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ABSTRACT: Due to the extreme negative effects of gasoline engines on the environment and people, the automotive industry has shifted to electric cars. This study describes the operation of an electric car and compares it to internal combustion engines and hybrid car. The research outlines some of the benefits and drawbacks of electric cars. A brief future picture of the technology is also provided.

INTRODUCTION

Electric car were needed in the 1960s and 1970s to alleviate the difficulties of internal combustion engine exhaust pollution and to lessen reliance on imported foreign crude oil. Many attempts to build workable electric cars occurred and continue to occur between 1960 and the present.

The goal of this paper is to outline the technology that goes into making an electric car and to demonstrate why an electric engine is superior to an internal combustion engine. It explains why the electric car has grown so quickly and why it is now a must for a better future. The study goes over the most significant components of an electric or hybrid car. It contrasts electric cars with hybrids and internal combustion engines. It also covers the electric car's future. The entire impact of the electric car helps individuals in the long run. Electric cars are ninety-seven percent cleaner than gasoline-powered cars, with no exhaust emissions that can cause particulate matter to enter the air. Particulate matter, a type of carcinogen spewed into the environment by gasoline-powered cars, “can aggravate asthma and irritate respiratory systems” [1].

The paper opens with an overview of the electric car's history, including manufacturing lows and highs as well as the causes for change. The following section gives a technical overview of an electric car, including its components, functions, and operation theory. The hybrid car is described in the next section, which includes parts, their roles, and the theory of functioning. I then compare the internal combustion engine, hybrid engine, and electric engine in terms of efficiency, speed, acceleration, maintenance, mileage, and cost based on this knowledge. The study finishes with sections on the benefits and drawbacks of electric cars, as well as their future prospects.

ELECTRIC CAR (EC) HISTORY

Robert Anderson, who invented the first primitive electric carriage, developed the first electric car (EV) in Scotland between 1832 and 1839, the precise year is unknown. America did not pay attention to the electric car until 1895, when A.L. Ryker produced an electric tricycle and William Morrison built a six-passenger wagon. The Electric Phaeton, which was more than an electrified horseless car and surrey, was built by Wood in 1902. “The Phaeton had an 18-mile range, a top speed of 14 mph, and a price tag of $2,000” [2].

In the 1920s, the use and production of electric cars began to fall. A better road system, lower fuel prices due to the discovery of Texas crude oil, the introduction of the electric starter, and mass manufacture of internal combustion engine cars are all factors contributing to the fall in production

[2]. “In 1912, an electric roadster sold for $1,750, while a gasoline car went for $650,” according to the History of Electric cars. [2, p. 1]; [3, p. 1]; [4, p. Electric automobiles had all but vanished by 1935.

AN ELECTRIC CAR'S DESCRIPTION

Rather of a gasoline engine, the electric car (EC) is propelled by an electric motor that is powered by rechargeable battery packs. The car does not look to be electric from the exterior. Electric automobiles are usually manufactured by converting a gasoline-powered car. The fact that the car is nearly silent is often the only indication that it is electric [5].

The electric automobile has an electric motor under the hood.

A rechargeable battery and a controller

The controller provides power to the electric motor, and the controller is powered by a rechargeable battery.

The electric car works on the principle of electricity and current. To power the electric motor, it utilizes a battery pack (batteries). The motor then rotates a gearbox, which turns the wheels [3], using the power (voltage) obtained from the batteries.

The electric car is made up of four major components: a potentiometer, batteries, a direct current (DC) controller, and a motor. Figure 1 shows the situation.

PARTS AND THEIR FUNCTIONS ARE DESCRIBED IN DETAIL.

Potentiometer. It has a round form and is connected to the accelerator pedal by a cable. The potentiometer, also known as a variable resistor, sends a signal to the controller that tells it how much power it should give.

Batteries: The controller is powered by the batteries. Lead acid, lithium ion, and nickel-metal hydride batteries are the three types of batteries. The voltage of batteries varies (power).

DC Controller: The controller transfers energy from the batteries to the motor.

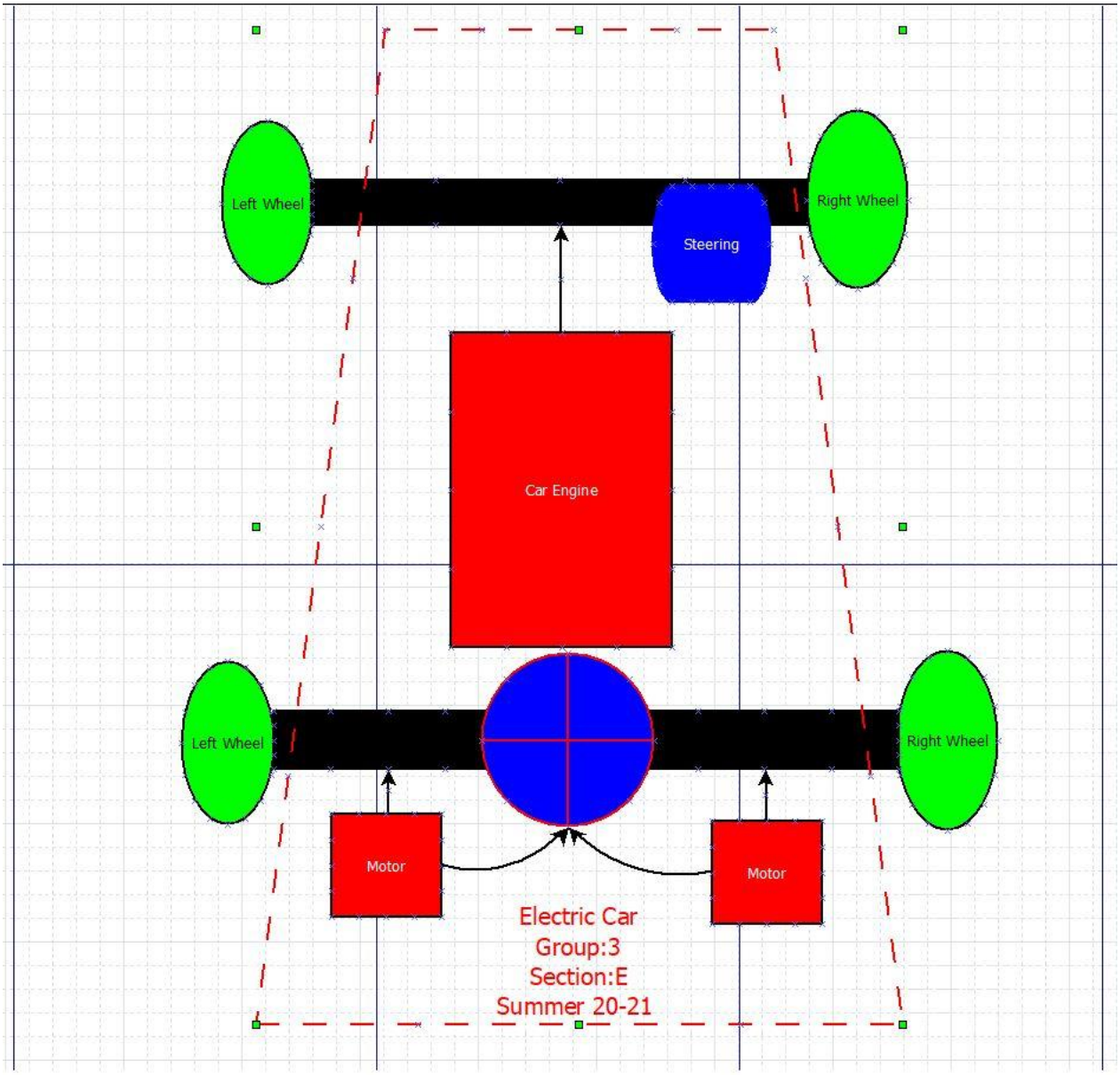
When the automobile is stationary, the controller can give zero power, full power (when the driver depresses the accelerator pedal), or any power level in between. The controller takes in 144 volts direct current and provides it to the motor in a controlled manner if the battery pack has twelve 12-volt batteries linked in line to create 144 volts [3].

The controller reads the settings of the two potentiometers on the accelerator pedal and adjusts 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

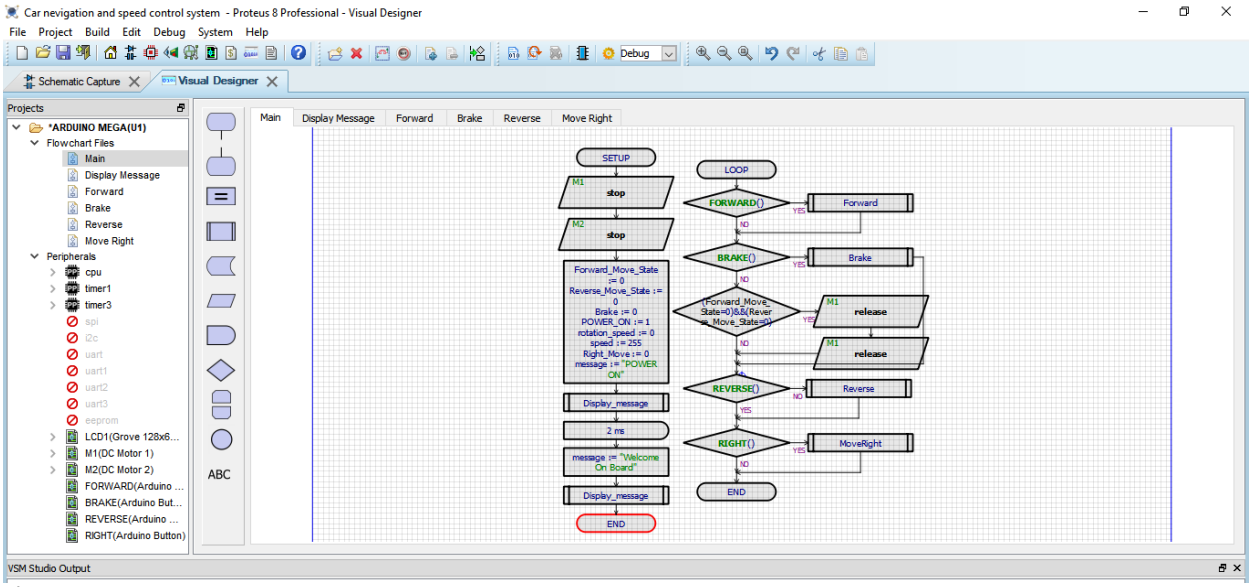
Design an electric car with dia diagram application:



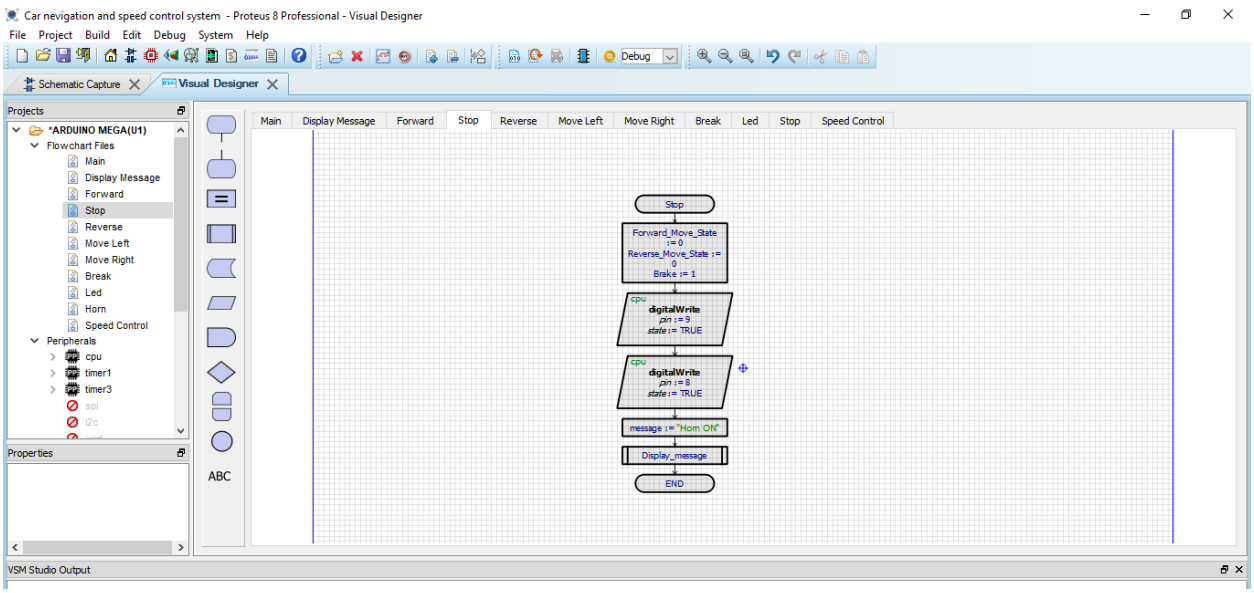
Design an electric car with manual navigation and PWM speed control:

Manual navigation will include:

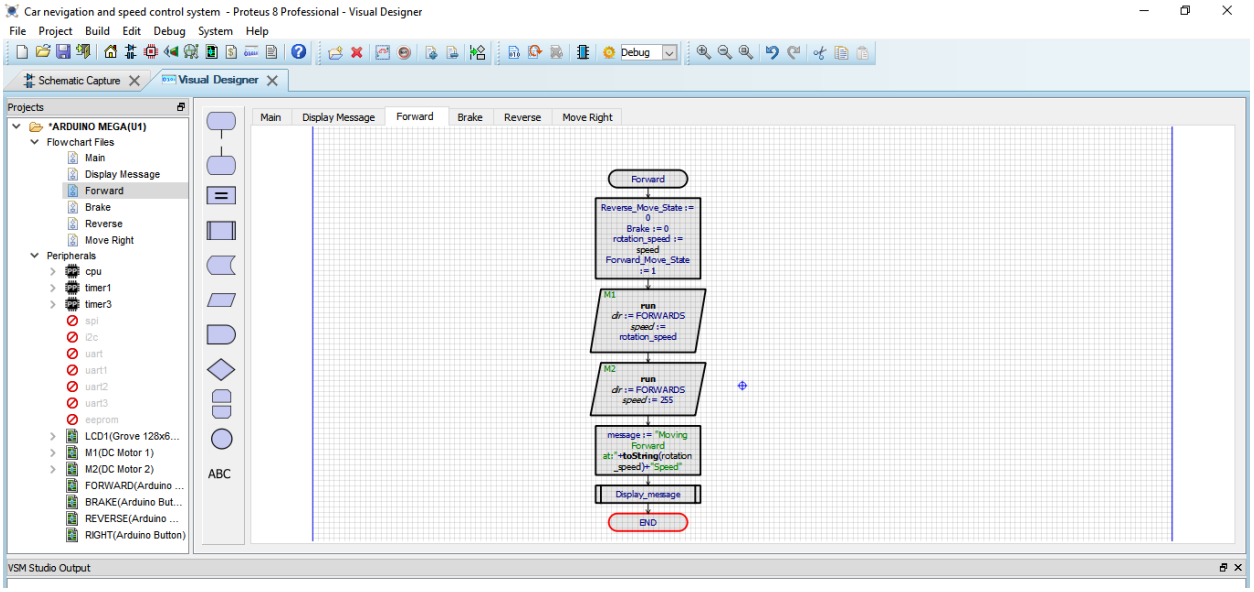
- **Start**



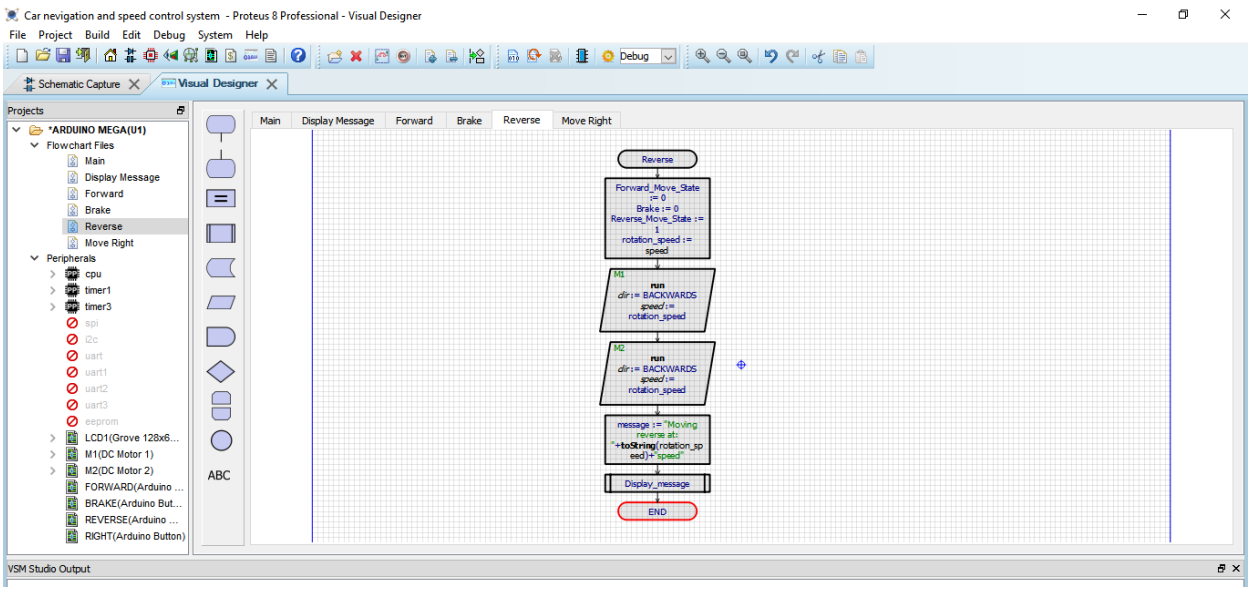
- **Stop**



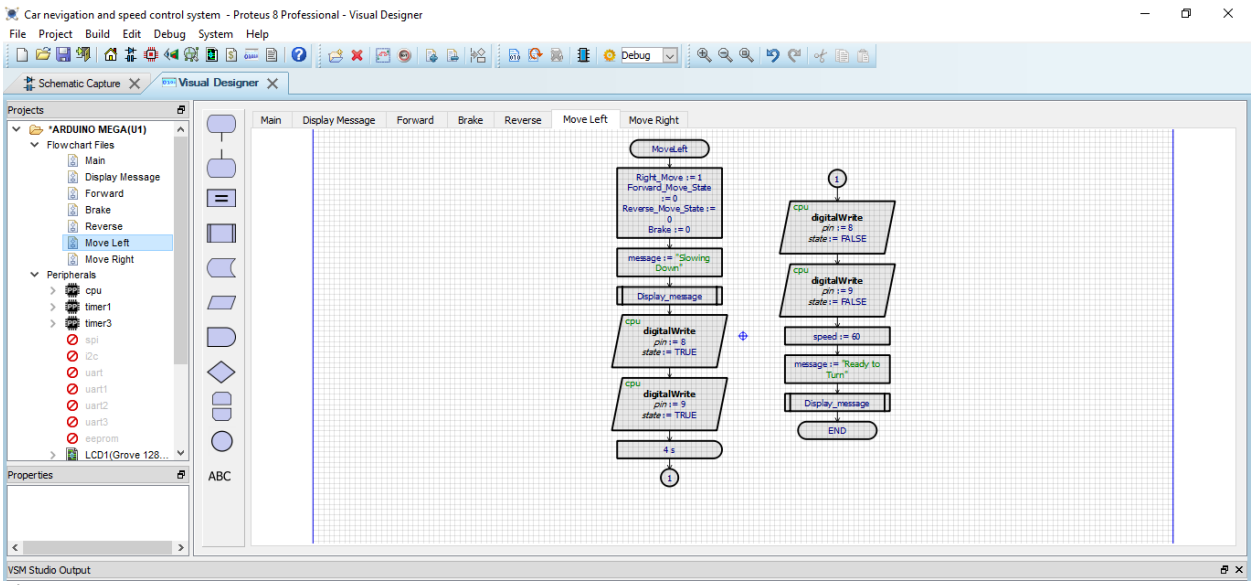
Forward



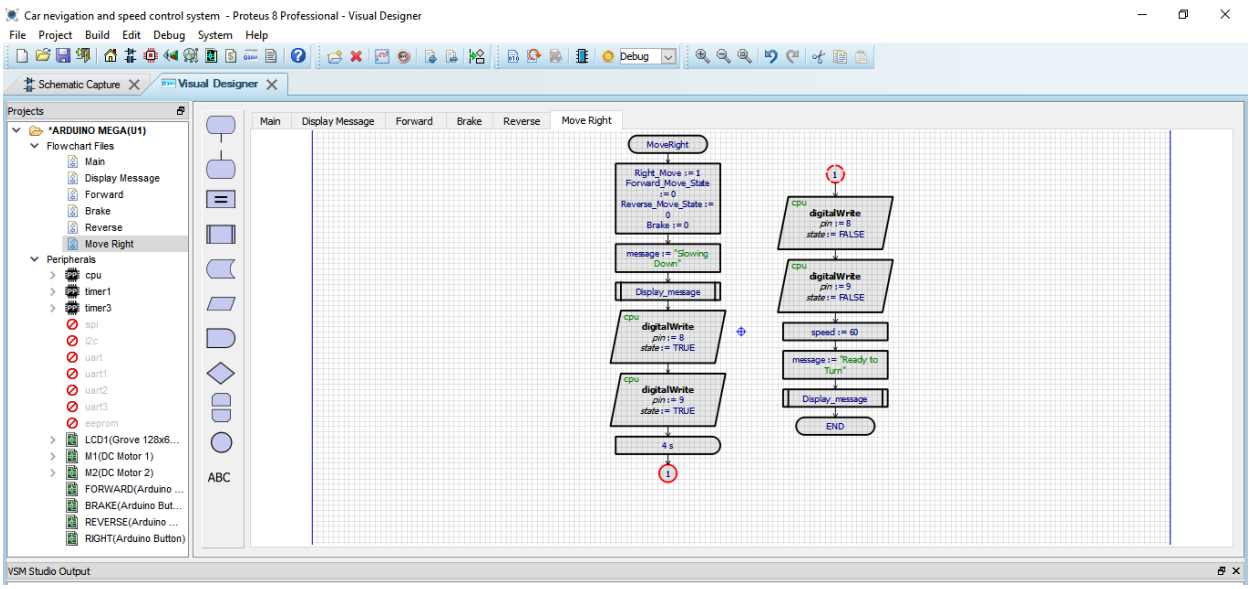
Reverse



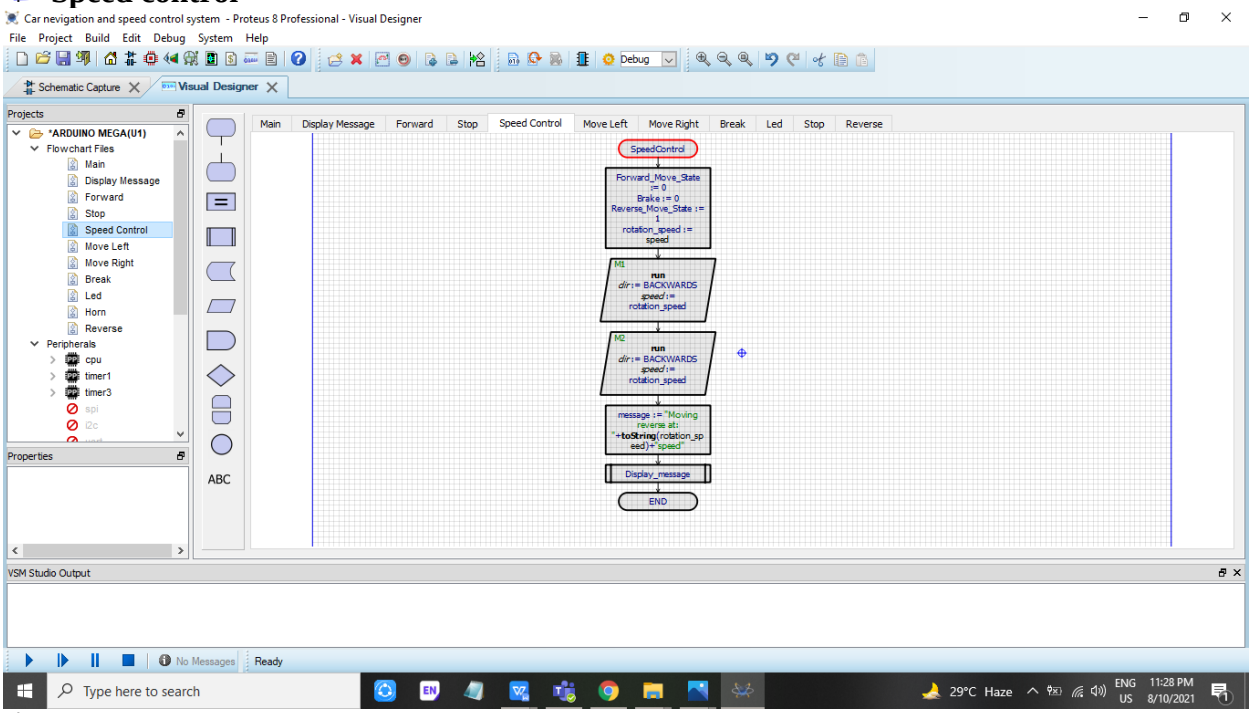
Left movement



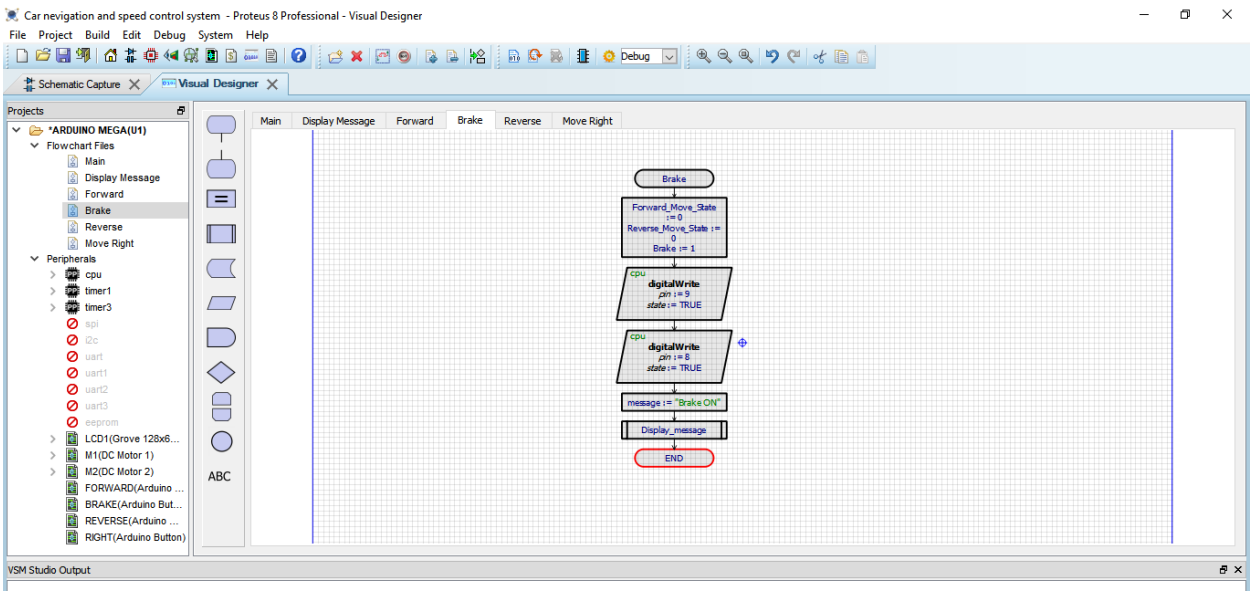
Right movement



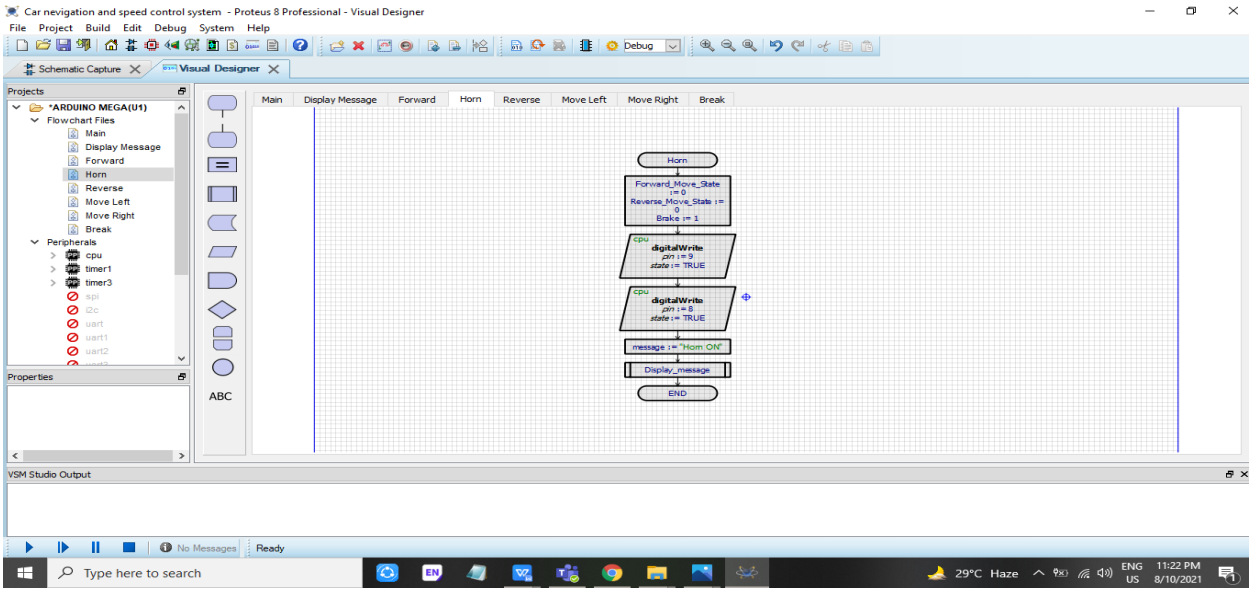
Speed control



Brake function



Horn



Led light indicator for corresponding operation

EC'S THEORY OF OPERATION

When the driver presses the pedal, the potentiometer activates and sends a signal to the controller, telling it how much power it should supply. For safety, there are two potentiometers. The controller reads the potentiometers to determine the position of the accelerator pedal, controls the power

accordingly, and draws power from the batteries to drive the motor. The controller provides electricity (voltage) to the motor, which is used to rotate the transmission. The transmission then drives the car forward or backward by turning the wheels.

When the driver depresses the accelerator pedal all the way, the controller sends the motor the entire battery voltage. The controller gives 0 volts to the motor when the driver removes his or her foot off the accelerator. The controller trims the battery voltage thousands of times per second for any setting in between to provide an average voltage anywhere between 0 and full battery pack voltage.

A HYBRID CAR'S DEFINITION

A gasoline engine and an electric motor power the hybrid car (HV).

Argueta has a score of 4 points.

The HV is powered by a combination of internal combustion engine and electric motor. The engine generates the majority of the car's power, with the electric motor supplying additional power as needed, such as when accelerating or passing [4].

The hybrid car is powered by both gasoline and electricity. A hybrid car has a tiny, fuel-efficient gas engine that works in tandem with an electric motor to help the engine accelerate. The electric motor is fueled by batteries that automatically replenish while driving [4].

The hybrid car is made up of five basic components: a battery, an internal combustion engine (ICE), a generator, a power split device, and an electric motor.

PARTS AND THEIR FUNCTIONS ARE DESCRIBED IN DETAIL.

Battery: The energy storage device for the electric motor in a hybrid car is the batteries.

Unlike gasoline in a fuel tank, which can only power the gasoline engine, the electric motor in a hybrid car can both put and take energy from the batteries.

Internal Combustion Engine (IC Engine) (ICE). The hybrid car has an internal combustion engine (ICE), usually known as a gasoline engine, similar to those used in most cars. A hybrid, on the other hand, has a smaller engine that uses sophisticated technologies to cut emissions and improve efficiency.

It gets its energy from the gasoline contained in the fuel tank.

Generator: The generator resembles an electric motor, but its sole purpose is to provide electrical power to the batteries.

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	Disadvantages
Any source of power, which is found in most homes and companies, can be used to generate fuel.	The distance that may be driven before the battery completely fails is limited.
It cuts hydrocarbon and carbon monoxide emissions by 98 percent, which are responsible for a variety of environmental issues.	The battery is depleted by accessories such as air conditioning and radios.
Also reduces pollution.	Electric motors, batteries, chargers, and controllers make the automobile heavier.
There are no emissions. Important in cities where better air is desperately required.	The cost of the parts makes it pricier.

PEOPLE AFFECTED: ILLNESS

Particulate matter, a type of carcinogen spewed into the environment by gasoline-powered cars, “can aggravate asthma and irritate respiratory systems” [1]. Internal combustion cars produce carbon dioxide into the atmosphere, which depletes the ozone layer, which absorbs 97% to 99% of the sun's high-frequency UV energy [7]. “Every one percent drop in the earth's ozone barrier is anticipated to increase the quantity of UV light exposure to the lower atmosphere by two percent,” according to Ozone Layer. [7]. the sun's ultraviolet light is exceedingly dangerous to life on Earth. UV light causes skin cancer by causing damage to the skin. It also causes harm to the eyes and aquatic life.

THE ELECTRIC CAR'S FUTURE

Lithium-ion phosphate (LiFePO4) batteries, which are becoming increasingly common in other nations, will almost certainly be used in future electric cars. Electric bikes and scooters employ LiFePO4 batteries, which are rechargeable and powerful. This technology will most likely be adopted by electric cars in the future. The expanding usage of super capacitors and ultra-capacitors for storing and delivering electrical charge is another technology that is probable for future electric cars. Many of these batteries are presently being utilized in hybrid car prototypes, therefore they are also expected to be employed in future electric car markets. The market for future electric automobiles will be wide open if developers can construct cars with a range of 300 miles per charge, a charging time of five to ten minutes, and driver safety. Improved battery technologies are being developed by researchers in order to extend driving range while reducing recharging time, weight, and cost. The future of electric cars will be determined by these considerations [8].

CONCLUSION

The electric car, as shown in this research, has numerous advantages and benefits over the internal combustion engine and hybrid car. It is cleaner and more efficient, but it has drawbacks as well. It is heavier, has a limited range of travel before needing to be recharged, and is more expensive. The future of the electric car is dependent on its battery. The future of electric cars looks bright if researchers can develop or discover the "super battery." As of today, each car has its own distinguishing feature that makes it superior to the others. Only time and technical advancements will determine which car will be the most successful in the future.

REFERENCES

[1.] Electric Cars: Effect on the Environment. (1998) Retrieved January 31, 2010 from http://library.thinkquest.org/20463/environment.html.

[2.] Bellis, M. History of Electric cars. Retrieved January 31, 2010 from http://inventors.about.com/library/weekly/aacarselectrica.htm.

[3.] Brain, M. (2002). How Electric Cars Work. Retrieved January 29, 2010 from http://auto.howstuffworks.com/electric-car2.htm.

[4.] How Hybrids Work. (2009) Retrieved February 20, 2010 from http://www.fueleconomy.gov/feg/hybridtech.shtml.

[5.] Electric cars (EVs).(2009) Retrieved January 31, 2010 from http://www.fueleconomy.gov/feg/evtech.shtml.

[6.] Dunn, P. (2006). Hybrid Cars – Pros and Cons. Retrieved February 20, 2010 from http://www.physorg.com/news10031.html.

[7.] Sparling, B. (2001). Ozone Layer. Retrieved February 1, 2010 from http://www.nas.nasa.gov/About/Education/Ozone/ozonelayer.html.

[8.] Future Electric Cars. (2007) Retrieved January 29, 2010 from http://www.future-car.ghnet/future-electric-cars.html