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An Ultrasonic Powered Hybrid Vehicle

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ABSTRACT: The words "Global Warming" "Air Pollution" "Noise Pollution" "Release excess amount of CO2" are some major concerns from an automobile exhaust due to the combustion of fossil fuels which pollutes the environment. This problem can be minimized by using hybrid vehicles. Generally, Hybrid vehicle are powered by an internal combustion engine and electrical motor. This work involves hybridization with ultrasonic power and conventional power IC engine**.** Hence it is called a **Hybrid Ultrasonic Vehicle (HUV)**. It can be driven both on internal combustion engines as well as on ultrasonic motor powered energy assisted with electrical motor. In real life applications using solar vehicle produces zero emissions**.** Hybrid electric vehicles are currently being developed and introduced to the market. Long-distance travel necessitates the charging of batteries on a regular basis, therefore these vehicles are reliant on electrical sources, which raises the cost of electricity. These issues will be overcome by employing hybrid ultrasonic vehicles, which are also environmentally friendly

KEYWORDS: Hybrid Ultrasonic Vehicle, Combustion engine **,** Ultrasonic power.

I.INTRODUCTION

Internal Combustion Engine was invented by Nicolas Otto, after Automobile field start its millennium journey. Later on, Petrol and Diesel became the main source of fuel for these vehicles. This technology changed the human life . As, the world entered into 20th Century, huge advancements and R&D made the technology more efficient and cost-effective. Due, to which it became the most successful industrial sector day to day. Now. People could reach one side to other of the world. As we know everything has pros and cons so as it is Carbon Monoxide (CO) and Carbon Dioxide (CO2) levels abruptly soared to dangerous levels in the early twenty-first century, wreaking havoc on the ecosystem, contributing to global warming, and causing health problems, among other things. This pushed scientists, researchers, and policymakers to concentrate on or consider Green Technology, or technology that can mitigate the negative effects on the environment. As a result, the twenty-first century will be remembered as the century of technological evolution, with a particular concentration on the automobile industry.

In this paper, Hybrid Electric Vehicles, Hybrid Solar Vehicles, Hydrogen Fuel Cells, and other innovations will change the face of the automobile industry. All in all, the Hybrid Electric Vehicle is the most industrially mature technology and outperforms gasoline-powered vehicles in terms of efficiency. We are trying to get efficient and free piezoelectric effect dependent ultrasonic motor powered Hybrid Vehicle

II. METHODS AND MATERIAL

1. Internal Combustion Engine

A four-stroke 15 cc engine was assembled in the chassis which produces power of 5.8Bhpand torque of 5.36NM.

2. Internal Combustion Engine

Motor and its Controller are the two most critical components for HV. As the selected motor must be able to produce enough torque and power to pull the load. Three types of motors: AC motor, DC motor and Brushless DC motor were taken into consideration. According to calculations and references we concluded by choosing 0.13hp, 48V BLDC motor .

3. Motor Controller

A motor controller is a component which is used to start and stop the motor also which is used control and varying the speed of the motor drive. The direction of motor rotation also possible to change using this controller during vehicle reverses movement/drive.

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4. Braking System

Braking system is a key feature in any vehicle. Two types of braking system namely disc brake and drum brake. In this work disc brake is mounted on the chassis for considering the safety precautions.

5. Battery

Three types of battery namely lead acid battery, Nickel metal hydride battery and Li-ion battery were examined. Li-ion battery is widely used in the application of hybrid vehicle. In this work Li-ion batteries each of 34 Ah are preferred to store the energy and which is used to drive the motor. Li-ion batteries of 20Amps are used as they will last for about 800 full charge cycles before any replacement required.

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7.Ultrasonic & Connecting Kit

According to the design calculation and torque requirements, 200 watts hydraulic motor has been selected in this work. Four set of 50 watts capacity each were used. All the materials were effectively utilised to avoid energy losses. The whole parts of hybrid vehicle is arranged in such a way so that conventional engine and ultrasonic motor can work simultaneously in very effective manner.

III. RESULT AND DISCUSSION

1.Basic Of Hybridisation

A hybrid vehicle has multiple distinct energy sources which could be separately or simultaneously operated to drive the vehicle. In the ultrasonic motor vehicles, the drive obtained from electric motor through the power stored from the batteries then due to piezoelectric effect ultrasonic motor assembly also start to rotate the wheel of vehicle.

2.Hybrid Ultrasonic Vehicle

The most commonly adapted hybrid vehicle has sources of a ultrasonic power assisted with electric motor and an I.C. engine. In a HUV, the I.C. engine cooperates with an electric motor which has very optimal usage of the engine. Especially driving in city traffic involves frequent starts and stops of the vehicle and during idling, the engine consumes more fuel without producing useful work thus it leads to higher fuel consumption, less efficiency and unnecessary emission from the exhaust. The HUV solves those problem and also no exhaust emission from the vehicle. The parallel power train runs on both, combustion engine and electric motor. The primary drive of the vehicle from solar powered and secondary drive by the combustion. These vehicles gain maximum efficiency in city during heavy traffic conditions without producing any emissions which supports to the green environment.

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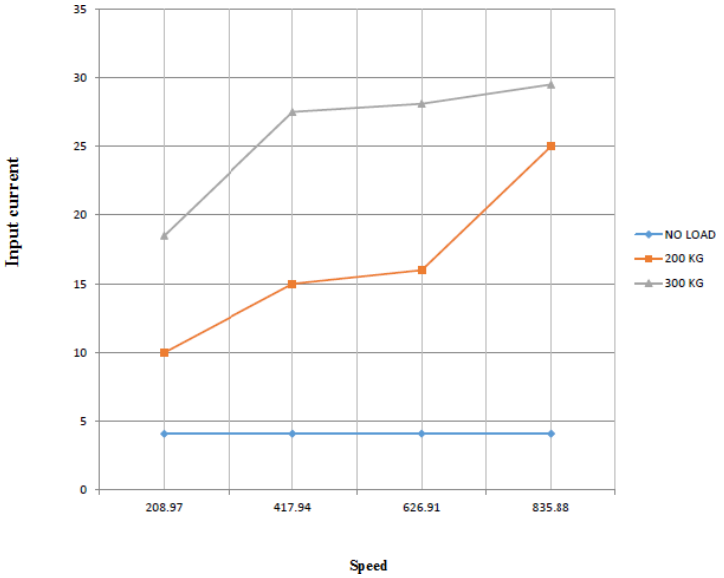

Fig. 1 Electrical characteristics of motor

- Analysis to find out the required torque for the selection of engine to upload max load 200 kg.

  As we know the width of the span of engine rod (frame) is 80 cm
  The Generated Torque = Force * perpendicular distance
  = load* perpendicular distance
  = 200*.080 = 16 N-m

- So The essential required engine is a 100 cc we of a maximum torque of 7.6 Nm and a maximum output power of 7.9 Bhp. Since the required torque is less than the design torque, the design is safe
- To control the mechanism in hybrid vehicle we have to use a brushless motor of 24V
- The motor output torque and speed relationship has been discussed in further table

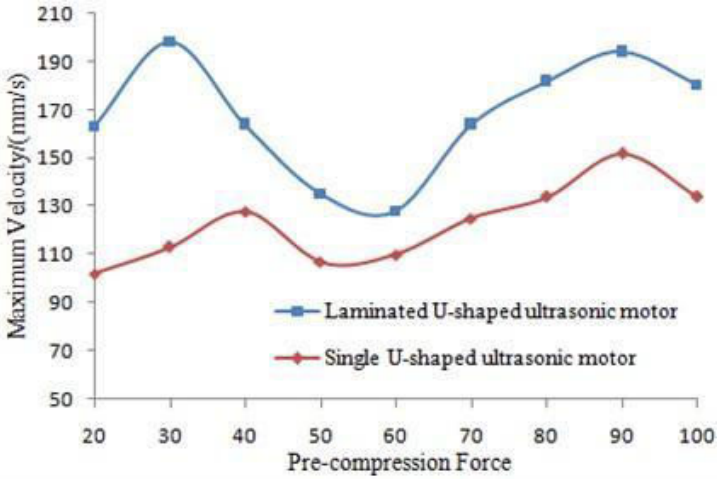

Fig. 2 Velocity Vs Pre Compression Force in Ultrasonic Motor

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Calculations for obtaining speed and torque:

Speed in rpm= (speed in km/hr*1000)/ (2*pi* radius*60) Torque = power/ (speed in rpm)

Table 1. Motor output torque with respect to speed

SPEED (KM/HR)	SPEED (RPM)	TORQUE (NM)
10	208.97	3.58
20	417.94	1.79
30	626.91	1.19
40	835.88	0.897

In Fig 2, From the above obtained value in the graphs and calculations, a motor of 500watts-48V was selected. Fig. 2 shows the torque versus speed of the motor which indicates the mechanical characteristics. Selected motor gives the maximum output torque of 8.2 Nm thus more than satisfying than the required torque of 9.0 Nm. The design is safe as the required torque is less than the maximum output torque of the motor. Fig3 depicts current versus speed, known as electrical characteristics which indicate, at the maximum load conditions while increasing the speed of the vehicle the required input current increases. The required input current for the motor, calculated as per design is only 10Amps. The selected motor can produce an output of 11.3Nm when the maximum input current of 21Amps is provided.

VI.CONCLUSION

In this work ultrasonic powered hybrid vehicle has been successfully fabricated built in with internal combustion engine. Generally, the electric hybrid vehicles are disadvantageous during long distance travels also required periodic plug in of their batteries. These kinds of problems have been solved using hybrid solar vehicle which gives a car, self-charging potential from the solar panels. The efficiency of the solar panels which is used is 15-20%, but there are various means to increase the efficiency of the panels by changing their silicon materials. The future of energy sector lies solely on alternative energy resources. The cost of HSVs is more than the conventional cars but they are more efficient and cause less exhaust emissions. This challenge now can turn out to be a good scope for further development of a pollution free vehicle.

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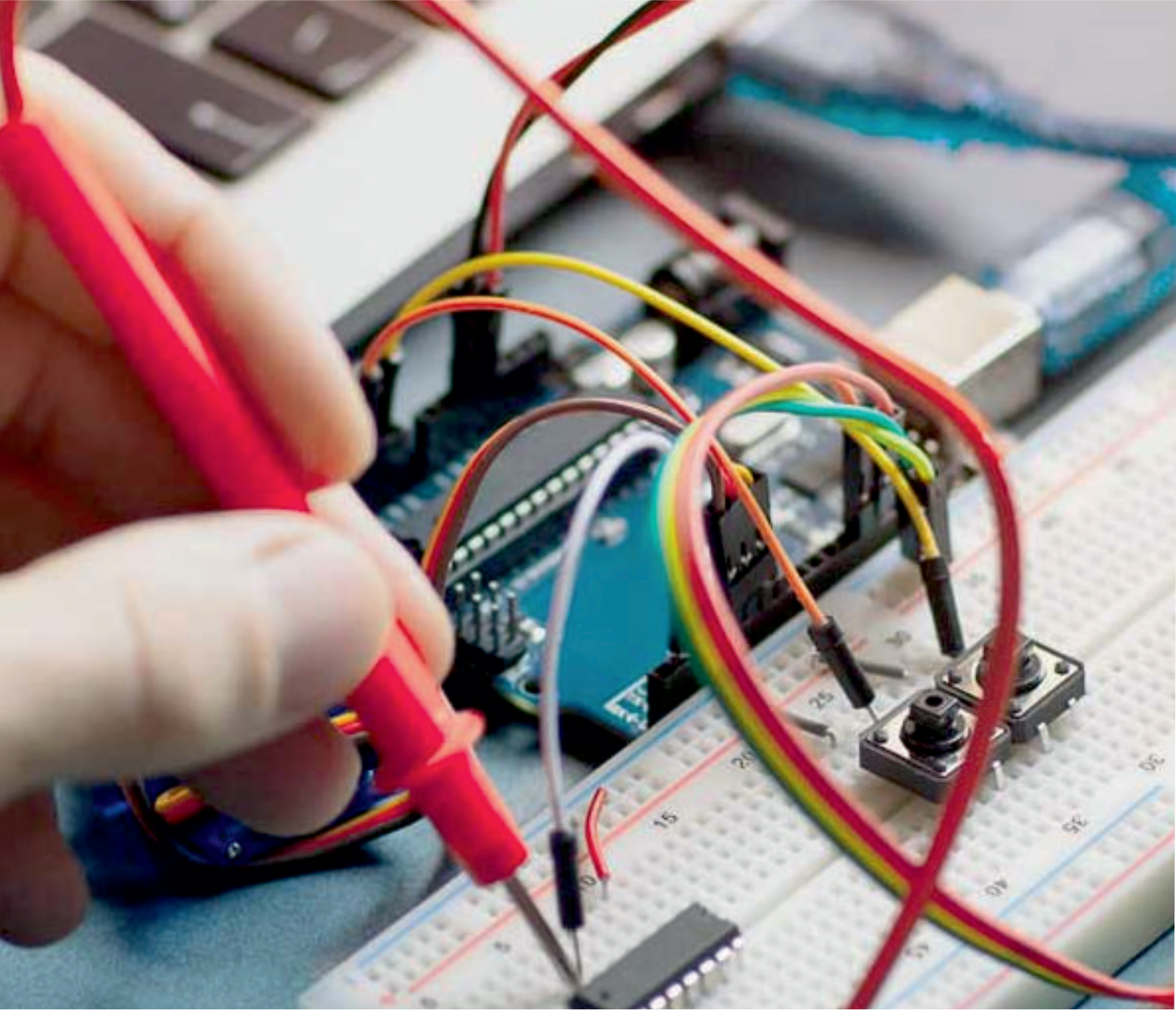

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