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Design an electric car with manual navigation and PWM speed control system

ABSTRACT: This research examines how an electric automobile works and compares it to internal combustion engines and hybrid vehicles. The study covers some of the advantages and disadvantages of electric vehicles. There's also a quick look into the technology's future. Different buttons control different speed grades and directions. Experiments have shown that this system is more effective.

Keywords—internal combustion engines, gasoline engines

INTRODUCTION : In the 1960s and 1970s, electric cars were required to address the problems of internal combustion engine exhaust pollution and to reduce reliance on imported foreign crude oil. Between 1960 and today, numerous attempts to construct practical electric cars have been made and continue to be made.

The purpose of this paper is to describe the technologies used to create an electric vehicle and to show why an electric engine is superior to an internal combustion engine. It explains why the electric automobile has exploded in popularity and why it is now considered a necessity for a better future. The research looks at the most important aspects of an electric or hybrid vehicle. Electric vehicles are pitted against hybrids and internal combustion engines. It also discusses the future of electric vehicles. The electric car's overall influence benefits people in the long run. Electric vehicles are 97% cleaner than gasoline-powered vehicles, with no exhaust emissions that might cause particulate matter to enter the atmosphere. Particulate matter, a form of carcinogen emitted into the atmosphere by gasoline-powered vehicles, "may worsen asthma and irritate respiratory systems" [1].

The paper begins with a summary of the electric car's history, highlighting manufacturing lows and highs as well as the factors that influenced progress. The sections that follow provide a technical overview of an electric car, including its components, functions, and theory of functioning. The next section goes into the parts of a hybrid car, their functions, and the theory of operation. Based on this knowledge, I compare the efficiency, speed, acceleration, maintenance, mileage, and cost of the internal combustion engine, hybrid engine, and electric engine. The report concludes with sections on the advantages and disadvantages of electric vehicles, as well as their possibilities for the future.

ELECTRIC CAR (EC) HISTORY : Between 1832 and 1839, Robert Anderson, the inventor of the first crude electric vehicle, constructed the first electric car (EV) in Scotland; the exact year is uncertain. America did not pay attentionto the electric car until 1895, when A.L. Ryker produced an electric tricycle and William Morrison built a six-passenger wagon. Wood constructed the Electric Phaeton in 1902, which was more than an electrified horseless carriage and surrey. "The Phaeton had a range of 18 miles, a top speed of 14 mph, and a $2,000 price tag" [2].

Electric car utilization and manufacture began to decline in the 1920s. The reduction in output is attributed to an improved road infrastructure, lower fuel prices due to the discovery of Texas crude oil, the advent of the electric starter, and mass production of internal combustion engine cars [2]. According to the History of Electric Cars, "an electric roadster sold for $1,750 in 1912, while a gasoline automobile sold for $650." [2, p. 1]; [3, p. 1]; [4, p. 1]; [5, p. 1]; [6, p. 1]; [7, p. 1]; By 1935, electric autos had all but vanished.

AN ELECTRIC CAR'S DESCRIPTION :

The electric car (EC) is propelled by an electric motor that is powered by rechargeable battery packs rather than a gasoline engine. From the outside, the automobile does not appear to be electric. Electric vehicles are often created by converting a gasoline-powered vehicle. The car's near-silent operation is frequently the only sign that it is electric [5].

Under the hood of the electric vehicle is an electric motor. A controller and a rechargeable battery The electric motor is controlled by a controller, which is powered by a rechargeable battery. Electricity and current are at the heart of the electric car's operation. A battery pack is used to power the electric motor (batteries). Using the electricity (voltage) obtained from the batteries, the motor rotates a gearbox, which turns the wheels [3]. A potentiometer, batteries, a direct current (DC) controller, and a motor are the four major components of an electric car. The situation is depicted in Figure 1.

PARTS AND THEIR FUNCTIONS ARE DESCRIBED IN DETAIL:

Potentiometer. It has a spherical shape with a cable that connects it to the accelerator pedal. The potentiometer, also known as a variable resistor, delivers a signal to the controller telling it how much power to supply.

Batteries: The controller is run on batteries. The three types of batteries are lead acid, lithium ion, and nickel-metal hydride. The voltage of batteries changes with time (power).

DC Controller: The controller is responsible for transferring power from the batteries to the motor.

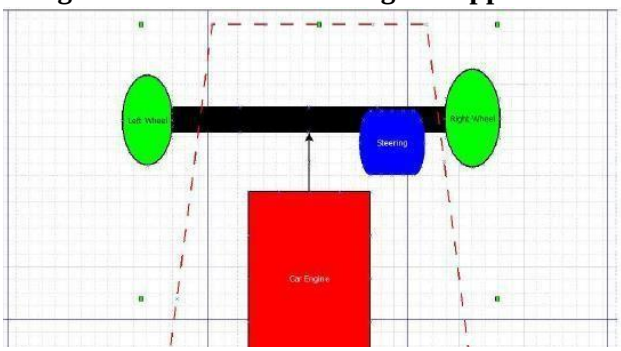
The controller can provide zero power, full power (when the driver depresses the accelerator pedal), or any power level in between when the vehicle is stationary. If the battery pack contains twelve 12-volt batteries linked in line to provide 144 volts, the controller takes in 144 volts direct current and provides it to the motor in a regulated manner [3].

The controller reads the potentiometer settings on the accelerator pedal and changes the power accordingly. When the accelerator pedal is 25% depressed,the controller pulses the power so that it is on 25% of the

time and off 75% of the time. The controller will not work if the signals from both potentiometers are not equal [3]. **Motor**: The controller provides power to the motor, which rotates a gearbox. The transmission then drives the car forward by turning the wheels.

SOFTWARE IMPLEMENTATION :

Design an electric car with diagram application:

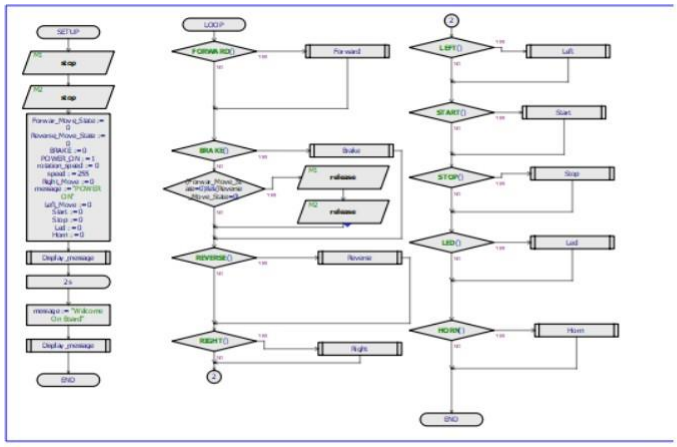


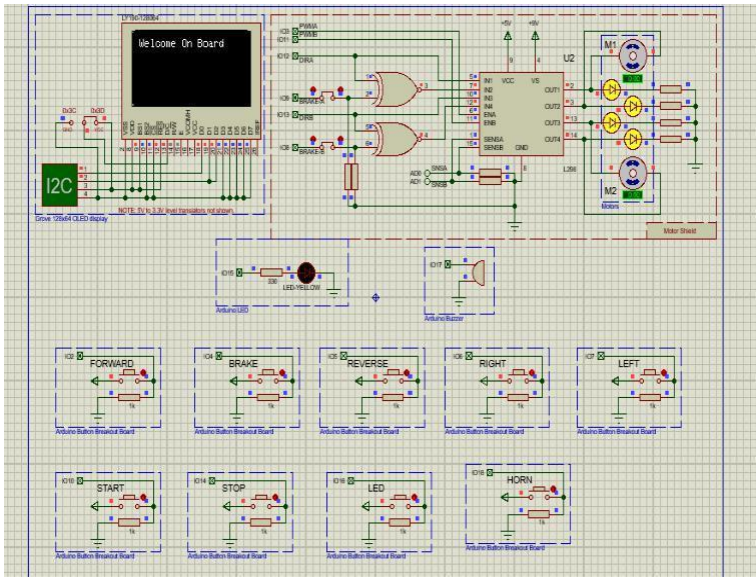
Design an electric car with manual navigation and PWM speed control:

Experimental Procedure:

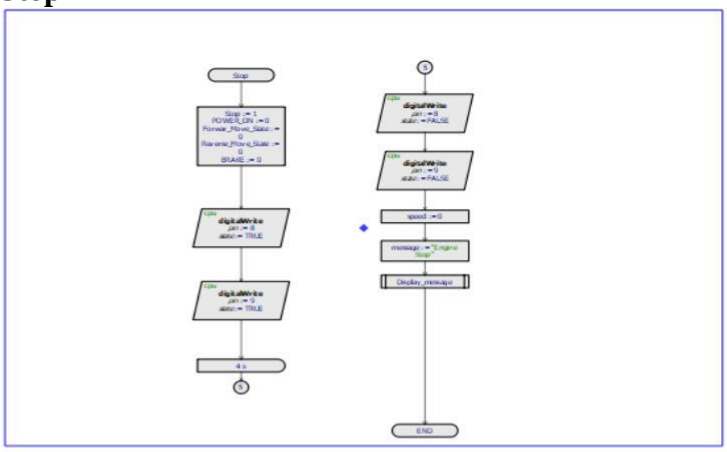
Simulation in Proteus:

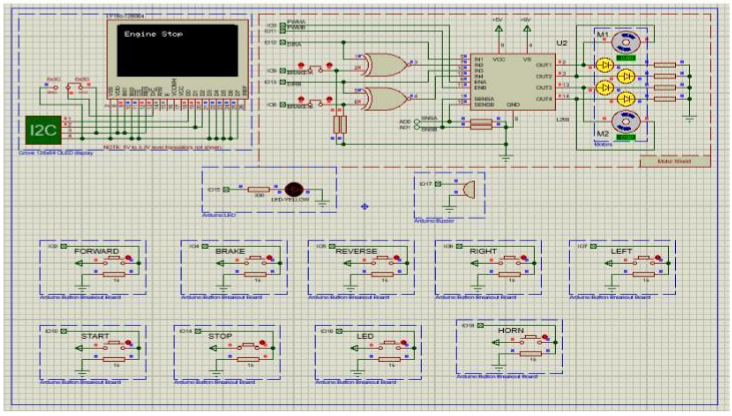
Start



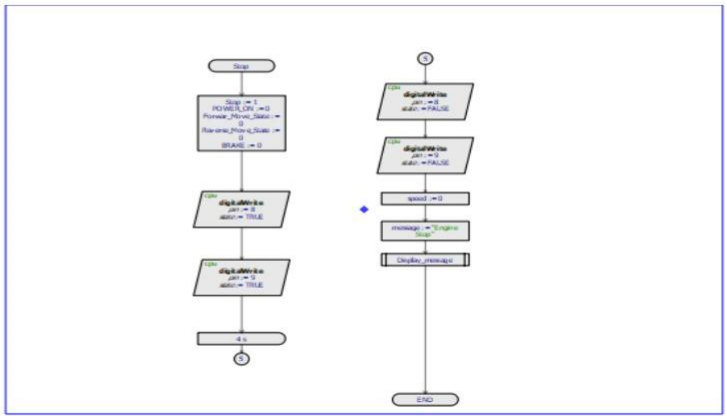


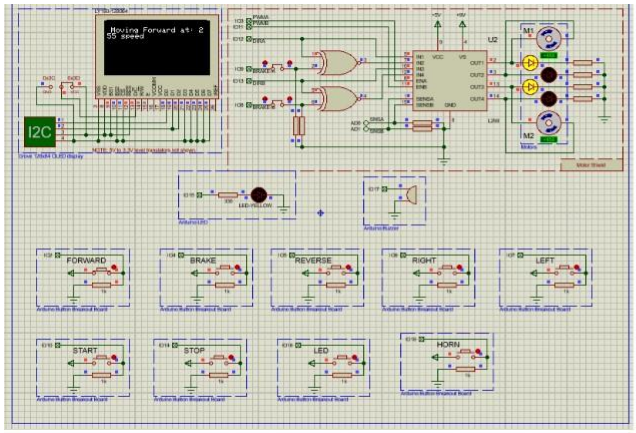
Stop



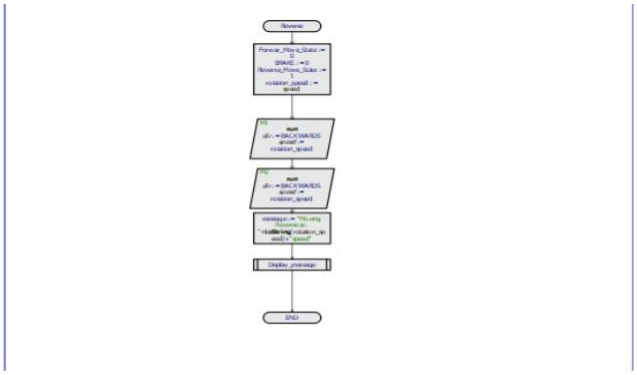


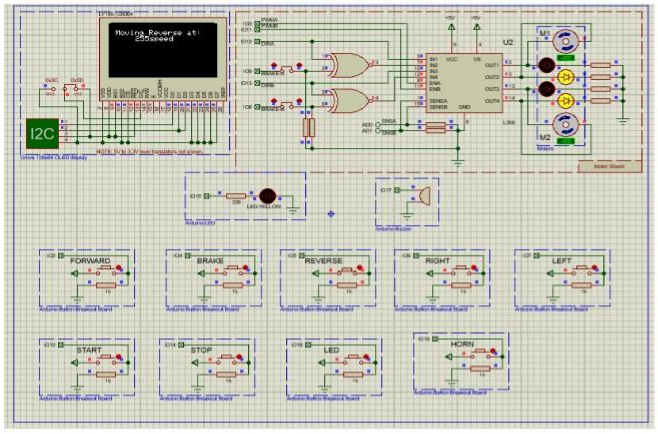
Forward



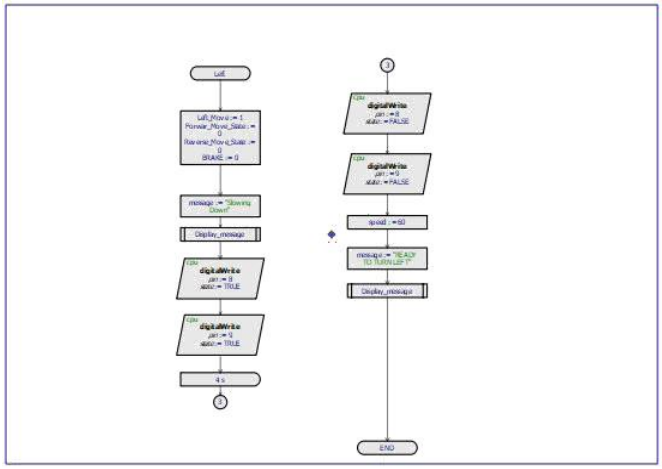


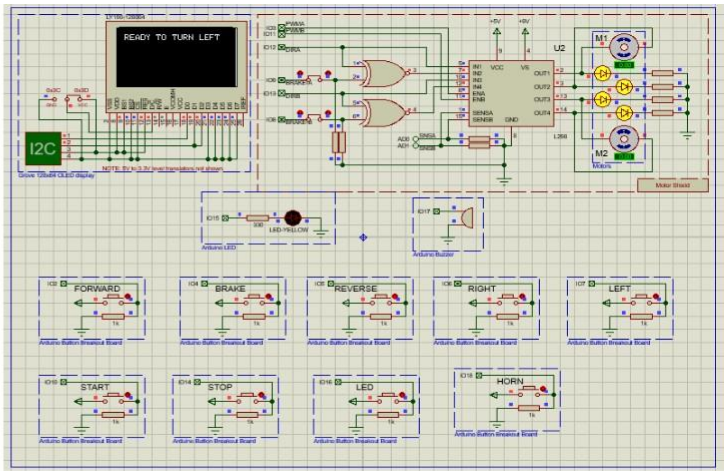
Reverse



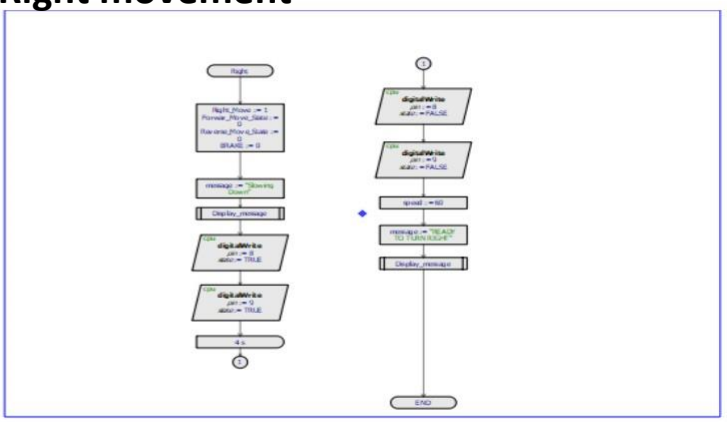


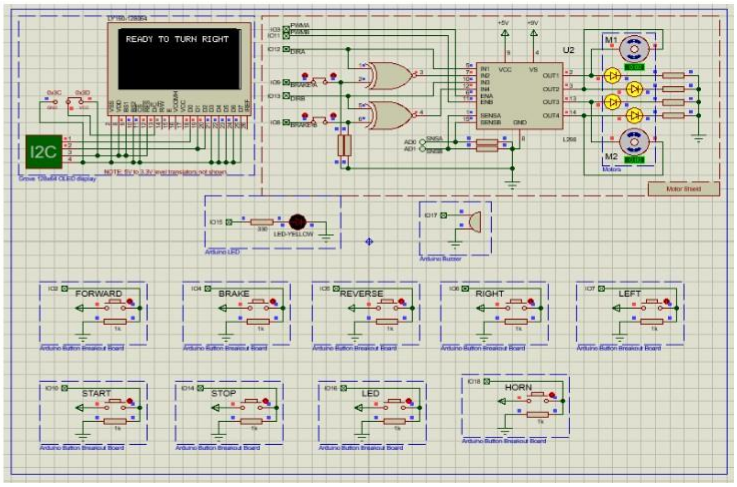
Left movement



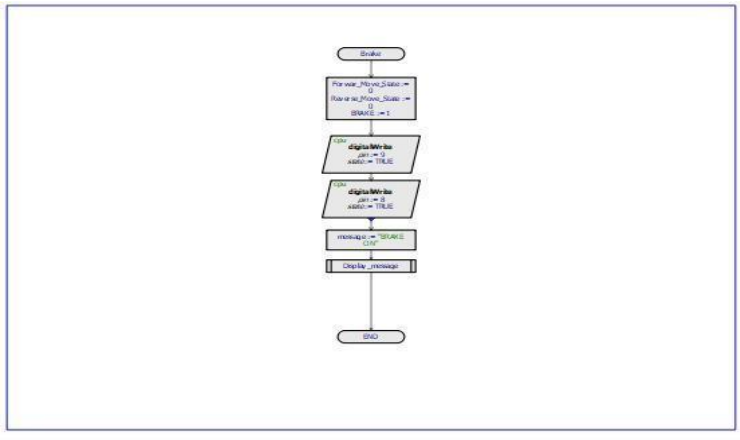


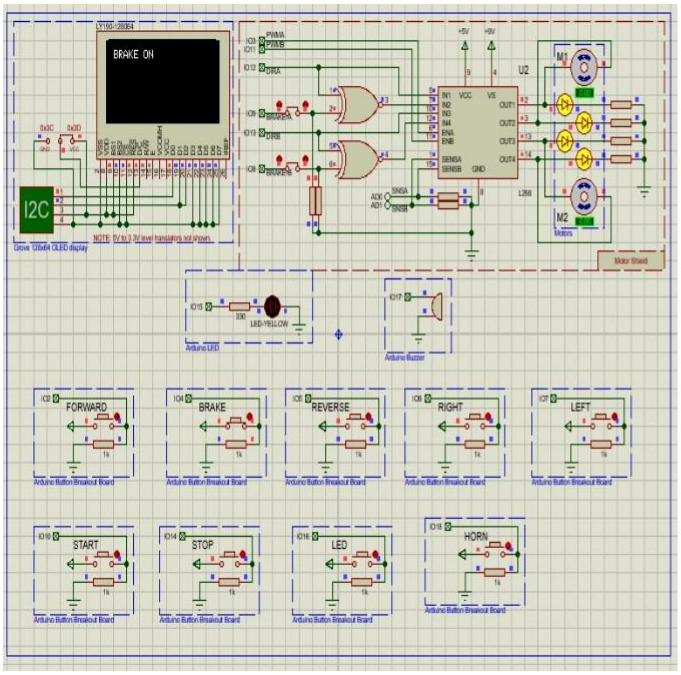
Right movement

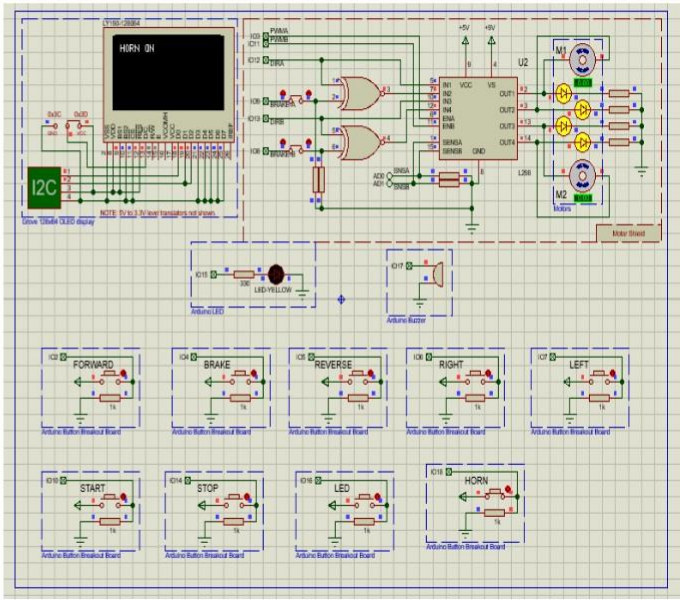




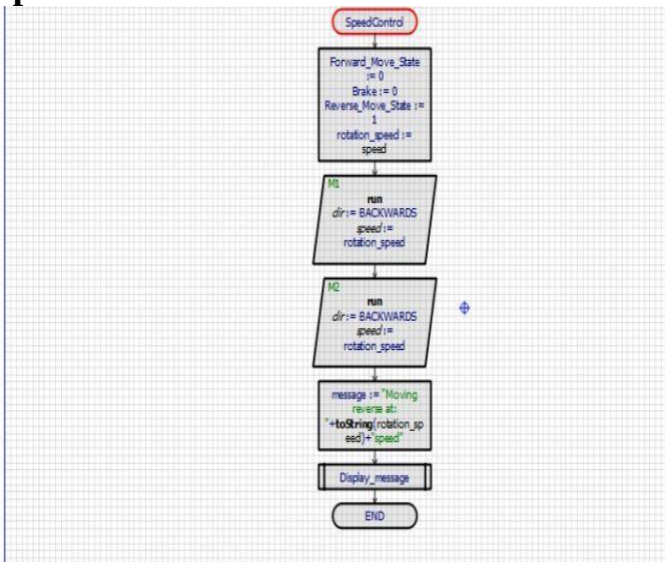
Break



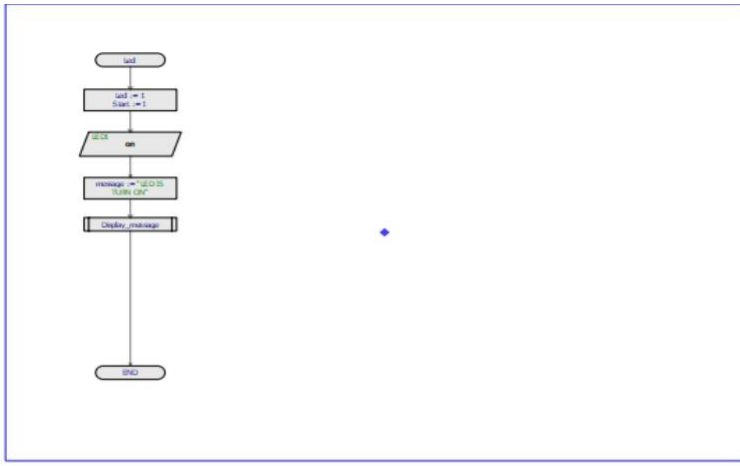




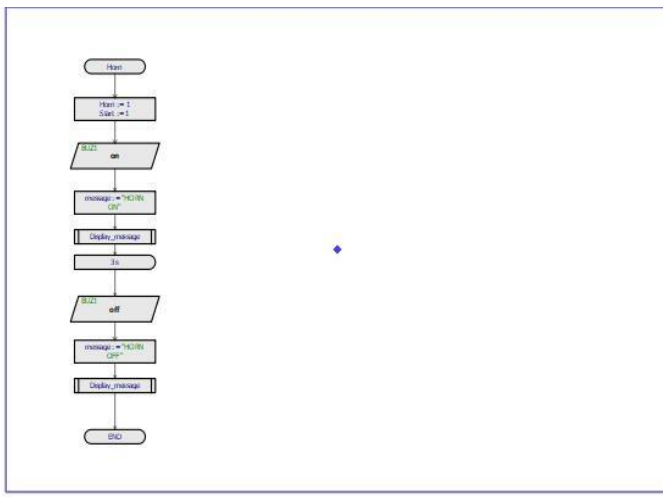
Speed control

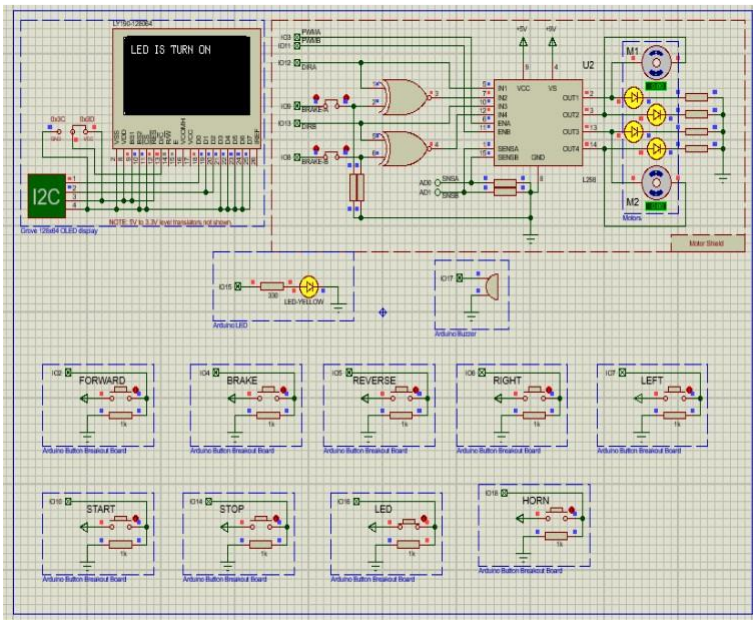


Led light



Horn





EC'S THEORY OF OPERATION :

The potentiometer activates when the driver pushes the pedal, sending a signal to the controller that tells it how much power to deliver. Two potentiometers are included for safety. The controller reads the potentiometers to detect the location of the accelerator pedal, adjusts the power, and draws electricity from the batteries to power the motor. The controller controls the flow of electricity (voltage) to the motor that rotates the transmission. The transmission then turns the wheels to propel the car forward or backward. When the driver fully depresses the accelerator pedal, the controller transmits the entire battery voltage to the motor. When the driver takes his or her foot off the accelerator, the controller gives the motor 0 volts. For each setting in between, the controller trims the battery voltage thousands of times per second to deliver an average voltage somewhere between 0 and full battery pack voltage.

A HYBRID CAR'S DEFINITION:

The hybrid automobile is powered by a gasoline engine and an electric motor (HV).
Argueta has a 4 point total.
An internal combustion engine and an electric motor combine to power the HV. The engine provides the majority of the car's power, with the electric motor providing additional power as needed, such as when accelerating or passing [4].
Both fuel and electricity are used to power the hybrid car. A hybrid vehicle has a small, fuel-efficient gas engine that works in concert with an electric motor to accelerate the vehicle. The electric motor is powered by batteries that are replenished automatically while driving [4].
A battery, an internal combustion engine (ICE), a generator, a power split device, and an electric motor are the five main components of a hybrid car.

PARTS AND THEIR FUNCTIONS ARE DESCRIBED IN DETAIL:

Battery: The batteries in a hybrid car serve as an energy storage device for the electric motor. The electric motor in a hybrid car can both put and receive energy from the batteries, unlike gasoline in a fuel tank, which can only power the gasoline engine.Internal Combustion Engine (IC Engine) is a type of internal combustion engine (ICE). The hybrid vehicle is powered by an internal combustion engine (ICE), sometimes known as a gasoline engine, which is comparable to those found in most automobiles. A hybrid, on the other hand, is equipped with a smaller engine that employs advanced technologies to reduce emissions and increase economy.
Generator: The generator looks like an electric motor, but its main job is to power the batteries with electricity.

5 Power Split Device by Argueta: The power-split device is located between the two motors and generates a sort of continuously variable transmission when combined with the two motors.
The motor is powered by electricity. A hybrid car's electric motor serves as both a motor and a generator. For example, it uses energy from the batteries to accelerate the car when necessary. However, by working as a generator, it slows down the car and recharges the batteries.

HYBRID THEORY OF OPERATION :

The generator transfers energy from the engine into electricity and stores it in the battery when the driver steps on the pedal. The electric motor is then powered by the battery. Both the internal combustion engine and the electric motor operate at the same time, supplying power to the power split device. The power split device combines the two sources of power and uses them to turn the transmission. The transmission then drives the car forward by turning the wheels.
When braking, the energy is converted to electricity and stored in the battery.
The electric motor is reversed when braking, so that instead of using electricity to spin the wheels, the rotating wheels turn the motor and generate power. The car slows down when energy from the wheels is used to turn the motor. When the car comes to a complete stop, the gasoline engine and electric motor immediately turn off to save energy. Auxiliary systems, such as the air conditioning and dashboard displays, are still powered by the battery.

GLOBAL WARMING: OZONE LAYER

Carbon dioxide emissions into the atmosphere, often known as global warming, deplete the Earth's ozone layer, which is what is happening currently. Electric cars are clean since they use half the number of parts, including gasoline and oil, as a gasoline-powered car.

THE EC'S ADVANTAGES AND DISADVANTAGES :

The rechargeable battery is the most significant problem that EVs face. Most electric cars can only travel 100–200 miles before needing to be recharged, and fully charging the battery pack can take four to eight hours. Battery packs are bulky, expensive, and take up a lot of room in cars [5].
Overall, the electric car offers more benefits than drawbacks. There are no tailpipe emissions, which means less global warming and fewer unhealthy individuals. The advantages and cons of the EV are summarized in Table 2.
Advantages
Any source of power, which is found in most homes and companies, can be used to generate fuel.

It reduces hydrocarbon and carbon monoxide emissions by 98 percent, reducing a range of environmental problems.

Disadvantages

The amount of distance that can be driven before the battery dies is limited.

Accessories like as air conditioning and radios drain the battery.

The automobile is made heavier by electric motors, batteries, chargers, and controllers. The parts cost more, so it's more expensive.

PEOPLE AFFECTED: ILLNESS

Particulate matter, a type of carcinogen emitted into the environment by gasoline-powered vehicles, "may worsen asthma and irritate respiratory systems," according to the researchers. [1]. Internal combustion engines emit carbon dioxide into the atmosphere, depleting the ozone layer, which absorbs 97 to 99 percent of the sun's high-frequency UV radiation [7]. According to Ozone Layer, "every one percent drop in the earth's ozone barrier is expected to increase the quantity of UV light exposure to the lower atmosphere by two percent." [7]. The ultraviolet light from the sun is extremely harmful to life on Earth. UV light damages the skin, which leads to skin cancer. It is also harmful to aquatic life and the eyes.

THE ELECTRIC CAR'S FUTURE:

Future electric automobiles will almost definitely use lithium-ion phosphate (LiFePO4) batteries, which are becoming more widespread in other countries. LiFePO4 batteries, which are rechargeable and strong, are used in electric motorcycles and scooters. Electric cars will most likely embrace this technology in the future. Another technology that could be used in future electric cars is the growing use of super capacitors and ultra-capacitors for storing and delivering electrical charge. Many of these batteries are currently being used in hybrid car prototypes, thus they should be used in future electric car markets as well. If developers can build cars with a range of 300 miles per charge, a charging period of five to ten minutes, and driver safety, the market for future electric autos will be wide open. Researchers are working on new battery technologies that will increase driving range while reducing recharging time, weight, and cost. These factors will influence the future of electric vehicles [8].

CONCLUSION :

The electric automobile has various advantages and benefits over the internal combustion engine and hybrid car, as demonstrated in this study. It is more efficient and cleaner, but it has negatives as well. It is heavier, has a shorter range before requiring recharging, and is more expensive. The battery is critical to the electric car's future success. If researchers can construct or find the "super battery," the future of electric cars is bright. Currently, each automobile has its own distinguishing trait that sets it apart from the competition. Only time will tell which car will be the most successful in the future, as will technological improvements.

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