

# Ecofriendly Vehicle Charging Using Hybrid System

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## ABSTRACT

Our project is about the Ecofriendly Vehicle Charging Using Hybrid System. If this technology is apply to any battery operated vehicle than there are many advantages of this technology. In this technology wire connected charging system is not used. In this project the charging system work on IR sensor (transmit & receive data) so due to this their no issue of electrical shock & accident. For the hybrid system we are using the solar panel which is connected to the battery, so in summer season it can be used for the charging of battery.

## I. INTRODUCTION

Now a day the battery vehicles are used for transportation, so main problem of this vehicle is of battery charging and speed of charging. Normally the charging time is 6 to 7 hour. So the owner keeps the vehicle for charging during night time, if due to lose of socket the vehicle is not able to charge and owner has to suffer from this problem. So we are mainly focus on the charging of battery without any interruption and charging of battery fast as much as possible. So we develop the project which solve the above problem easily and economically. Our Project is to develop a wireless vehicle charging system using hybrid technology. The battery of the vehicle is charge by hybrid system in which battery is supported solar charging and electrical charging. In our project, an electrical charging system consists of primary & secondary winding of transformer, IR sensor and Rectifier (AC-DC converter). Primary winding of transformer is kept under the floor and secondary winding is connected under the vehicle chassis. So the problem of lose contacts and socket is no more.

The rating of the transformer is 230V/12V & stepdown Transformer. In this technology wire

connected charging system is not used. In this project the charging system work on IR sensor (transmits & receives data). The rating of the transformer is 12V and 2M range. Transmitter of IR sensor is connected at primary site and Receiver is connected at secondary site of isolated transformer. When the vehicle come at these floor, sensors of both primary and secondary match and vehicle start charging through electrical supply.

From the secondary the supply is given to A.C to D.C converter (rectifier) which converts the A.C supply into D.C as appropriate to battery charging. The A.C supply is converted into D.C using Rectifier. The rating of rectifier is 12V-24V, 1A. The rectifier output is supply to the battery. By using this technology there is no issue of wire charging, charging of vehicle is done by wireless in which primary and secondary is isolated from each other and vehicle is charge through magnetic field. So due to this their no issue of electrical shock & accident.

## II. BLOCK DIAGRAM

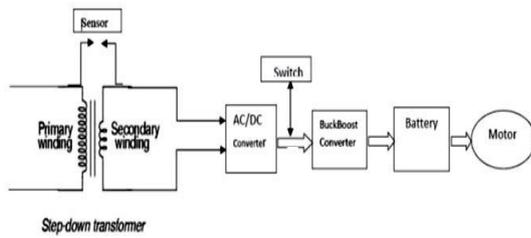


Figure 1: Block diagram

In this paper we experimentally studied the hybrid electrical charging of the battery operated vehicle. In this we studied about the fast charging of battery. In our this phase we charge the battery wirelessly through the primary and secondary of the transformer which is connected to the vehicle and the floor. In this system we use the transmitter as the sensing device. The output of the transformer is given to the AC to DC converter. The rectifier convert the power as per requirement of the battery. The capacitor bank is use for the fast charging of the battery. The vehicle come over the floor at which the primary winding is connect the sensor are come in action and battery is start charging.

## III. METHODS AND MATERIAL

### • Material

#### A. Primary & Secondary Transformer coil

Isolation Transformers have primary and secondary windings, which are physically separated from each other. Sometimes these transformers are referred as "insulated". This is because the primary and secondary windings are insulated from each other. In our project the primary winding is kept under the floor area whose rating is 230V A.C, 50Hz.

The secondary winding is kept under the vehicle chassis whose rating is 12V A.C. An isolation transformer allows an A.C supply to be taken from one device and fed into another without electrically connecting the two circuits. Isolation transformers

block transmission of D.C supply from one circuit to the other, but allow AC signals to pass.

#### B. 12 volt Rechargeable Battery

A storage battery, secondary cell, rechargeable battery, or accumulator is a type of battery which can be charged and discharged into a load, and recharged many times, as they opposed to a disposable or primary battery, which is fully charged and discarded after use.

In our project the battery is charge through the isolation transformer, the AC supply is convert into the DC supply which is useable for the battery charging. The battery is fast charge by the Capacitor Bank.

#### C. IR Sensor (Infrared sensors)

In our project the transmitter & receiver IR sensor are use. Transmitter of IR sensor is connected to the primary side of transformer and receiver of IR sensor is connected to the secondary side of transformer. Infrared technology mainly use in the wireless applications. The range of the IR sensor is up to 12 meter and voltage is up to 12V.

#### D. Rectifier 24V/1A

The device which convert the alternating current (AC) into the Direct current (DC), which flows in only one direction is known as rectifier and the process is called rectification. In our project the 24V rectifier is used for the charging of battery. Rectifiers are available in different voltage range and use as per the battery available.

#### E. DC Series Motor

Construction of this motor is similar to any other types of DC motors in almost all factors. DC series motor has very high starting torque. Series motor draws less current and power from the source compared to a shunt or compound motor. Series

motor use the lowest starting current at a given torque.

### F. Charging Indicator

The charging indicator is use to indicate the charging level of the battery. The charging indicator must be accurate so the owner had got the proper indication of the battery.

### Component Requirement

Table 1. List of components

SR NO	COMPONENT NAME	NOS.	VALUE
1.	Transformer winding	2	---
2.	IR Sensor	2	---
3.	Rectifier	1	24V/1A
4.	Switch	1	---
5.	RECHARGEABLE BATTERY	1	12V/10A
6.	CHARGING CIRCUIT	1	---
7.	Capacitor Bank	1	100 $\mu$ f/35V
9.	BALL BEARINGS	4	---
10.	Changeover Switch	1	---
11	Charging Indicator	1	---
12.	D.C series Motor	1	12V/60 R.P.M

#### • Method

Fabrication of the body structure is done carefully with the help of fabricator, because of the vehicle body which is made of metal. The chassis of the vehicle are fabricated in the proper alignment for better performance of the vehicle. The floor at which the primary winding is connected should be robust to handle the weight of the vehicle. The different test

may be conduct for better performance of the vehicle. The electrical wiring and component are connected as per the diagram of the vehicle. The rectifier, capacitor bank, primary & secondary coil, sensors are connect to the vehicle and the floor with the help to nuts and proper wiring.

The system was tested by means of human power for three times and it was recognized that the charging time and the reliability of the system must be require, it can easily operate by using single hand. Before starring the system the connection of vehicle and floor must be check. When the vehicle come over the floor the transmitter of the vehicle send the signal to the receiver of the floor sensor and vehicle start the charging by means of indicating in the charging indicator. The vehicle is charge without any wire connection.

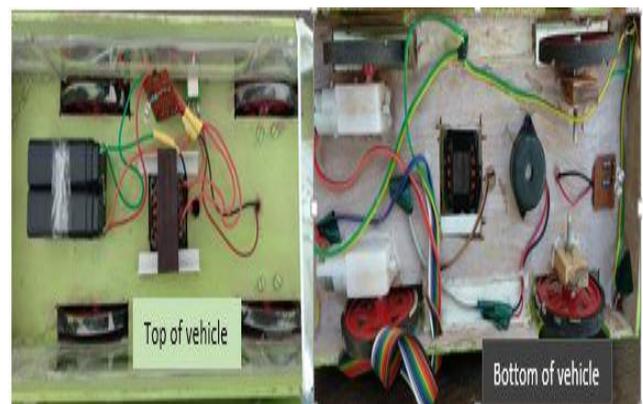
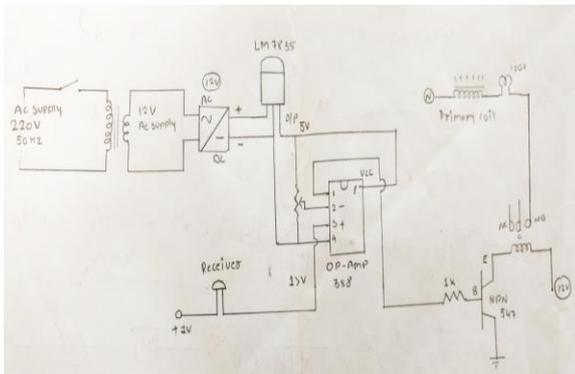


Figure 2: Hardware of vehicle



Figure 3: Hardware diagram of vehicle



**Figure 4:** Circuit Daigram of System

In this system the fabrication, assembly and testing are the important part of body structure, they are discuss as follow:

### A) Fabrication Phase

Fabrication of the body structure is done carefully with the help of fabricator. The body is fabricating according to the design of the project. One of the major parts of the fabrication is chassis alignment and joint fabrication. The chassis are welded with the help of welder is proper jointing are done.

The rubber wheels and bearings are fitted and welding to the chassis of the vehicle body. Nuts and bolts are tightening as per required and fitted to the major parts of body structure.

### B. Assembly Phase

After the body structure is completed the main part is assembly of the electrical and mechanical component of the vehicle. The fitting of the primary and secondary winding is completed. The primary winding is fitted under the floor and secondary is fitted under the chassis of the vehicle body. The sensors are fitted as per required distance and wiring id done.

The rectifier and capacitor bank is fitted to the body and wiring is completed. The charging indicator and analog & digital meter are connected to the body. The wheel is connecting to the motor.

### C. Testing Phase:

This phase is last phase of our project. In this phase testing of electrical circuit and Motor and maintenance of gear box. We check daily arena which is must be clean. The primary and secondary winding are checked and coils are checked properly. The sensors are clean and check the accuracy.

The DC series motor is run at top speed and check the condition of the winding, heating, vibration etc. Testing of the rectifier is done properly with the help of testing equipment. The wiring of all equipment is check with the help of multi meter.

## III. RESULTS AND DISCUSSION

This system depend on the fast charging system and the charging time require for the battery. The reading of charging time of the battery is taken for three to four time so we can able to get time require for charging and if any component require to change that may be change.

The accuracy of the sensors are taking as the important part of the system so when the vehicle come the floor the sensor come in the action and battery start charging. The battery is full charge during the testing and reading of different charging methods are taken.

The rectifier and the dc series motor must be work properly so the vehicle charging and run without any interruption.

There are some advantage, applications and limitation of this system as follow and also discuss about the future planning and expansion of the system for the better performance so we eliminate the error of the system. There are some feature of our project which are main highlight.

### A. Advantages:

- It is an eco-friendly to environment.
- Charging speed of battery is high.

- Save the time of charging of battery vehicle.
- Wiring charging system is removed so there is no problem of loose contact as well as sparking.
- It is an economical system.
- It provides maintenance free operation.

#### IV. CONCLUSION

This project solves the problem of loose contact of wires and sockets used for the charging. Moreover, it also solves other problems such as slow rate of charging so that the owner may not have to keep his vehicle for hours for the charging. For this we use the capacitor bank at a cheaper rate and less maintenance requirement. The running cost of the project is less. In this project, using a capacitor bank and an isolated transformer, the charging rate is boosted with wireless charging economically.

#### B. Applications:

- Government Travel and transportation vehicle, two-wheeler battery motor bike, light and heavy battery vehicle.
- Such areas where fuel is not supplied easily. Further, it is also applicable to use against high fuel prices.
- Running cost is less so the poor people can afford.

#### C. Limitation:

- Battery is running on the single source of charging so in case of electricity cut-off, the battery is not able to charge.
- The sensors must be clean sometimes due to dirtiness, charging is not started.
- The changeover switch is not automatic.
- The chassis is not able to handle high capacity of load.

#### D. Future Enhancement:

- In the future, we use solar energy for the auxiliary charging in case of electrical supply cut-off or failure.
- The capacity of the battery can be increased to increase the travelling capacity. The chassis can be made more robust for the high load capacity.

#### E. Features:

This system has many characteristics, few of them are mentioned as follows:

- For fast charging.
- For wireless charging.
- Easy operation.
- Highly sensitive.
- Reliable.
- More flexible.

#### V. REFERENCES

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