

CHARGING OF ELECTRIC VEHICLES USING PARKING LOTS

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CERTIFICATE

We accept the work contained in this report as a confirmation to the required standard for the partial fulfilment of the degree of MS (EE).

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DEDICATION

Dedicated to my loving parents

DECLARATION OF AUTHORSHIP

I **Muhammad Ammar Nazeer**, Registration No. 44725, hereby declare that I have produced the work presented in this thesis, during the period of registration. I also declare that I have not taken any material from any source except referred to wherever due that amount of plagiarism is within the acceptable range. If a violation of HEC rules on research has occurred in this thesis, I shall be liable to punishment action under the plagiarism action under the plagiarism rules of HEC.

Parts of this thesis appeared in the following publications, to each of which I have made substantial contributions:

- Mathematical Analysis for Calculation of an optimum Tilt Angle of Solar Panels for Islamabad in <http://www.iiu.edu.pk/conferences/pgsret2018/index.html>

Dated: _____

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ABSTRACT

Installation of solar panels at parking lots provides the 'green energy' as well as charging of Electric Vehicles (EV) at workplaces. Besides it can provide shade and generate electricity with the help of solar panels to charge the parked EV's. This generation may feed to grid using vehicle to grid technology (V2G) or energy can be drawn from the grid to charge the EV's if the generated energy is less than the required energy for the charging of the EV. According to survey the penetration of electric vehicles in 2040 will be 35- 47% in the world which will reduce a lot of carbon emission and fossil fuel usage but this will also be a burden on the grids so we need to design an efficient system for EV's charging which doesn't rely on the grid until crucial conditions.

This work considers the possibility of creating an EV charging mechanism using solar panels at parking lots at work places. The system is designed for the parking lots to charge EV's as the mostly cars remain parked over there for a long time i.e. office time. The motive is to maximize the utilization of PV power for EV charging with less dependent on grid. The main bottle neck in the EV charging from PV panels is the insolation of sun not remains the same for the whole day so there's a need to cover this problem. So, the concept of dynamic charging has been introduced to full utilize the PV power in order to charge the EV. Dynamic charging works in a way to charge EV as like solar irradiation varies. This will be a priority-based car charging on weekdays also at the weekend the surplus energy may be send to the grid.

The described technique is carried out using MATLAB to analyse the charging system characteristics and behaviour of solar availability. Different scenarios are discussed under different contingencies. The results are analysed to ensure the feasibility of the proposed technique.

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