



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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Design and Implementation of E-Vehicle Smart Charging for Cost Minimization Consideration Temperature and Battery Health

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ABSTRACT-Considering the effect of high temperature on lithium-ion batteries, an optimal control for electric vehicles has been proposed to reduce cost and make consumers the most profitable. To achieve this goal, we propose a smart two-way payment algorithm using grid-to-car and car-to-grid. The decentralized intelligent charging algorithm takes into account daily energy costs, EV data, consumers, outside temperature and battery temperature to create and solve a nonlinear optimization problem. The algorithm was tested in various conditions, taking into account the daily power profile in France. The results show that the efficiency of the decentralized system is high and the payment cost is reduced compared to the unmanaged payment.

KEYWORDS: Battery charger, battery internal resistance, capacity fade, electric vehicle, lithium-ion battery.

I. INTRODUCTION

The development of electric vehicles (EVs) is part of the transition from fossil fuels to other energy sources in terms of reducing reliance on fossil fuels, fossil fuels and CO₂ emissions; It is an important part of addressing environmental concerns as we move towards the environment. green future highway This trend is supported by recent advances in batteries and converter technology. The policy is also backed by government energy independence and protectionism, with major automakers launching electric vehicles (EVs) and their cousins, plug-in hybrid electric vehicles (PHEVs). While estimates of EV population growth vary, there is consensus that EVs will make up a significant portion of vehicle ownership between 2025 and 2030. Obviously, penetration could be higher. This estimate is based on the price of batteries, the price of gasoline, government regulations and the ability to pay for electricity. However, EVs introduce new challenges such as EV charging issues for three reasons: i) simultaneous charging of many EVs in the same area causes more interference, thus overloading the grid, ii) pre-charging EVs must. off-peak hours when electricity prices are the lowest; and iii) the need to integrate several renewable energy sources to reduce electricity costs, etc. That's why electric vehicles are considered one of the main energy consumers in the smart plan. These numbers are expected to increase significantly in the coming years. Therefore, it is important to analyze the impact of EV charging on the smart grid and create the best strategy for EVs. The most accurate EV charging strategy is to charge EVs when electricity prices are low, eg.g., eat. In it, the change in power line level is controlled by controlling the electrical load. In addition, EE payments are analyzed and optimized using the latest mathematical methods. The behavior of the electric car to charge it at the lowest price is analyzed using average play. Use particle swarm optimization to find the best EV charging time. Distributed congestion control for internet traffic has been changed to control distribution-based EV charging. Additionally, consumer preferences for EV charging are explored.

II. LITERATURE SURVEY

This project presents a hybrid system with an electric motor and an internal circuit (IC). The front wheel is powered by batteries and the rear wheels are gasoline powered, meaning it has a single-cylinder, air-cooled internal combustion engine and a generator based on the BLDC engine for a hybrid drive car. The controller is designed to switch between internal and external generators based on power demand and load conditions. Low-speed cars follow front-wheel drive, and high-speed cars are converted to front-wheel drive. Items in the guide for connecting the tire to the hopper motor. There is no need to downshift as the power produced is sufficient to propel the vehicle. The shaft of the motor is connected to the suspension. The suspension is attached to an arm with the main frame. Enhancements such as lighting are included in the user assistance. A battery-powered microcontroller performs the on-demand conversion

from electrical to burning and vice versa. It senses the throttle position and controls the internal combustion engine via a servo motor to control the speed of the hub motor and rear wheel speed via a control circuit. Due to space limitations, two batteries are located in the front and near the two fuel tanks. The engine is attached to the main frame and the seat is above the engine. The CVT is connected to the crankshaft of the engine to prevent jolting when changing, making it easier to control than the .

III. IMPLEMENTATION SYSTEM

This shows the complete layout of the proposed electric hybrid vehicle.

The components involved in hybrid vehicle are shown below:

Grounded Low Voltage System (GLVS) Battery

- Tractive System (TS) accumulator
- Converter
- IC engine
- CVT transmission
- Master controller
- Switch
- Motor control unit
- Self-motor
- Ignition control

GLVS Battery and TS accumulator

The vehicle's TS are defined as any part that is connected to the engine and TS accumulators electrically. The vehicle's GLVS is defined as any electrical part that does not belong to the TS.

IC Engine

An Internal Combustion Engine (ICE) is a warm engine where a fuel ignition occurs with an oxidizer (usually air) in an ignition chamber which is an essential part of the operating liquid stream circuit. The development of high-temperature and high-weight gasses delivered by burning in an internal combustion engine applies direct power to some part of the engine. The power is usually connected to cylinders, sharp edges of turbines, rotors or spouts. This power moves the part over separation, changing concoction vitality into valuable mechanical vitality.

Working of IC Engine

The principal thing it helps to remember in IC engine is the petroleum/diesel motor. Petroleum motor is spark start motor though diesel motor is packed start engine. These IC engines are for the most part four stroke motors and subsequently can examine about especially four stroke IC engines. The petroleum engine works in the rule of OTTO cycle. It is a four stroke cycle and it is a blend of gas and air. It is packed in the burning chamber to a predetermined weight proportion. An explicit weight spark is created by methods for flash attachment and the ignition is delivered. This is called control

stroke as in this stroke control is made [3]. The steps for the working of oil motor are below:

Procedure 1: Suction of air and fuel blend

Procedure 2: Compressing the blend to foreordained weight proportion

Procedure 3: Power stroke (spark lights the fire)

Procedure 4: Expansion stroke/exhaust The flash fitting is utilized to create a spark that is sufficiently varied for the fuel blend to get scorched. Other most famous IC motor is diesel motor. Diesel motor operates based on the diesel cycle guidelines. The primary contrast between the Otto cycle and the diesel cycle is that heat is included in the Otto cycle in a steady volume process while heat expansion occurs in a consistent pressure process in the diesel cycle. Other than that the vital distinction between these two is that the diesel motor doesn't have a carburetor and furthermore a flash attachment. Rather they have a fuel injector framework where

it infuses diesel straight forwardly into the ignition chamber. Consequently, these two motors vary by their wellspring of admission. In any case, as a rule these two motors have a constructional distinction.

IV. DESIGN AND DEVELOPMENT OF HYBRID SCOOTER

HEVs are vehicles with more than two engines. The main problem with the HEV configuration is related to the different electrical components that have an impact on the drive, battery metering and onboard battery. HEVs take advantage of the electric drive to compensate for the shortcomings of ICE, especially to avoid idling, in order to expand environmental friendliness and reduce emissions during release and fast running. Then use regenerative braking instead of mechanical braking when decelerating and driving downhill. HEVs can solve consumers' problems, including reputation, but price is a big issue. The cost of these vehicles is incredible and the government should support some strategies to promote HEVs. HEVs are divided into two basic types, stable and balanced. Recently, with the advent of some hybrid cars with both equal and equal balance, the layout has reached three types - equal and equal. It is worth noting that some HEVs have recently been classified into these three types. The purpose of this article is to present the most efficient and least polluting cars. Hybrid electric car models combine the internal combustion engine of a conventional car with the battery and electric motor of an EV, doubling the fuel economy of a conventional car. The map of smart management is shown in Figure 3. In general, hybrids have a lot of fuel, some even reach 100 km / l. Better gas mileage also means fewer trips to the gas station, which is good for your wallet. Hybrid bikes are designed to thrive on city streets. In fact, most people in county have better gas than the highway. Depending on the region, they may not require emissions testing when it's time to renew your vehicle license. Depending on the region, the vehicle may be eligible for tax exemption or credit.

Vehicle needs to modify

Two propulsions are employed in this system, namely BLDC motor which is mounted on the front wheel that works on HUB motor mechanism and the other is IC engine. The proposed hybrid scooty .



HUB motor propulsion mounting for front wheel



Fig. 5. IC Engine propulsion mounting for rear wheel



Fig. 6. Tractive Accumulator Mounting at Scooty Front Foot place



Implementation of the Hybrid Vehicle

V. RESULTS AND DISCUSSION

A HEV is a vehicle that uses two energy sources, one gasoline and the other battery. Battery drives are used for low-energy applications, while high-energy applications require high levels of gasoline. Gasoline works best at high speeds. The best performance is achieved when the hybrid car operates in these two modes. But it doesn't work very well in low speed petrol engines. As a result, HEVs provide twice the mileage of conventional vehicles, as shown in Table 1. This hybrid vehicle emits 50% less emissions than a conventional vehicle; It plays an important role in reducing pollution to some extent without affecting performance. This is why they are most efficient in the city, especially in high-traffic areas, where gasoline engines are less efficient, because gasoline uses electricity, is wasted, and creates pollution.

VI. ADVANTAGES

- E-scooters can be very convenient.
- Not required to have a driver's licence.
- Use with minimal effort.
- Savings on greenhouse gas emissions.

- Electric scooters are environmentally friendly.
- There is no noise pollution.
- Cost-effective
- No fuel required so you save money on gas.
- Environmental friendly as they do not emit pollutants.
- Lower maintenance due to an efficient electric motor.
- Better Performance

VII.CONCLUSION

A HEV is a two-wheeled vehicle that uses gasoline and batteries. A battery driver is used for low power consumption; high control The petrol engine must be used for high power consumption, which is a prerequisite for the . It was determined that the internal combustion engine was used to obtain the thrust of the car. Once the desired speed is reached, the BLDC motor combines with the ICE drive to complete the entire motion of the vehicle. By replacing the controller, the total torque obtained by the ICE and the generator is synchronized to the same level. By properly distributing the torque, it is also possible to start the engine to reduce the fuel required for the ICE propulsion and extend battery life at all costs. The throttle that starts the engine is associated with the throttle that powers the ICE. Both engine torque and ICE torque are responsible for keeping the vehicle running. Therefore, the short battery problem with e-bikes can now be solved using this technology.

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