

Fast Charging Electric Vehicle

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Abstract: One of the real issues that we are confronting today is expanded discharge of CO₂ to atmosphere. One among major emitters are vehicles drives on fossil energizes like petrol, diesel and so on also, the main arrangement is to supplant existing framework with another innovation which disposes of contamination. Fuels like petrol, diesel etc. and the only solution is to replace existing system with a new technology which eliminates pollution. And the only solution is Green Fuel which means to be electricity. FCEV is a new innovative technology which transfers power wirelessly. It eliminates some drawbacks of conventional electric bus which exhibit high cost, large batteries, charging time and so forth.

Keywords: Tesla Coil, Wireless Power Transfer, green fuel, electric vehicle.

I. INTRODUCTION

One of real issues that we are confronting today is pollution and its health hazards. And the major emitters are industries and vehicles which consume fossil fuels as energy source. The only source which can eliminate all this effect is green fuel which means to be electricity. World energy analysis says that by 2020 complete fossil fuels where being used out to it exists. So the only way is to depend renewable or non-polluting sources like sun, wind, Geo-thermal and so forth.. All the studies on power transmission says that the only way to improve power transmission is to reduce the losses and the major losses occupied in power transfer occurs in transmission line and the only solution for that is wireless power transfer. And the first attempt is carried out by Nikola Tesla[1][2] in 1987.Later many scientists experimented on wireless power transfer technology and the latest of them is SMFIR[3][4] (Shaped Magnetic Field in Resonance) by KISAT. Basically it's all about power up a vehicle wirelessly but it open a new trend in electric vehicle industry where many researches are taken place to develop a wireless power transfer technology which delivers maximum power with minimum loss.

FCEV is a tremendous technology evolved as a result of eliminating existing drawbacks of conventional electric vehicle and complete replacing of fossil energized vehicles to electric vehicle which will cause air pollution and health hazards. Quick charging is initiated within the system. This project will eliminate existing plugin electric vehicles to wireless powered with a minimum time. The future of this system will create green public transportation system for a green future and as the demand rise for green fuel new technology will emerge to meet the needs.

II. FCEV BASICS

Fast charging electric vehicle keeps wireless quick charging technology evolved as need to eliminate drawbacks of conventional electric vehicle. And the main parts of this system are wireless transmission and receiving system along with regulator, battery and vehicle driving unit Fig1.shows block diagram of FCEV Instead of metal core we adapt air core for resonant coupling of our

system while in SMFIR they adopt ferrite core we take dc supply from the mains after rectification of about 9v which is switched into 5 kHz frequency with a power transfer of 20 w with 100 turns.

Receiving end placed inside vehicle which keeps a clearance of 50mm from the transmitting coil with 85turns which delivers 7.2v with 16.5watt power after regulation The received voltage is rectified and regulated to 7.2v which is used to charge battery where we utilized 6 cells of 1.2v and a total of 9600mAh and supply is taken to drive system which the motor takes an input of 6 v with controlling mechanism. Around all we provide a relay based system actuates using IR transmitting and receiving system which make sure that the primary will only actuates only by providing signal to the IR receiver where the relay is connected from IR transmitter.

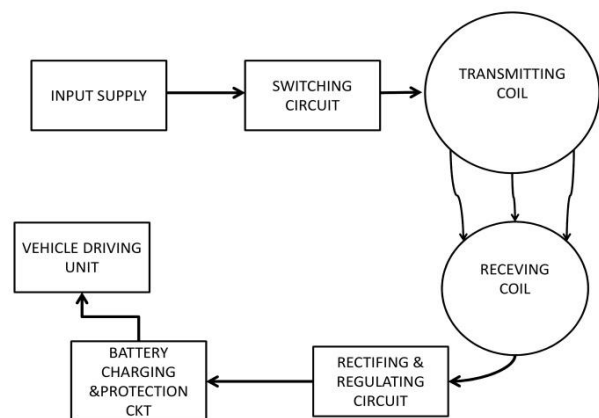


Fig.1: Block diagram of FCEV

III.FCEV WPT

Wireless power transmission is beneficial to power electrical devices wherever interconnecting wires are inconvenient, dangerous or aren't possible. Wireless power techniques are of two kind viz. Non – Radiative and Radiative [5]. In near field or non – Radiative techniques, power is transferred over short distances by magnetic fields using inductive coupling between coils of wire or

electric fields using capacitive coupling between electrodes. In Radiative or far-field techniques, additionally referred to as power beaming, power is transmitted by beams of no particulate radiation like microwaves or laser beams. During this experiment near field or non – Radiative technique is employed for power transmission.

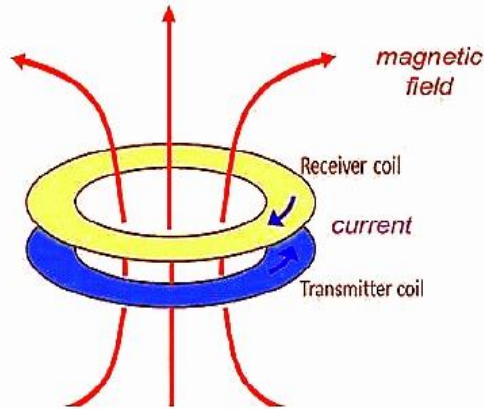


Fig 2: Wireless Power Transfer

Wireless power transferring system is the heart of this technique. That thought by resonant inductive coupling which implies that the system is coupled with same resonating parts of same frequencies. It works by creating a coil with an oscillating current that generates an oscillating magnetic field. And once another coil placed on top of it picks up energy without high lost.

IV. ELECTRIC VEHICLE



Fig 3: Fast Charging Electric Vehicle

Fig 3 shows Fast Charging Electric vehicle consists of receiving coil which will receive the transferred power from transmission coil which then fed to rectifying and regulating circuit to regulate its output to 7.2v. This 7.2v supply will utilized to charge battery of Ni-Mh which later provides the power for driving system which uses two electric motor of 6v one for driving the vehicle and other for providing direction.

V. FCEV WORKING

FCEV works on resonance inductive coupled [6] [7] [8] [9] [10] wireless power transfer technology which enables

maximum power transfer with high efficiency above 90 % and also provides maximum safety.

The ac supply is directly fed via new led driving technology which reduce ac supply without transformer and rectified instead and pass to a backup battery of 9v which enables the driving circuit it supplies voltage at 9v and dc cannot be directly transmit through the coil. So we switch the dc supply with a frequency of 5kHz through the transmission coil (primary) of 100 turns of gauge 22.

The receiving (secondary) coil place about 50mm above transmission coil consists of 85 turns with gauge 36 which receives voltage of 7.6v which is regulated and rectified at 7.2v with 18.5w output is fed to the 6 cells of 1.2v Ni-Mh[11]battery. We provide indications on the top of the vehicle with red, blue and green led to provide information about battery level. RED led alone indicates the battery is below 20% of its full capacity and when the blue stars lighting up it shows the battery status is in between 20 – 60 % of its full load capacity and above 80% the green led become lights up and while it shows its full brightness it becomes 100% of battery level.

In addition to protection of the system we provide IR based actuator system which enables the system to provide supply to transmission system for transmission only when the IR transmitter transmits a signal to the receiver system.

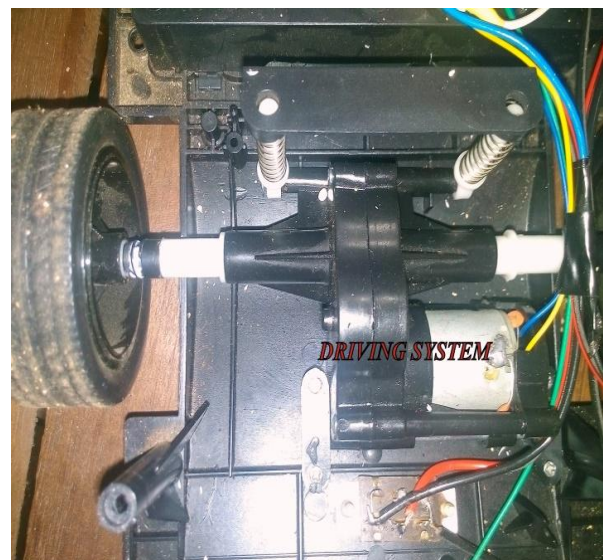


Fig 4: Driving system

The vehicle driving consists of two dc motors of 300 rpm each where one provides driving of the system and the other is used to prefer the direction ie either right or left sides which takes direction from the driving control system.

VI. ADVANTAGES & DISADVANTAGES

The main advantage of this system is that it eliminates fossil powered vehicle which cause air pollution and health hazards. And also we can replace existing fossil energizing vehicle to green vehicles. This mode of transportation system is more economical than fossil energizing vehicle i.e. take electric train as example now our Indian railways are electrifying its locomotives by replacing coaled fuelled or diesel fuelled locomotives with

electric locomotives and the results shows electric locomotives are more economical and efficient than other locomotives and the cost for track electrification costs and make a replace with short period due to damage. If we adopt FCEV technology to our railway system it provides safety and economical infrastructure

And the only disadvantage is that it needs high initial cost for change existing road rail.

VII. RESULTS

On experimenting the wireless power transfer system, we observed

1. Resonance inductive coupled wireless power transfer technology provides an efficiency of about: -- Efficiency = 82.5 %
2. Input Power = 20 w
3. Output Power = 16.5 w
4. Maximum Charging Time = 6 M 30 Sec
5. Minimum Charging Time = 4 M 15 Sec
6. Ground Clearance = 50 mm

VIII. FUTURE SCOPE

At present we developed this system only to implement in transportation system like electric buses. But further research in power transfer system will emerge a trending hope for this technology for implementing it in electric locomotive to eliminate the overhead line which they are currently fed by carry more cost than locomotives. By eliminating overhead lines and implementing FCEV technology we can eliminate it and the replacement will make railway system more efficient and economical.

IX. CONCLUSION

The FCEV is a trending technology which provides wireless power transfer technology by means of resonant inductive coupling technology of 5kHz with an efficiency of 82.5% with an input power of 20w and output power of 16.5w. From all the experiments that we conducted made us to conclude that FCEV will be the future of our vehicle industry which provides fast charging with low costed electric vehicle's which eliminate pollution and health hazards caused by fossil energized vehicle by excessive emission of CO₂ to atmosphere.

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