

## International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 3, March 2019

# Hybrid Vehicle Controlled by Combined Pedal Mechanism

S.Kingston Jebasingh Moses<sup>1</sup>, H.Mohamed Sheik Abdulla<sup>1</sup>, S.P.Josebin<sup>1</sup>, V. Jeyanthi<sup>1</sup>,

J.Jeremy Jeba Samuel<sup>2</sup>

U.G. Student, Department of Mechanical Engineering, Francis Xavier Engineering College, Vanarpettai, Tirunelveli,  
Tamil Nadu, India<sup>1</sup>

Associate Professor, Department of Mechanical Engineering, Francis Xavier Engineering College, Vanarpettai,  
Tirunelveli, Tamil Nadu, India<sup>2</sup>

**ABSTRACT:** The project deals with construction and working of accelerator and brake controlled by combined pedal mechanism in the hybrid vehicle. The main objective of this innovation is to reduce the fuel consumption for the purpose of achieve greater mileage and to eliminate the operator's risk of pressing the wrong pedal at the time of emergency as well as reduction in the driver's reaction time to switch from accelerator to brakes or viceversa. This new mechanism is designed in such a way that it can be implemented in any type of automotive vehicle. This new mechanism enables the driver to control acceleration and braking using one foot, which will lead to reduction in stopping distance, misjudgement and ultimately decrease in number of road accidents that may happen each day.

**KEYWORDS:**Hybrid vehicle, Combined brake pedal mechanism, Reaction time, Accelerator, Brake ,fuel economy

### I. INTRODUCTION

Die is an important material to make a pipe in pipe machine, a die has play an vital role for various size of pipe production. In the pipe industry various machines are used for making different set of pipe production. The hydraulic jack is a device used for lifting heavy loads by the application of much smaller force. It is based on Pascal's law, which states that intensity of pressure is transmitted equally in all directions through a mass of fluid at rest. A jack or jackscrew is a mechanical device is used as a lifting device to lift heavy loads or to apply great forces. A mechanical jack employs a screw thread for lifting heavy equipment. A hydraulic jockey uses hydraulic power. Jacks are usually rated for a maximum lifting capacity for example 1.5 tons to 3 tons.

### II. LITERATURE REVIEW

**Sahil Arora [6]** done a prototype of the combined accelerator and brake pedal. There are two pivot points are used in this prototype. In order to accelerate, the foot lever rotates about pivot point. In order to brake the foot lever and support both moves in linear direction such that, there would be no acceleration of the vehicle. This is achieved by fixing the source (acceleration cable) at the bottom end of the pedal near the heel rest.

**N. Ramachandran and R. Raghul[3]** deals with construction and working of Accelerator and brake operated by single pedal using on/off and cut off limit switches for electronic vehicle and this technique is not applicable to normal vehicles. It is technique for controlling of solar cart vehicle in the future and will reduce accidents. This new mechanism is designed in such a way that it can be implemented in any type of automotive electrical vehicle

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 3, March 2019

**Dr. K.V. Vidyanandan [3]** Introduction of electric vehicles (EVs) signal the beginning of the end for traditional engine vehicles. The major motivators for shifting to EVs are the need for reducing polluting engine emissions and reducing dependence on costly oil fuels.. The two EV technologies currently remain at the top are the battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEV). This paper gives an overview of various EV technologies, their features, limitations and challenges in their bulk deployment as a replacement to conventional vehicles

### III. PROBLEM STATEMENT

In India the death rate is 20% because of the accidents on the highways hence this innovation can help us to reduce the death rate by 7% to 10% since this can be used in the any 4 wheeler. In hybrid vehicle conventional pedals are equipped with separate brake and accelerator. The clutch is to the left, accelerator to the right and the brake in the middle. The right foot should be used for pressing the accelerator and brake. The arrangement guarantees, that the throttle is released as the driver brakes. However, it also means that the foot is almost always placed at a distance from brake, i.e, on the accelerator, thus movement time adds to brake reaction time. The fuel rate is in increasing manner in a day by day life.

### IV. TYPES OF HYBRID VEHICLE

#### A. Hybrid Electric Vehicle (HEV)

A hybrid electric vehicle is a type of hybrid vehicle which combines a conventional internal combustion engine propulsion system with an electric propulsion system. Or in a technical way, a Hybrid Electric Vehicle is a type of technology which indulges both mechanical and electrical..A mechanical drive consists of the Fuel tank (containing conventional fuels like petrol/diesel/CNG), the Combustion Engine, the gear box and transmission to the wheels, An electric drive consists of the Battery, an electric motor and Power Electronics for control. The use of Ultracapacitors [1] has a high potential in the Hybrid Electric Vehicles. They have the advantage of being a more robust power device when compared to batteries (Lithium Ion and Nickel Metal hybrid), as an example during regenerative braking which is considered as a high powered event.

#### Classification of Hybrid Electric Vehicle: -

**Series Hybrid:** The traction power is delivered by the electric motor, while the internal combustion engine, via a generator, produces electric power to drive the electric motor. The excess power is then stored in the battery pack. The Internal Combustion Engine is decoupled from the driven wheels and can be operated mostly in the maximum efficiency region. The major shortcomings of the series hybrid drive train configurations are the high power installed in each component and the request of a generator. In fact the energy from the Internal Combustion Engine is converted twice before to drive the wheels. Thus the system is more expensive than the parallel one.

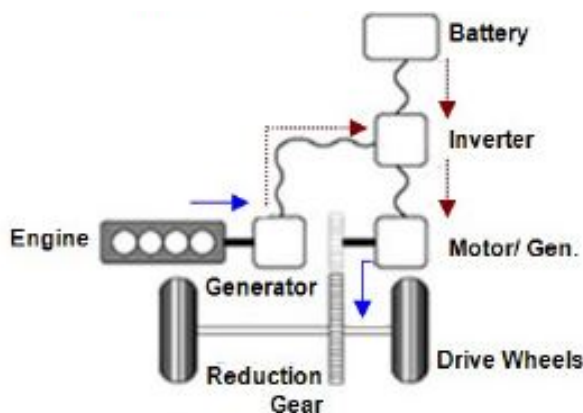


Fig 1 series Hybrid

**Parallel Hybrid:** There is direct mechanical connection between the hybrid power unit and the wheels. In addition, this layout has an electric traction motor that drives the wheels and can recuperate a share of the braking energy, in order to charge the batteries (regenerative braking) or help Internal Combustion Engine during acceleration conditions. In fact,

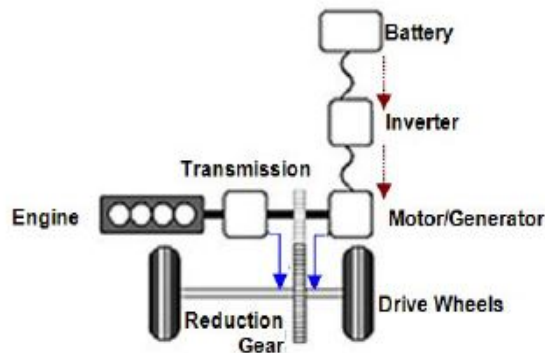
## International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

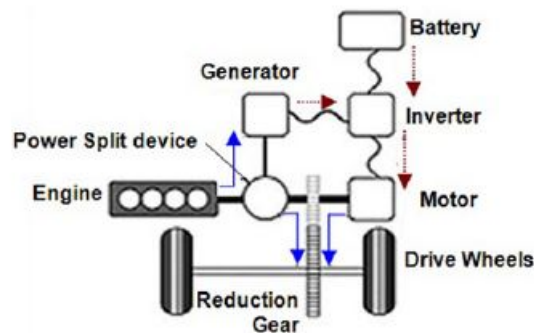
Vol. 8, Issue 3, March 2019

Internal Combustion Engine and electric motor are coupled by a mechanical device. Then the electrical machine can be designed with a reduced capability, i.e. cost and volume. There are several configurations depending on the structure of the mechanical combination between the Internal Combustion Engine and the electrical motor. There can be a torque-coupling with a single shaft or two shaft configuration, a speed-coupling with planetary gear unit, a merge of both previous coupling



**Fig 2 parallel hybrid**

**Series parallel Hybrid:** the series layout and the parallel layout are merged together in order to have both advantages. In particular the ICE is able to supply the electrical motor or charge the battery thanks to a generator.



**Fig 3 series parallel hybrid**

**Complex Hybrid:** There are two separate mechanical links obtaining a light transmission system and a flexible mounting. As an example, the front wheels are powered by hybrid propulsion, while the rear wheels have a pure electric system. There is a wide flexibility on the power flux managing.

### B. Hybrid Solar Vehicle (HSV)

This technology is an integration of Vehicle and Photovoltaic Panels. Normally, photovoltaic panels are mounted on the roof-tops of the vehicles. It is also classified into four types: - Series Hybrid, Parallel Hybrid, Series-Parallel Hybrid and Complex Hybrid. Out of which, Series Hybrid technology is very efficient and more research is going on this type

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 3, March 2019

## C. Plug-In Hybrid Electric Vehicle (PHEV)

A plug-in hybrid electric vehicle is similar to the hybrid electric vehicles (HEVs) on the market today, but it has a larger battery that is charged both by the vehicle's gasoline engine and from plugging into a standard 110 V/230V electrical outlet for a few hours each day .

### Classifications of Plug-In Hybrid Electric Vehicle:-

**Series Plug-In Hybrids:** Also called as Extended Range Electric Vehicles (EREVs). Only the electric motor turns the wheels; the gasoline engine is only used to generate electricity. Series plug-ins can run solely on electricity until the battery needs to be recharged. The gasoline engine then generates electricity to power the electric motor. For shorter trips, these vehicles might use no gasoline at all.

**Parallel or Blended Plug-In Hybrids:** Both the engine and electric motor are mechanically connected to the wheels, and both propel the vehicle under most driving conditions. Electric-only operation usually occurs only at low speeds

## V. CONTROL IN HEV.

**Driver Command Interpreter.** The function of driver command interpreter is to compute the driver's torque demand according to desired speed of vehicle and actual speed of vehicle. Speed of vehicle is controlled by accelerator pedal and brake pedal position. This is a feed control system by adjusting the accelerator pedal and brake pedal position to make the vehicle follow the desired vehicle speed.

**Vehicle System Controller.** Compared to the conventional vehicles, HEV is a multiple energy source, then, how to split the required power among energy sources is called EM. Vehicle system controller performs power train control by using EM strategies according to command signals received from driver command interpreter and parameters information feedback from electronic controller. Vehicle system controller can be divided into three function blocks (i)Required power of vehicle interpreter. (ii) Energy management strategies. (iii)Torque interpreter. Required power of vehicle interpreter is a function block to convert the driver's torque demand to power demand. HEV is a multiple energy system different from conventional vehicles which can only output power, battery not only can output power but also absorb power. For a required power, how to split the power required between two energy sources and mechanical brake in order to minimum the fuel consumption or emission is the hot topic among technology

## VI. CONCLUSION

Environment protection and energy crisis have urged the development of EV. However, PEV is not widely used currently. The main reason is that they could not satisfy the consumers' need due to high initial cost and short driving range. Thus, BEV will be designed mainly for short range, such as community transportation. Although FCEV has long term potential for future main stream vehicles due to zero emission and comparable driving range with conventional vehicles, the major challenge for developing FCEV is how to investigate low-cost FC and refuelling system. Consequently, HEV can meet consumers' need currently and will grow in faster rate. The main issue of HEV is how to optimize the multiple energy sources to obtain best fuel economy or low emission at lower cost. This paper has presented an overview of HEV with focus on the configuration, main issues, especially the control of HEV, and it elaborates the EM approaches. The EM problem is the hot research area until now, and it is also the critical technology for HEV Global optimization approach can obtain global optimum but it requires substantial amount of computational time and so the global optimization approach.

## International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 3, March 2019

### REFERENCES

- [1] C. C. Chan, "The state of the art of electric and hybrid vehicles," Proceedings of the IEEE, vol. 90, no. 2, pp. 247–275, 2002
- [2] M. Barcaro, N. Bianchi, F. Magnussen. PM Motors for Hybrid Electric Vehicles. The Open Fuels & Energy Science Journal, Vol. 2, pp. 135-141, June 2009
- [3] M. I. Marei, S. J. Samborsky, S. B. Lambert, M. M. A Salama. On the Characterization of Ultra capacitor Banks Used for HEVs, Proceedings of the IEEE Vehicle Power and Propulsion Conference, VPPC '06, Windsor, UK, 2006, pp. 1-6.
- [4] M. Ehsani, Y. Gao, S. Gay, A. Emadi. Modern Electric, Hybrid Electric, and Fuel Cell Vehicle's, CRC Press: USA, 2005.
- [5] M. Barcaro, N. Bianchi, F. Magnussen. PM Motors for Hybrid Electric Vehicles. The Open Fuels & Energy Science Journal, Vol. 2, pp. 135-141, June 2009.
- [6] C.C. Chan. In Global Sustainable Mobility and EV/HEV/FCEV Development in China & Japan Keynote Presentation of the IEEE Vehicle Power and Propulsion Conference, VPPC'06, Windsor, UK, 2006.
- [7] T. Yaegashi. In Challenge of Achieving Sustainable Mobility through Hybridization, Research and Development of Hybrid Vehicles in Japan and Sweden Seminar, Göteborg, Sweden, 2006.
- [8] Zs. Preitl, P. Bauer, J. Bokor. Fuel Consumption optimization for Hybrid Solar Vehicle, Page: 11-18. International Workshop on Hybrid and Solar Vehicles. University of Salerno, Italy. November 5-6, 2006. <[www.dimec.unisa.it/WHSV](http://www.dimec.unisa.it/WHSV)>, 4th February 2013.
- [9] "What is Plug-In Hybrid?" <[www.transportation.anl.gov/phev](http://www.transportation.anl.gov/phev)>. 22nd December 2014.
- [10] "Different Kinds of Plug-in Hybrids" <[www.fueleconomy.gov/feg/phevtech.shtml](http://www.fueleconomy.gov/feg/phevtech.shtml)> 22<sup>nd</sup> December 2014.
- [11] C. C. Chan, A. Bouscayrol, and K. Chen, "Electric, hybrid, and fuel-cell vehicles architecture and modeling," *IEEE Transactions on Vehicular Technology*, vol. 59, no. 2, Article ID 5276874, pp. 589–598, 2010.