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CHARGING-DISCHARGING MANAGEMENT OF E-VEHICLE WITH MANAGING EMERGENCY POWER

Akash R. Puranik
Department of Electrical Engineering
Sandip Institute of Engineering & Management
Nashik, Maharashtra, India

Prof. Deepak S. Suryavanshi
Department of Electrical Engineering
Sandip Institute of Engineering & Management
Nashik, Maharashtra, India

***Abstract*-Burning of the fossil fuels for energy has a critical role in global warming, which left unbridled could lead to disastrous climate change.**
Not only the oil eat up for transport via internal combustion engine vehicles (IC Engine) result in Greenhouse Gas emissions, aextensive range of other negative side also impact the environment, economy, and society.
Then, we realize thatmanaging of charging discharging supply of electric vehicles bettering the power factor and accord consumer reliable power isan effective solution, grantto minimize the expected daily residentiary operation cost in the household without seeing the voltage constraint. According to the current state of charge of the EV's battery bank, customers and the grid demands, a control center makes the decisions and sends the instructions of specific charging/discharging mode.

Keywords—Electrical Vehicles (EV), Charging, Discharging,Plug-in, Vehicle to Grid (V2G), Grid to Vehicle (G2V),CHARGING DISCHARGING MANAGEMENT (CDM)

I.INTRODUCTION

The vehicle industry is one of the main pillar industries in most countries, whose rapid development results in continuous number increment, fuel consumption augment, aggravated exhaust emissions to air pollution together with greenhouse effect. Therefore, energy supply transformation may be the only way out to keep the sustainable development of the automobile industry. The emission of a EV whose power is provided by fossil energy is only 10% of that from traditional fuel driven vehicles with equal driving mileage.

The battery packs in EVs can be regarded as distributed storage units. A number of studies underline the importance to analyse EV users' charging habits, preferences, and opportunities to evaluate the beneficial charge and discharge time of the EV for the user and for the network.

One challenge of the current power grid is to provide sufficient capacity and cost-effective energy storage. The energy storage is used as a tool by the power grid operator to efficiently manage the generation and transmission of the electricity.

Through the introduction of V2 G technology and smart grid technologies, all participants will benefit from this project. As for EV consumers, they can re-sell the energy stored in EVs back to the grid during peak times. Reducing CO2 emissions to avoid global warming is a global challenge. By 2040, electricity will account for about a fifth of final energy consumption.

II.LITERATURE SURVEY

Policy approaches designed to increase the attractiveness of EVs have been documented elsewhere Study of strategies employed in various industrial markets indicates that government intervention is necessary to enable individuals to purchase EVs, hence the need for governments to promote the implementation of fast-recharge infrastructure, among other initiatives. Such actions can be a key route to a rapid reduction in transport-related oil consumption; however, the Australian Government's efforts to promote the transition to EVs have been very limited to date.Promoting the use of electricity will help alleviate the fuel crisis and increase environmental pollution by gradually reducing the consumption of gasoline, diesel and other vehicle fuels and by alleviating pollution generated by exhaust emissions. Electric vehicles (EVs) are emerging as a priority of growth in the transport sector. Energy for EVs is mainly sourced from the power grid, and large-scale development of such vehicles cannot be separated from the support of the power system.

According to estimates from the China Automotive Engineering Association, the number of electric vehicles in

China will hit 80 million by 2030. If the average EV battery is fitted with 60 kW h, the equivalent storage capacity would be 48 × 108 kW h compared to the daily energy consumption in China.

With the introduction of vehicle-to - grid (V2 G) technology, electric vehicles can share power with the grid through A / D and D / A charging stations and participate in network charging and discharging services.

Energy demand is considerable, whether it absorbs electricity from the system or emits electricity into the system. The optimal charging and discharging behaviour of EV users can therefore provide power supply to the power grid in the event of power shortages, reduce the balance of power supply and demand, and is of great importance for improving the stability of the power grid.

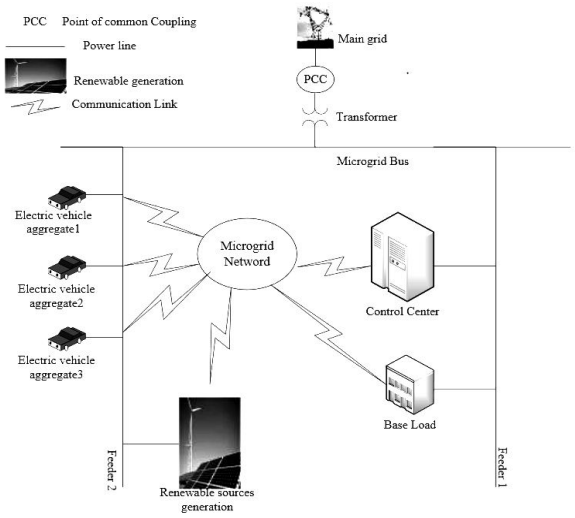
With the increased energy capacity of EV batteries, the energy requirements of the grid, the charging or discharging flexibility of EVs and the concepts of vehicle-to-home (V2H), vehicle-to-grid (V2 G) and vehicle-to-vehicle (V2V) have become more desirable for grid-connected operation. V2H can provide multiple house energy services through smart building management systems during peak periods and enhance reliability when loads are shed. In V2H, EV can be coordinated with photovoltaic generation for flexible load scheduling and optimal energy management, thus increasing the benefits of V2H implementation.

In recent literature on electric vehicles, considering EV batteries as controllable parts of the power system, numerous papers focus on optimizing the charging and discharging modes of EVs in order to participate in ancillary services in the smart grid. Some works have been studied to minimize the cost to the owner of the EVs or to reduce the total cost of the aggregator separately. With bi-directional chargers, EV batteries can be used to exchange active power with G2V and V2 G power grids.

III.OBJECTIVE FOR CDM OF EV

A specific goal of plug-in hybrid vehicles is their ability to combine the transport sector and the energy generation market in order to boost the performance, fuel economy and reliability of both systems. The following options need to be made available in the EV CDM.

Modelling of grid system- In the paper, we consider a charging/discharging of EVs system model in microgrid, as shown in Fig. 1



The microgrid and main grid are linked together via a common coupling (PCC). The microgrid consists of the base load, the renewable energy storage, the control center and other generators and EVs. Wind turbines and solar panels are generating renewable energy. Base load refers to a load that excludes the load of an electric vehicle.

Enhancing ancillary services- In fact, there are a lot of cars on the road for just 4-5 per cent of the day, as they spend the majority of their time on parking. This means that we will use such electric vehicles to promote ancillary services in V2 G systems.

Smart charging/discharging control- As the number of PEVs grows, the implementation of smart charging / discharge management solutions has become increasingly necessary to prevent high costs and negative impacts on the power grid.

Data communications- In V2 G networks, data contact between PEVs and V2 G infrastructure is the most critical step towards achieving the best performance for both PEV users and V2 G system operators, since operators need information on the requirements of PEVs to manage energy resources spread over broad geographic areas, while PEV users need V2 G infrastructure information to reduce their energy costs.

Improving quality of services for PEV users- Due to the advancement of battery technology, V2 G systems enable very quick energy supply response times during which

charging and discharging reactions can be performed in milliseconds. In addition, there are no major operating costs for unit commitment activities. It can also be greatly enhanced by serving time.

Supporting renewable energy- The combination of PEVs and renewables will increase the stability and efficiency of the power grid. Power output from renewable sources, such as solar and wind turbines, can be significantly enhanced by using PEVs as philtres and storage devices.

Rising revenue to PEV users- PEV users may receive a monetary reward for energy discharging or other support incentives by V2G operators participating in the scheme.

IV. COMPONENTS& THEIR USES

The following components are available for use along with the CDM of EV:

a) Microcontroller atmega 328P- ATMEGA328p Is a high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller that combines 32 KB ISP flash memory with read-write capability, 1024B EEPROM, 2 KB SRAM, 23 general purpose I / O row, 32 general purpose working registers, three versatile timer / counters with matching modes, internal and external interrupts, serial programmable USART, byte-oriented 2-wire serial interface The system works between 1.8 and 5.5 volts.

b) Lcd- The liquid crystal display (LCD) used is a 2x16 LCD panel. I.e. two lines of 16 characters each. The LCD was used in the 8bit format. The RW pin is pulled low when the data is sent to the LCD. The allow pin is essentially a latch pin that informs the LCD that the data on the data lines is available.

c) Electromagnetic Relay- Electromagnetic relays are the circuits that run on the electromagnetic attraction principle. It is a kind of magnet switch that uses the magnet to create a magnet field. The magnetic field then uses the switch to open and close and to operate mechanically.

d) Inverter- The input DC voltage can be switched on / off using a power transistor, such as MOSFETs. The frequency of oscillating signal was calculated by supplying a 12 Volt DC to the IC SG 3525 PWM using a 10 K a variable resistor connected in series to another 56 K a resistor and both connected to the RC time constant network in parallel with 0.22µF.

V. SCOPE & CONSTRAINTS

Urban land is particularly valuable in most towns. It is therefore impractical to find an undeveloped blanket area in which solar PV panels can be built in cities. Mounting solar panels on building roofs is an alternative that can be explored, but another challenge seems to be that it is difficult to resolve the division of ownership and interest between homeowners and operators of solar power stations. The urban space that can be allocated for installation of solar panels is therefore very small. In addition, the location and distribution of solar panels is a key factor in supporting solar-powered charging stations in major metropolises, such as Shenzhen.

The use of the PLC system is also in private industry parking and the use of improvements to charge and discharge grid management. The project will be built in that way.

- Let load shearing free grid in India also free of emissions.
- The Government of India will work on a project that is also funded by private companies.
- Electric Vehicle development can occur all over the world over "healthy shot" for Reasons, Zero Carbon Emissions, Economy to Run, Negligible Maintenance, Easy to Drive.
- It will have to reduce taxes on electric cars or even allow purchase discounts.
- Trying to introduce and supporting divisions and rising mechatronics in engineering colleges.
- Some positive step that we are seeing now as electric cars in markets, however the costs of such cars are very high.

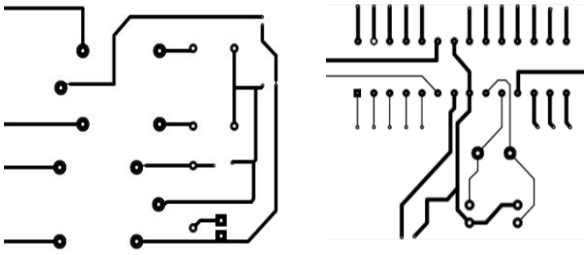
There's really no question that EVs will revolutionize the way we travel while keeping things simple on Earth. But there are still a range of restrictions in the method that require the following:

- The charge rate to be N rather than Z. We want to make the charging rate the highest possible. A reduced charge rate means a higher effective speed of travel and thus we have more flexibility / freedom.
- Batteries are heated when charged, due to internal resistance and other factors. The heat is likely to cause harm or worse. Batteries have a maximum safe charging rate that varies with a particular battery.

- The report also recommended the renovation and relocation of charging parking spaces and charging stations.

VI. PCB DESIGN

- Kodak photo-resistant photopolymer is a light sensitive organic material that is added to the board as a thin film that is insoluble in certain chemical solvents.
- Here the photo resists printing is performed in which it polymerizes when the photo resists is exposed to ultraviolet light. When polymerized, it becomes unsolvable in some chemical solvents known as developers.
- Immersion plating uses tin and alloys and gold. It is achieved by chemically removing the salt solution of the coating material. This is an easy and less expensive form.
- We choose ferric chloride method for etching because it has a short etching time and can be processed for longer periods of time.

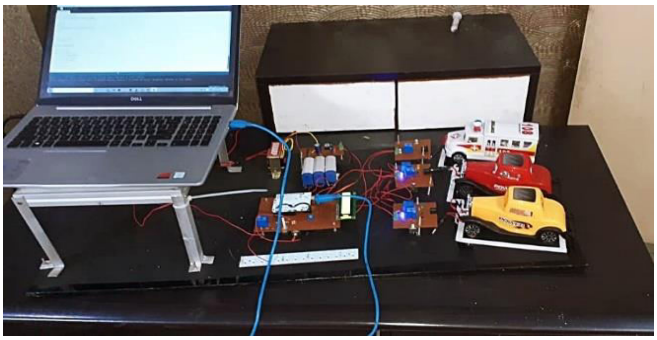


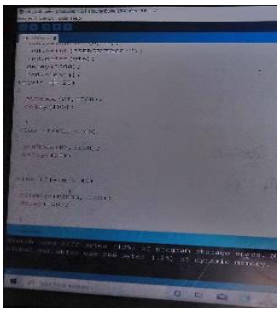
VII. TESTING

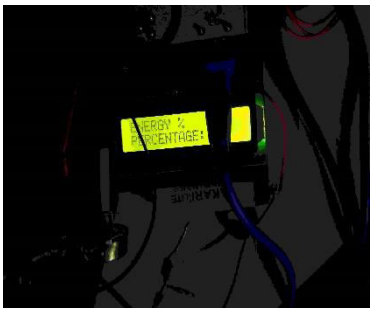
- SOFTWARE TESTING:We tested the assembly language software, then we found that the loop given in the software is wrong, so we check it and then put it in the correct position so that the programmed function in the correct way.

Arduino IDE Testing- The source code for the ide is released under the gnu general public license, version 2.The Arduino Ide supports the C and C++ languages by implementing special code structuring laws. The Arduino Ide supplies a wiring project software library, which includes a variety of standard input and output procedures.

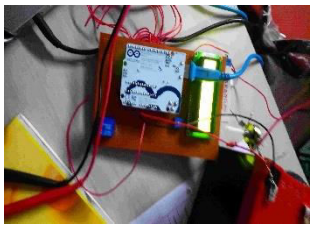
Proteus 8.1Testing- While u is not used to build the pcb, it may be able to see the pcb layout of the component individually when selecting the component. Proteus is going to simulate the circuits of microcontrollers in which we can simulate the circuit by uploading the hex code to the microcontroller where it is difficult to do so as a multi-simulation.

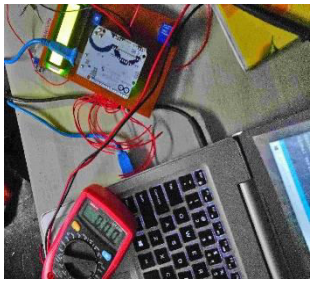






- HARDWARE TESTING: When making pcb there is shorted two paths accidentally because of which we are getting output the error while we tested for continuity. While making power supply we are not getting desire output so we check voltage at every point then we found error in the capacitor then we change it and then capacitor got desire output.





VIII. RESULT

It shows proof that policymakers should consider promoting the transition to fossil-free driving in a country like Australia, where governments have not taken substantial measures to facilitate ev sales to date. This article was focused on the auto purchasing preferences of well-educated, urbanized, Australian engineers with environmental patterns and testing whether knowledge would improve the potential for ev consumption. There are big barriers to be solved before environmental customers actually purchase an ev. The research shows. As a consequence, one suggestion resulting from this research is that the government should support the introduction of this important business co-condition. If consumer needs are not key considerations in the design and execution of policy measures, the full value of the investment in support of increased adoption cannot be realized. It is recommended that improvements in infrastructure take place before price stability of icevs is achieved. The demand will possibly pick up at that stage and cater to the masses. Motors will benefit from acts to boost their relationship with an invention like evs well before their next purchase of vehicles.Details on the range of vehicles and guarantees that they will be able to safely enter remote destinations since there is a sufficient recharging network will help to alleviate range anxieties.

The second recommendation concerns the need for centralized data collection on the location of facilities and the type of recharger. Such data will be useful to ensure that applications, such as mobile apps, are up-to-date and accurate, thus dispelling motorists' fears of reaching their destination without running out of charge and thus promoting uptake. In order to improve user usability, it is proposed that infrastructure networks will benefit from open access, i.e. no need to enter the network and credit / debit card payment options, potentially improving penetration and further network flexibility.The third suggestion underpinning our findings is the need to resolve the lack of knowledge on ownership and service. Rising experiential learning for future owners of rides and driving events is an example of a cost-effective method for governments to promote adoption in countries with low market acceptance of evs.

IX. CONCLUSION AND SCOPE

This project paper provides evidence to support recommendations that policy makers could consider encouraging the transition to fossil-free driving in a country such as Australia, where, to date, governments have not taken any significant action to encourage sales, which will inevitably increase the heat loss from the solar absorber to the surroundings through heat convection. The reason for designing this improved experimental setup is to have the opportunity to investigate the effect.
Solar and wind and other sustainable technologies will help to re-label the energy system in the future. More electric vehicles can give the energy replaced to a power system that can be very useful to increase the power factor.
Use a plc system to improve the charging and unloading power with grid control.

- Peak load leveling: The idea allows v2g vehicles and provide power to help balance loads by "valley filling" (night loading when demand is low) and "peak shaving" (sending power back to the grid when demand is high, see the duck curve). Peak usage levelling will allow new ways for utilities to provide control services (maintenance of voltage and stable frequency) as well as provide spinning reserves (metallization of sudden power requirements).These services, combined with smart meters, would allow v2 g vehicles to re-energize the grid and, in exchange, gain monetary benefits on the basis of the amount of power returned to the grid in its current growth, it was suggested that such use of electric vehicles could buffer renewable energy sources such as wind power , for example, by storing excess energy generated during windy periods and p. Some see this implementation of vehicle-to - grid technology as an approach to helping renewable energy to become a simple electrical charge technology.
- Backup power: Modern electric vehicles can typically carry more than just the daily average energy demand at home in their batteries. Without the capacity of a phev to produce electricity, such a vehicle can be used for emergency power for several days (e.g., lighting, home appliances, etc.). This will be an example of vehicle-to-home (v2h) transmission. As such, they can be used as technological innovations for intermittent renewable energy resources such as wind or solar electricity. Hydrogen fuel cell vehicles (fcv) with tanks of up to 5.6 kg of hydrogen will provide more than 90 kWh of electricity.

X. REFERENCES

1. *ZhaiHaizhou. Modeling of Lithium-ion Battery for Charging/Discharging Characteristics Based on Circuit Model, Heze University, Heze, China.*
2. *An Analysis of Consumer Incentives in Support of Electric Vehicle Uptake: An Australian Case Study.*
3. *SikalHuang, David Infield IEEE "Electric vehicle to contribute to power system operation through vehicle to grid technology"*
4. *Ravi, D.K.Jain,Preetikhasa,DCRUST ,Murthal Synchronization of EV to distribution grid is gaining attention as the vehicle will coordinate to distribution grid ensuring good power quality.978-1-5090-4530-3/16/$31.00 ©2016 IEEE*
5. *Kempton, W. and Letendre, S.E., "Electric vehicles as a new powersource for electric utilities." Transportation Research Part D, 1997, 2(3): 157-175.*
6. *Verma, A.K., Singh, B. and Shahani, D.T., "Electric vehicle and gridinterface with modified PWM rectifier and DC-DC converter with power decoupling and unity power factor., India International Conference on Power Electronics, Dec 2012, pp.1-6.*
7. *Rizopoulos, D.; Esztergár-Kiss, D. A Method for the Optimization of Daily Activity Chains Including Electric Vehicles. Energies 2020, 13.*
8. *Richardson, D.B. Electric vehicles and the electric grid: A review of modeling approaches, impacts, andrenewable energy integration. Renew. Sust. Energy Rev. 2013, 19, 247–254.*
9. *Carrion, M.; Zarate-Minano, R. Operation of renewable-dominated power systems with a significant penetration of plug-in electric vehicles. Energy 2015, 90, 827–835.*
10. *Wade, N. S., e.a. (2010). Evaluating the benefits of an electrical energy storage system in a future smart grid. Energy Policy (38)(11), 7180-7188.*