Electrical Car/Bus Charging Station Using ATmega328

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Abstract **- This report discusses about the potential need for electric vehicles (EV), charging station (CS) infrastructure and its challenges for the Indian scenario. With increase in liberalization, privatization and expansion of distributed and renewable power generation of Indian electricity market, transmission and distribution, as well as market processes related to the allocation of energy and energy mix are undergoing an evolutionary development with improved efficiency and reliability. The main challenges in adoption of EV there are 4 reasons. First are insufficient charging stations second being long charging time third is high initial cost and fourth is limited range. Making India an all-EV market by 2040 also ushers in incentives for the development of EVs like the Faster Adoption & Manufacturing of Electric Vehicles (FAME) Scheme in 2015 to incentivize manufacturing of Eco-friendly vehicles including Hybrid Electric Vehicles (HEV). This paper is focused on providing an overall picture of the modern Electric Vehicle scenario and areas for further growth.**

Index Terms **- Electric Vehicle, Charging Station, Charging Time, Range, Hybrid Electric Vehicle.**

1.INTRODUCTION

Few years ago, electric vehicles were invented in India to reduce the excess use of fossil fuel and to reduce the harmful emissions emitted from the electric vehicles. But in order to run this electric vehicle the fuel required for running vehicle was electric energy which is obtain from grid but the grid energy is also limited and it is not easily available hence it was the main disadvantage but due to the development of the charging stations this effect was also neglected hence the charging station is very efficient. Fast charging stations will be needed to facilitate longer EV travel distances, including inter-regional trips.

They emit less greenhouse gases and air pollutants over their life than a petrol or diesel car. This is even after the production of the vehicle and the generation of the electricity required to fuel them is considered. But electrical vehicles provide more than just individual benefits. Societal benefits for EVs include national security benefits, better air quality and health, domestic economic development and environmental benefits. Recently, Electric Vehicles (EV) have attained popularity owing to their eco-friendly nature. Their main advantage involves curtailing greenhouse gas (GHG) emissions. EVs make less noise, involves simple operation in addition to reducing the fuel costs associated with conventional vehicles. It does not produce smog and air pollution. Major challenges towards EV adoption are high cost due to batteries and fuel cells, limited range due to battery capacity and speed, long charging period depending on battery type and charger and insufficient charging stations.

2. LITERATURE SURVEY

Afida ayob (2014). This study presents a comprehensive review and evaluation of various types of electric vehicles and its associate with equipment in particular battery charger and charging station. A comparison is made on the commercial and prototype electric vehicles in terms of electric range, battery size, charger power and charging time. The various types of charging stations and standards used for charging electric vehicles have been outlined and the impact of electric vehicle charging on utility distribution system is also discussed. Authors define standards for charging stations such as IEC 61851(IEC, 20100), IEC 61851-1, IEC 61851- 23, IEC 61851-24, IEC 62196-Plugs, socket-outlets, vehicle connectors and vehicle inlets (IEC, 2011, IEC 62196-1, IEC 62196-2, IEC 62196-3, IEC 60309-Plugs, socket-outlets and couplers for industrial purposes (IEC, 2012) etc. For better understanding on the state-of-the-art EV technology, a comparison is made on the commercial and prototype electric vehicles in terms of electric

range, battery size, charger power and charging time.[1]

Adam Junid et all (2016) This paper assesses the effectiveness of Electric Vehicle (EV) charging station installation progress in Malaysia. Aspects of studied include: (i) planned vs actual progress of EV charging stations, (ii) main barriers to building an EV charging network in Malaysia, (iii) how should those barriers be addressed and overcome? As per research approach he surveys to collect primary data from three companies in Malaysia selling EVs: Nissan, Mitsubishi, and Renault. Recommendations to overcome such barriers are to increase the desirability of EV ownership by enabling sufficient EV charging stations to allow EV driving anywhere in the country, and to provide EV charging stations at all petrol stations and malls. Given that sufficient numbers of EV users are required to enable EV station operation to become a viable business, initial EV station funding to enable sufficient users of EVs to "drive anywhere in Malaysia" will likely have to come from government grants and/or subsidies.[2]

Praveen Kumar et all (2013) This paper discusses about the potential need for electric vehicles (EV), charging station (CS) infrastructure and its challenges for the Indian scenario. Up to now the BEV's bottleneck is in the range of 100km per charge due to limited on board energy which can be optimized by introduction of plug-in hybrid vehicles along with real time road traffic management. With increase in liberalization, privatization and expansion of distributed and renewable power generation of Indian electricity market, transmission and distribution, as well as market processes related to the allocation of energy and energy mix are undergoing an evolutionary development with improved efficiency and reliability. Consortiums of companies in the transport, energy and power electronic sectors which are working on projects connected with the initiation of commercial charging terminals for electric vehicles, as well as fast-charging stations.[3]

Kara M. kockelman et all (2018) this paper uses U.S. long-distance travel data to place charging stations in order to maximize long-distance trip completions. Each scenario assumes a certain number of charging stations (from 50 to 250, across the U.S.) and vehicle range (from 60 mi to 250 mi). This work formulates a new flow-refueling location model (FRLM) to identify optimal sites for 11 charging stations, to maximize the share of U.S. long-distance highway travel that can be achieved 12 by BEV owners. To handle the very-large-scale input data that exist for this unusually massive 13 problem, origin and destination locations were clustered into 196and only heavily used paths were tracked between these over 38,000 OD pairs 15 (reflecting over 90 percent of the nation's long-distance automobile travel).[4]

Marcy Lowe et all (2010) in this paper, researcher states that the automotive industry is moving away from internal combustion engines toward electric drivetrains, and advanced batteries are the key to this shift. The United States will need to be capable of making lithium-ion batteries in order to remain competitive. By 2020, roughly half of new vehicle sales will likely consist of hybrid electric, plug-in hybrid, and all-electric models. This means that what's at stake is not just the U.S. role in lithium-ion batteries, but also its future position in the auto industry.[5]

3. SCOPE OF THE PROJECT

Indian current scenario- large scale introduction of Plug-in electric vehicles (PEVs), including plug-in hybrid electric vehicles (PHEVs) and Battery Electric Vehicles (BEVs) have the potential to improve Indian energy and environmental landscape of personal transportation. Central government should start enforcing necessary measures to install EV charging infrastructure. Initial step could be to encourage international market players to make case studies on potential locations and adequate quantity of Electric Vehicle Supply Equipment (EVSE). With a projection of EVs, the effects on current, energy production, transmission and distribution scheme, road traffic density, emission level and parking space requirement need to be analyzed. Operation and maintenance of installed infrastructure should be maintained properly. Instead of direct involvement of Govt. body, private players should be tendered in order to maintain the smooth workflow. Central management through Charging Station Selection server (CSS) will play a vital role in information transfer between EVs-Server-Control centers. India is a coal driven country and so most electricity required for EVs is supplied from thermal plant. Two wheelers are seen more on road due to its fuel efficiency. India is 2nd longest 2W market after China and will remain the preferable choice fill 2035. People in India are more concerned

about the Mileage, maintenance free, durable, immediately accessible and service-oriented vehicles. Market of EV in India is about 1% over the decade. Indian government has released its "National Electric Mobility Mission Plan" (NEMMP 2020) in 2013, which aims to deploy 4 lakh passenger BEV's on road by 2020.

4. OBJECTIVES OF THE ELECTRIC VEHICLE CHARGING STATION

- To enable faster adoption of electric vehicles in India by ensuring safe, reliable, accessible and affordable charging infrastructure and eco-system.
- To promote affordable tariff chargeable from EV owners and charging station operators/owners.
- To generate employment/income opportunities for small entrepreneurs.
- To encourage preparedness of electrical distribution system to adopt EV charging infrastructure.

5. SITE LOCATION FOR ELECTRIC VEHICLE CHARGING STATION

In case of public charging stations, the following minimum requirements are laid down with regard to density/distance between two charging points:
At least one Charging Station should be available in a grid of 3 Km X 3 Km. Further, one Charging Station be set up at every 25 Km on both sides of highways/roads.
For long range EVs (like long range SUVs) and heavy duty EVs like buses/trucks etc. there should be at least one Fast Charging Station with Charging infrastructure Specifications as per para 4.I at every 100 Km's, one on each side of the highways/road located preferably within/alongside the stations laid in para3 above. Within cities, such charging facilities for heavy duty EVs shall be located within Transport agars, bus depots. Moreover, swapping facilities are also not mandatory within cities for Buses/trucks.

6. BLOCK DIAGRAM

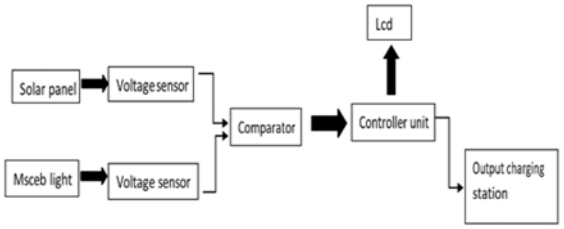

Fig. 1. Block Dig.

7. CIRCUIT DIAGRAM

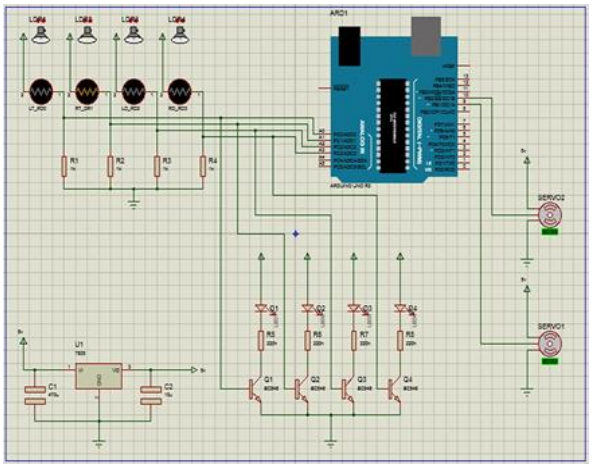

Fig. 2. Circuit Dig.

As per the circuit diagram we built the circuit connection. After that we upload the program in Arduino then all functions start to run with program. After uploading the program, we will give the external power supply to the Arduino.
This circuit shows that the fixed 5v voltage regulator output is connected in Arduino power input. Because fixed 5v is needed to active an Arduino and also shows that the voltage regulator is connected in parallel with all other parameters in this circuit. When the light falls on the first sensor or LDR. Then the sensor or LDR is active and the output LDR signal is follows in the Arduino analog input pin ao. Then the programmable logic function of Arduino is active.

8. FUTURE SCOPE

- For minimize power loss of circuit then we can use logical circuit.
- Ni-Cad Battery can be replaced by Li-ion or Lipo, to increase the power backup time.
- For easily and more efficient control various types of sensors and system can be introduced with this

system such as Accelerometer, GPS, Pattern recognition systematic.

- Improving this technology future demand of electricity will be filled up and saved enormous cost.

9. RESULT & APPLICATION

Lower Costs: Enabling EV drivers to participate in utility demand response programs and exposing customers to demand side management will significantly lower costs for drivers and station owners. In addition, avoiding long term utility investments through load management will lower costs over time for all ratepayers via greater utilization of utility generation, distribution and transmission assets.

More Charging Stations in More Places: Allowing utilities to incorporate into their general rate cases the costs of the infrastructure needed to install a charging station, alongside the other investments that utilities make every year, will cut the price per station by more than half. This can increase opportunities for workplaces, retailers, hospitals, schools, hotels, homes and apartments to add more stations in more places. Fuel Independence & Cleaner Air: Switching from gasoline-fueled vehicles to cleaner EVs can reduce dependency on foreign oil and reduce greenhouse emissions by more than 38% per vehicle annually according to the U.S. Department of Energy. Builds on Positive Utility Customer Relations: Utilities have a strong and historic relationship with ratepayers across their territories.

Grid reliability: Electric vehicle charging infrastructure can complement the increased growth of intermittent renewables, which means that utilities can balance solar energy being produced and added to the grid with the electricity flowing off the grid and into cars at the same time. Expansion of the Smart Grid: Deploying the latest advanced technology for EV charging, including smart charging applications and "vehicle grid integration" (V2I) capable stations, ensures that current and future EV drivers are fully integrated into a smart grid of the future.

10. CONCLUSION

In simple terms this project's objective is to have a solar panel outputting its maximum possible power all of the time, this occurs when track the sun and rotate the solar panel accordingly, to receive sunlight to the fullest extent always during the day time.

In this project we learned about parameters influencing energy conversion of Photovoltaic (PV) arrays. Also Learned about the general concept of Maximum Power Point Tracking (MPPT) and how to program burn an Arduino.

Smart charging, vehicle-to-grid, solar charging of EV, contactless charging and on-road charging will be five key technologies that will enable the transition to electric mobility. These technologies will not only disrupt the transportation industry but will affect the entire energy landscape with their potential to support the grid and to increase the penetration of renewables. The right business models and standardization will play a vital role in the fast acceleration and large-scale implementation of the technologies.

11. ACKNOWLEDGEMENT

We take this opportunity to thanks all those who have contributed to successful completion of this Capstone-project work. I sincerely wish to express gratitude to our Project Guide "Mr. A.S. Mulani" for full support, expert guidance, and encouragement and kind cooperation throughout the micro- project work. I am greatly indebted to her for his help throughout Capstone-project work.

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