

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & MANAGEMENT
OPPORTUNITIES AND CHALLENGES OF USING HYBRID VEHICLES IN INDIA****Akshit Tripathi^{*1} & Dr J.P. Kesari²**^{*1}B.Tech passed out 2018, Department of Mechanical Engineering, Delhi Technological University (Formerly DCE), Bawana Road, New Delhi-110042²Associate Professor, Department of Mechanical Engineering, Delhi Technological University (Formerly DCE), Bawana Road, New Delhi-110042

ABSTRACT

A hybrid electric vehicle (HEV) is a sort of vehicle which joins a customary internal combustion engine (ICE) impetus framework with an electric drive framework. The nearness of the electric power train is proposed to accomplish either preferable mileage over a traditional vehicle, or better execution. An assortment of kinds of HEV exists, and how much they work as EVs shifts also. Current HEVs make utilization of proficiency enhancing innovations. A few assortments of HEVs utilize their internal combustion engine to produce power by turning an electrical generator (this blend is known as an engine generator), to either revive their batteries or to specifically control the electric drive engines. Numerous HEVs lessen sit emanations by closing down the ICE out of gear and restarting it when required; this is known as a begin stop framework. In this paper, the various types of vitality sources are said and disclosed how they're used to control a vehicle or should be possible later on.

Keywords *Steering mountins . brackets , Casting*

I. INTRODUCTION**Energy crisis and cost consideration**

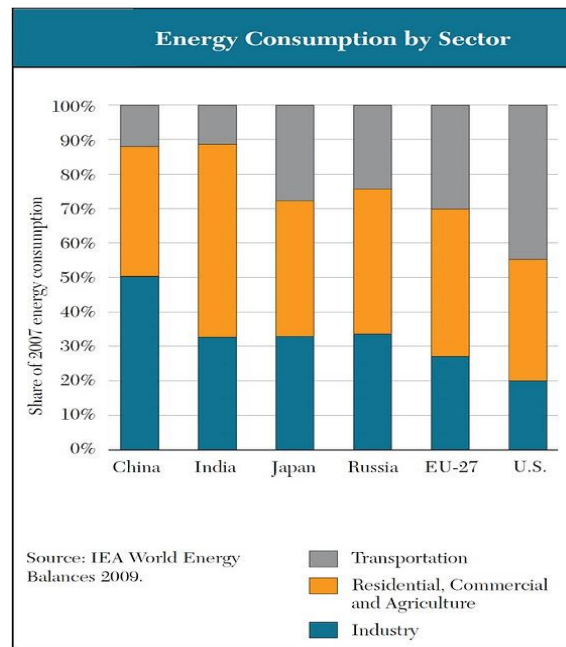
As we rely on coal, oil and gas (the fossil fuels) for over 70% of our current energy needs, there exists a concern to conserve these resources. On top of this energy demand is expected to grow by almost half over the next two decades. In light of this it is causing some dread that our vitality assets are beginning to run out, with crushing results for the worldwide economy and personal satisfaction which could without a doubt be awful to the general population. Energy crisis is the result of using excessive non renewable resources and use of limited renewable resources. Attributable to unreasonable reliance on non-renewable energy sources notwithstanding for the following two decades, petroleum derivatives are subjected to consumption which is presently a noteworthy worry for the forthcoming age.

The whole globe today is currently centering to move their aggregate power age to inexhaustible power as it is inferable from usage of spotless, substitute and reusable vitality sources. "Denmark has just produced 140% of its electricity needs with renewable wind power and The Scottish Government aims to generate 50% of Scotland's electrical power from renewable energy by 2015, and 100% by 2020" as stated by The United States Energy Information Administration (EIA) which provides a hope for improvement in India. The population of India is rapidly increasing day by day and over 80,000 villages in the country are not electrified. Vitality security keeps on being one of the greatest difficulties in India. The greater part of the introduced limits in India are controlled by the coal based power age which is related with nearby and worldwide natural contamination with resultant effect on air, water, land and biodiversity. Consequently it opens the entryway for an immense venture on the use of the inexhaustible assets. Because of the huge significance of vitality preservation, there is a need to center around mechanical alternatives for enhancing vitality productivity in numerous segments, for example, the modern, control age and business structures.

Non Conventional to Conventional Transition

As India remains very nearly a noteworthy change, conveying new work chances to its 1.3 billion individuals, satisfactory vitality supply will assume a major part. A nation that is uncommonly rich in bio-assorted variety, with types of uncommon greenery is undermined today by finished misuse of assets. "An examination has featured that in Delhi, 96 for every penny of the day's contamination levels surpass the national guidelines". Bengaluru, Mumbai, Pune, Kolkata and Hyderabad are excessively are battling with poor air quality on most days with contamination levels transcending allowable cutoff points – 72 for every penny, 33 for each penny, 57 for each penny and 45 for every penny, individually. Considerably littler urban areas like Kanpur, Haridwar, Agra, Surat and Varanasi are contaminating step by step and the circumstance is deteriorating with every day passing. Along these lines, it's not just the activity to tackle the option or sustainable assets for control age however to control this condition as well.

In India, not long ago the CNG driven vehicles were exempted from the odd-even govern in Delhi and Supreme court requested to boycott all the oil or diesel vehicles presently running. In this way it was a noteworthy advance in controlling the disturbing state in the capital. India will confront generous increment in vitality request in the following couple of years, with expanded industrialization and higher interest for power. Power is basic in managing monetary exercises and producing work openings. The Government needs to reassess how India delivers and devours vitality and together with partners work towards a lower-carbon future. Therefore it requires the presentation of the Hybrid Vehicles which can demonstrate compelling by giving less destructive outflows and better fuel proficiency sooner rather than later.

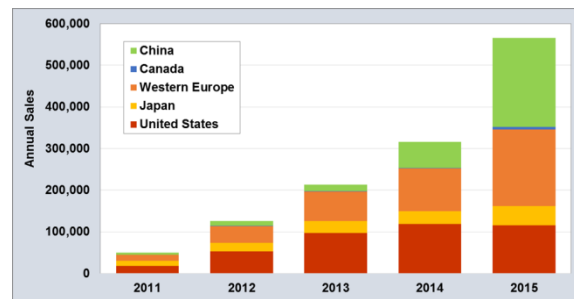
**II. REVIEW OF LITERATURE****2.1 Hybrid Vehicles in the World**

Because of the vast acknowledgment of electric vehicles, numerous automakers are beginning to investigate this market with unmistakable fascination, as these vehicles are giving clean outflows and better fuel effectiveness around the world.

"The world's top of the line battery electric and module half breed vehicles incorporate Tesla's Model S, Nissan's Leaf and Toyota's Prius Plug-in Hybrid. California-based Tesla Motors was among the main carmakers to collect electric vehicles only. In July 2014, Tesla and Panasonic made ready for the development and activity of the world's

biggest battery processing plant in the United States. In the principal quarter of 2017, Tesla conveyed around 25,000 vehicles around the world, which later turned out to be super hit.

China is positioned as the biggest market for every single electric vehicle. The developing interest for electric autos in business sectors, for example, China, the United States and Norway is frequently empowered by government motivating forces including sponsorships, exceptions from tolls and stopping expenses" as specified by statista.



2.2 Development in India

In August 2017, the Minister of State for Power and Renewable Energy, Piyush Goyal demonstrated that the Niti Aayog was planning with different government services to make an arrangement to guarantee that lone electric vehicles are at a bargain in the nation by 2030. Over the span of his announcements, the clergyman likewise showed that hybrid vehicles were a superfluous redirection on the grounds that while they decrease fuel utilization, the advantages are peripheral and the innovation is dated. Despite the fact that the 2030 date was along these lines pulled back, it appears that the Indian government is awakening to the potential advantages of electric vehicles. Indeed, even the financial aspects are noteworthy – changing to an electric armada would likewise enable India to lessen its reliance upon oil imports, and spare the nation a brain boggling \$330 billion by not obtaining 876 million metric huge amounts of oil. Nonetheless, regardless of these numbers, the market has been ease back to embrace electric vehicles. A report by showcase knowledge firm BIS Research demonstrates that the moderate rate of appropriation is an aftereffect of the cost of possession being at a 45 percent premium over regular cars. The report additionally recognizes absence of framework, government support, and motivations as being boundaries to the offer of more electric vehicles in a market that it distinguishes as to a great degree promising.

2.3 Challenges and the opportunities

There are certain signs for the electric vehicle division in India. The previously mentioned articulation from the pastor of state demonstrates that the administration is currently working towards empowering the reception of electric vehicles in the Indian market. In 2015, the legislature had propelled a plan named Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME) under the National Electric Mobility Mission (NEMM) to advance the offers of fuel-productive autos. Under this plan, the legislature is wanting to dole out concede up to \$16 million to urban communities with a populace of in excess of a million, for acquiring electric vehicles in FY 2018. Producers, for example, Hyundai, Mahindra and Mahindra, Nissan, Maruti, Toyota and Tata are starting to demonstrate an enthusiasm for the market, and a large number of electric vehicle models – 25, as indicated by the BIS Research report – are probably going to be propelled by them by 2021. Be that as it may, for the area to achieve a minimum amount and start supplanting the 230 million vehicles on Indian streets, the Indian government must make more solid strides.

It can take a gander at governments in the APAC locale, chiefly China, Japan and South Korea, for motivation. The improvement of electric vehicles in these business sectors has earned enormous consideration. This is because of the aggregate exertion of governments and makers to start changes that advance the offer of these vehicles and make them more prudent to utilize. Their endeavors have prompted the division demonstrating a maintained increment in showcase volume, and the monetary markers appear to point to a time of touchy development. As indicated by the BIS Research report, the area will demonstrate an anticipated CAGR of 29.5 percent in the vicinity of 2016 and

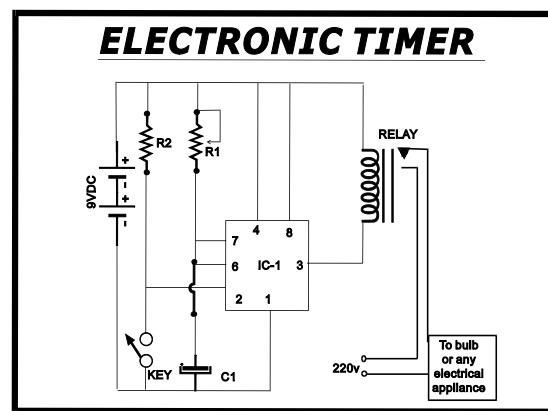
2026. Trend-setters, business people, and controllers must cooperate to develop new plans of action for effective selection. There should streamline of hardware, a more brilliant circulation of monetary motivations, and a deliberate push to build up a powerful foundation around electric vehicles. Once these components are set up, the market can move to decrease the cost of electric vehicle possession and help achieve a change in outlook in how individuals in India see and utilize transportation.

III. PROJECT DESCRIPTION

Materials Used

Resistors(100K variable resistance), Capacitors,9V DC Battery, DC motor, Solar Panel, semiconductors, LED, Shock absorbers, sound and wind system.

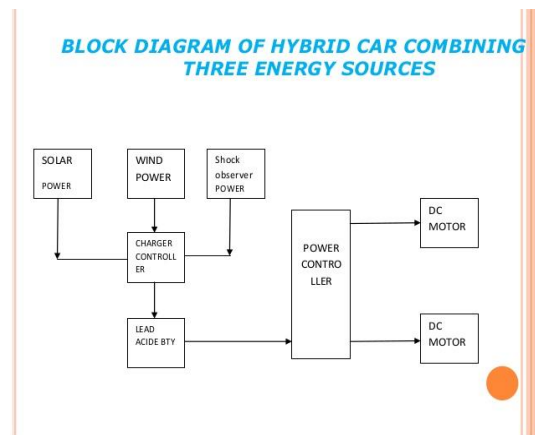
Circuit Diagram



How it works?

An ordinary car safeguard hoses suspension development to create a controlled activity that keeps the tire solidly out and about. This is finished by changing over the dynamic vitality into warm vitality, which is then consumed by the stun's oil. The Power-Generating Shock Absorber (PGSA) changes over this motor vitality into power rather than warm using a Linear Motion Electromagnetic System (LMES). The LMES utilizes a thick perpetual magnet stack installed in the primary cylinder, a switchable arrangement of stator loop windings, a rectifier, and an electronic control framework to deal with the shifting electrical yield and hosing load. The base shaft of the PGSA mounts to the moving suspension part and powers the magnet stack to respond inside the annular cluster of stator windings, creating substituting current power. That power is then changed over into coordinate current through a full-wave rectifier and put away in the vehicle's batteries. The power created by each PGSA would then be able to be joined with power from other power age frameworks (solar, wind and noise) and put away in the vehicle's batteries.

The circuit involves the inverter unit. The 6V DC of the battery is changed over into AC by control transistor T-1 (NPN). The yield of the transistor is sustained to the inverter transformer. Capacitor and Resistor arrange utilized for swaying. Accordingly, inverter transformer (here utilized 6-0-6 transformer) ventures up 6v DC to 160V AC, which is adequate for working a tube light. In the circuit every one of the segments ought to be mounted on PCB with the exception of X-1 stage down transformer. It is utilized to charge the battery and turn off transistor T-1 by applying reverse predisposition to its base when 230V AC mains supply is accessible. Diode D-2 and D-4 gives negative supply to the base of T-1 to make it turn around one-sided. Capacitor C-2 smooths this negative supply. At the point when the supply comes up short, T-1 leads through LC organize. The biasing voltage can be differing by R-3. The yield from its authority is nourished to the essential of inverter transformer. The progression up yield is accessible at auxiliary of is transformer to gleam the tube light.



IV. SCOPE FOR FUTURE EXPERIMENT ACTION

Since oil is restricted and will some time or another come up short on supply. In the self-assertive year 2037, an expected one billion oil energized vehicles will be on the world's streets. Fuel will turn out to be restrictively costly. The world needs answers for the "400 million generally futile autos". So year 2037 "gas runs out year" implies, oil will never again be utilized for individual portability. A market may create for sunlight based fueled EVs of the extent of a bike or golf truck. Since mixture innovation applies to overwhelming vehicles, crossover transports and half breed trains will be huger. Producers of hybrid cars are endeavoring anticipating expanding the proficiency of hybrid motors, ideally having the capacity to drive these vehicles up to 70 miles to the gallon. General Motors is as of now hoping to build up their new half and half to that 70 mile stamp in 2010, and might have the capacity to push that number even higher. If hybrids can utilize Lith-Ion batteries, at that point cars can quicken speedier to higher rates, be considerably more productive, and would have the capacity to extend the separation between fill-ups. Not exclusively would those points of interest be accessible, new hybrids would be considerably more reasonable to buyers, and ideally would tackle a great deal of issues. Particularly since, the way things are, the greater part of the battery packs utilized as a part of current mixtures could be substantially more proficient than they are. Hybrid cars are now amazingly proficient; however there is dependably opportunity to get better. 90% of the hybrid cars available today could without much of a stretch be more proficient, albeit, Zero Emissions won't be conceivable, seeing as how cross breeds still require gas So, despite the fact that the mixture you need may not be accessible yet, there is trust regardless. For whatever length of time that purchasers will purchase hybrids now, these advances will be more reasonable, and soon you could be making the most of your own one of a kind Volkswagen Beetle Hybrid with near zero emanations and a lot of space for that strolling stick you simply needed to carry outdoors with you.

V. RESULTS AND CONCLUSION

Hybrid cars are unquestionably more ecologically agreeable than inward ignition vehicles. Batteries are being designed to have a long life. At the point when the hybrid vehicles turned out to be more across the board, battery reusing will turn out to be monetarily conceivable. Examination into other vitality sources, for example, power modules and inexhaustible fills make the future look more splendid for hybrid vehicles.

Based on the research, the following conclusions can be drawn:-

- 5.1 Lithium-particle battery innovation has been growing quickly, particularly at the cell level, yet costs are still high, and the potential for sensational decreases seems restricted. Amassed battery packs right now cost about Rs72,250 to Rs1,10,500 per kWh of usable vitality (Rs40,625 to Rs55,250/kWh of nameplate vitality). A PHEV-10 will require about 2.0 kWh and a HEV around 8 kWh even after the batteries have experienced expected corruption over the long run. Expenses are relied upon to decay by around 35 percent by 2020 yet more gradually from there on. Projections of future battery pack costs are dubious, as they rely

upon the rate of enhancements in battery innovation and assembling strategies, potential achievements in new innovation, conceivable unwinding of battery assurance parameters as experience is picked up, and the level of generation, among different components. Additionally investigate is expected to lessen costs and accomplish leaps forward in battery innovation. Costs to a vehicle maker for a HEV worked in 2030 are

- 5.2 probably going to be about Rs9,10,000 to Rs11,70,000 in excess of an equal customary vehicle, including a Rs6,00,000 to Rs9,10,000 battery pack. The incremental expense of a HEV would be about Rs3,00,500 to Rs3,90,300, including a Rs1,20,500 to \$1,80,300 battery pack. Likewise, a few homes will require electrical framework overhauls, which may cost more than Rs60,000. In examination, the incremental expense of a HEV may be Rs18,000.
- 5.3 HEV are probably not going to accomplish cost-adequacy before 2040 at fuel costs underneath Rs240.00 per gallon, however PHEV-10s may arrive before 2030. PHEVs will recover a portion of their incremental expense, on the grounds that a mile driven on power will be less expensive than a mile on gas, yet it is probably going to be quite a few years previously lifetime fuel investment funds begin to adjust the higher originally cost of the vehicles. Endowments of tens to many billions of dollars will be required for the change to cost-viability. Higher oil costs or quick decreases in battery expenses could diminish the time and appropriations required to achieve cost-adequacy.
- 5.4 At the most extreme Commonsense rate, upwards of 40 million HEVs could be out and about by 2030, yet different variables (e.g., high expenses of batteries, unassuming fuel reserve funds, restricted accessibility of spots to connect, rivalry from different vehicles, and purchaser protection from connecting for all intents and purposes each day) are probably going to keep the number lower. The Greatest Down to earth rate relies upon quick mechanical advancement, expanded government support, and shopper acknowledgment. A more practical entrance rate would result in 13 million HEVs by 2030 out of around 300 million vehicles out and about, which still expect that current levels of government support will proceed for quite a few years.
- 5.5 HEVs will have little effect on oil utilization before 2030 on the grounds that there won't be sufficient of them in the armada. More generous decreases could be accomplished by 2050. PHEV-10s will lessen oil utilization just marginally more than can be accomplished by HEVs. A PHEV-10 is relied upon to use around 20 percent less fuel than an identical HEV, sparing around 70 gallons in 15,000 miles. Forty million PHEV-10s would spare a sum of about 0.2 million barrels of oil for every day. The current light-obligation vehicle armada utilizes around 9 million barrels for each day. PHEV-40s will expend around 55 percent less gas than proportional HEVs, sparing in excess of 200 gallons of gas for every year per vehicle.
- 5.6 HEVs will discharge less carbon dioxide than non-half breed vehicles, yet spare minimal with respect to HEVs subsequent to representing emanations at the producing stations that supply the electric power.

No significant issues are probably going to be experienced for quite a few years in providing the ability to charge HEVs, as long as most vehicles are charged around evening time. Age and transmission of power amid off-crest hours ought to be sufficient for a huge number of HEVs, albeit a few conveyance circuits may require updating on the off chance that they are to serve groups of HEVs. Urging HEV proprietors to charge their vehicles amid off-top hours will require both rate plans that remunerate time-proper charging and hardware that can screen—or even control—time of utilization. A portfolio way to deal with research, improvement, exhibition, and, maybe, showcase change bolster is fundamental. It isn't clear what innovation or mix of advancements—batteries, hydrogen, or biofuels—will be best in decreasing the country's oil reliance to levels that might be vital over the long haul. It is clear, in any case, that a portfolio approach will empower the best decrease in oil utilize. Expanding the proficiency of ordinary vehicles (counting HEVs) past the current administrative system could diminish gas utilization by around 40 percent in 2050, contrasted with the Reference Case. Including biofuels would decrease it another 20 percent. On the off chance that HEVs are likewise included at the Greatest Reasonable rate, gas utilization would be lessened an extra 7 percent, while HEVs could decrease utilization by 23 percent.

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