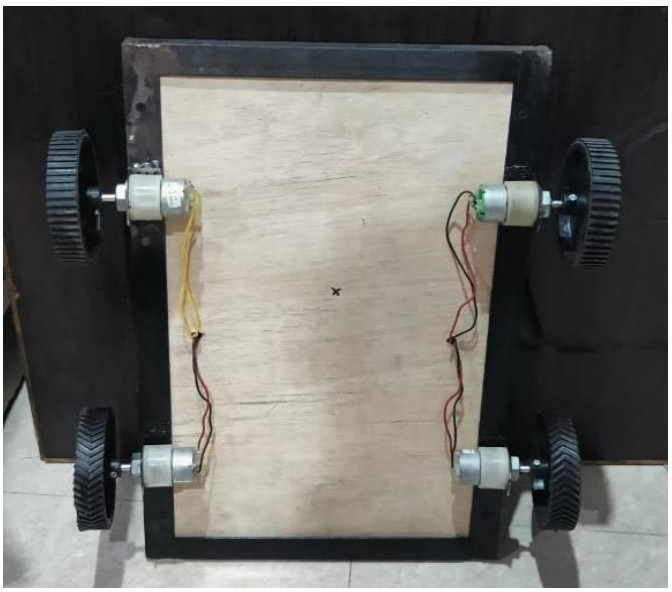


Fig6.Hybrid Car Lower View

CONCLUSION

This report contains an approach of making the system of steeringless hybrid vehicle, i.e. "automated vehicle" more efficient and less time consuming by allowing vehicles to move at its highest speed with less human interaction. This increases the capacity of the road and reduces the human based errors like accidents due to carelessness of driver. It prevents the collision between vehicles even when they are moving close enough with their high speed. This will help in automation of industries where this concept can be used to carry raw materials or any other product from one to another in less time and make it more efficient.

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