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A Review on IOT based Electric Vehicle with Self Charging System

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ABSTRACT: Currently, we are facing issues related to lack of fuel. So, we are moving towards electrical vehicle. But still people are not ready to prefer electrical vehicle over present ones. It is because of price as well as lack of available charging stations. Even if there are few charging stations are available, it is necessary to spend extra time for charging the vehicle. Also, present day car parking has become a major issue in urban cities. So, by taking in views these issues we can provide a IOT based Electric Vehicle with Self charging system. This will reduce the efforts of roaming for slot of parking. Also, there is no need to invest more time for finding charging station and for charging at charging station. This paper outlines the IOT based Electric Vehicle with Self charging system. In this paper, reviews of IOT based Electric Vehicle with Self charging system which are implemented is studied .

KEYWORDS: Electric Vehicles Self-Charging System, BMS, IOT, Battery, Rechargeable.etc.

I. INTRODUCTION

Electric Vehicles EVs are considered the most promising technology in the world because of their positive impact in reducing negative impacts on the environment and the developments in this technology that make them compete with traditional fuel-powered vehicles. However, Electric Vehicles still have many issues which need to be solved, this issues related to battery of the vehicle. The capacity of the battery makes represent a challenge for the driving limit, and it increase the EVs costs and the battery takes longtime of recharging in some cases (Schaltz, 2011). Because of that matter, many patents attempt to explain solutions to these problems, one of these patents is the self-charging electric cars (Al-otaibi, 2020), The inventor invented a method to add power generators to the EVs so that these generators are able to cover part of the electric energy that the battery needs during a single trip. This method is representing by adding a gear ring to the wheels in EVs. A transmission and a gearbox will transfer the motion from the wheels to the auxiliary generators as shown in figure 1. The aim of the study is to provide the EVs of apportion of energy that the vehicle consumes in a single trip, which means that the EVs can travel for a long distance. Electric vehicles used a high-voltage battery has a voltage greater than 200 volts. The battery has many types as lithium ion battery which is the type that is used in the study. The induction motors, permanent magnetic synchronous motors and switch reluctance motors are the main types of electric motors in electric vehicles. The power electronics will drive the motor (AC motor drive) and the regenerative braking will be when the motor work as a generator. The induction motor which is easy to control it using the field oriented control (FOC) method, switched reluctance motor has a simple structure, low cost, low efficiency and small size in comparison with other motors. The permanent magnetic synchronous motor can work with a wide range of speed without gearbox and it has high efficiency and high torque at low speed and it can be used at in-wheel motor system (Un-Noor et al., 2017).

II. LITERATURE REVIEW

Electrical Vehicles are easy to use and therefore accepted by customers. One important need of it is that it requires comfortable charging and parking space. Proposed model designed to give efficient solution to this by combining these two systems. In this paper the design of system which able to handle free parking slots and scheduling of the charging. Current parking system are unable to deal with all types of vehicles. For Electrical Vehicles there is need of charging facility along with parking. The proposed model provides facility to book the charging space via smartphone. Then system manages all activities related to it on the basis of information like arrival time of vehicle, battery status etc. The main components are customer manager, vehicle manager, map manager and lot manager. The software used is Java Platform and Enterprise Edition (Java EE). Another point take into account is security concept. For this it requires user ID which is also use for billing process[2].

Proposed model is designed for modification of original WSN and RFID system with ZigBee technology which is applied in parking garages. The RFID technology is used for checking in and out of vehicles due its fast and secure operation. There are two sections in proposed system one is monitoring and another is control section. Control section contains sensing element, processing element and display devices. The sequence is sensor nodes, LED display and information and management center respectively. The last one information and management center is main part of the system. In the hardware part it contains ARM7/LCP2148 controlled, ZigBee modules for communication, the reflection sensors and LCD panel. The software used is Keil micro vision, flash magic and express PCB. A centralized electrical vehicle (EV) recharge scheduling system for parking lots is developed by [3].

This system based on the realistic vehicular parking pattern which focus on individual parking slot. It considers two types of EV based on their mobility. One is regular EVs and another is irregular EVs. Electrical Vehicles require sufficient time for charging. This paper suggests a PLRS system which notices arrival and departure time of vehicle, battery state of EV, distance travelled by it. Then system designs its own schedule of charging for EVs. This system works for day and night time period. This system contributes to increase the number of recharged Electrical Vehicles as well as parking lot revenues. Proposed system has two layered PLRS system for recharging EVs based on parking patterns of these vehicles. An IoT based cloud integrated smart parking system is presented by [4].

This proposed smart parking system is on site development of IoT module. IoT is one of the most applicable idea of Smart City. This IoT model is used to monitor and provides information about availability of parking space. It also has one mobile application which provides information about availability of parking space to the user. User can book a parking space using this mobile application. For controlling parking system sensors like Infrared, Passive Infrared (PIR) or ultrasonic sensors are used. Processing unit used is Raspberry pi which communicate between cloud and sensor. The mobile application is platform to connect the system and user. This application is developed in Apache Cordova and Angular Js framework using JavaScript as a programming language. The IBM MQTT cloud server is used for store all data. This system gives real time information regarding the parking space availability in parking area. Another approach to smart parking system is presented by [5].

Proposed system uses ultrasonic sensor, Arduino Uno, ESP8266-01 Wi Fi module and cloud server i.e. ThingSpeak, mobile application. This IoT based parking platform able to connect and analyses real time situation. This system automatically generate data and execute smart parking. Availability of free space is detected by ultrasonic sensor. The sensor is connected to Arduino module which interface with Wi Fi network. Arduino uno is connected to cloud server via internet connection and upload data on it. The android app is run by software system for this user need to install this application on their smart phone. Parking slot can be booked if needed using this application. [6]

presented a review on Intelligent Wireless Charging Station for Electric Vehicles, induction or magnetic coupling techniques are suitable methods in WPT, for EV charging. In this study, an intelligent WPT system is introduced and simulated to charge EV. The charging process is proscribed by misalignment, innovative method is required to improve flexibility of the EV wireless charging. using finger print method, this technique is able to align transmitting coil with receiving coil automatically. Proposed system is able to save required time, minimize mistakes done by human, minimize use of energy and also able to charge car based on real time information about system. It's quite beneficial in energy saving and electricity cost reduction for EV consumer. For EV charging, Wireless power transfer is a new field of development. The efficiency of resonant inductive coupling for EV charging is showed in this paper and discussed techniques to improve wireless charging performance for high-frequency and high-power application. Various coil alignment methods were discussed and fingerprint method was presented as an economical technique for creating WPT intelligent. In recent time smart cities are under development and IoT plays main role in it. Problems like traffic jam, limited car parking space and road safety can overcome by IoT. [7]

proposed a smart parking system which is on site development of IoT module. This system monitors and analyses the availability of parking slot. In this system all data generated by it is stored on cloud therefore it is known as perfect platform for IoT. Due flexibility of cloud, it can add or remove data from IoT system on real time basis. Suggested

system consists of microcontroller, IR sensor, mobile application, buzzer, LED and LCD display. Another approach to Electrical Vehicle (EV) charging scheduling problem is presented by [8].

This paper studies charging problem under a parking garage which involves total use if time. When EV arrives at entrance of garage it takes information such as arrival time, suggested departure time, current and required battery SOC's and garage's charging management system (CMS). This CMS able to take decision about to admit or to decline the customers charging requirement. It manages the required power supply based on the decision. After completion of process it deactivates the power supply. All the charging unit is under control of an intelligent charging network. The power supply is controlled by CMS and all charging activities are automatically switched. The EVs whose charging service is not accepted by system are parked at non charging area. described research review of static and dynamic wireless electric vehicle charging system. It describes information regarding wireless charging as it is proposed in high power application, including EVs. Wireless charging has many advantages over plug in charging cause of its simplicity, reliability and user friendliness. The limitation is it can be utilized when vehicle is in stationary mode, like in parking[10]

. provided a snapshot of wireless charging technology. This paper mentioned that electricity is going to be major part of transportation, due to EVs. While wireless charging plays important role in charging facilitate to EV, since it provides an efficient and flexible means of charging. Also, standardization of this technology is underway which will give more flexibility and freedom to charge vehicle at any wireless enable parking slot[11].

III. SYSTEM ARCHITECTURE

Problem Identification The conventional vehicles use fossil fuels (petrol and diesels etc.) as main fuels for energy source. These fuels cause heavy damage to our environment by the emission of harmful gasses CO (carbon monoxide), Hydrocarbons etc. Other types of fuels such as bio gas, natural gases and other types of oils are also used instead of existing fossil fuels. The fossil fuels can exceed only for a certain period of time and it also becomes costlier, scares and creates environmental issues. Solar energy, hydro power and wind energy are the alternates of harmful fuels. But in automobile sector these energy sources cannot be used because of their bulky size. So we have to find alternate energy source for automobile sector. The solution to these issues is battery electric vehicles. Here battery is used as energy source for vehicles. One problem is there when battery is discharged it requires much time to charge again. If we add a self-charging circuit arrangement in the electric vehicle, then the charging time can be reduced. It can be done using dynamo, alternators, dc to dc step-up circuit, charging circuit, alternate batteries etc.

IV. PLANE OF ACTION

Our plan is to use the concept of two battery pack instead of single with higher capacity. For that we want to prepare a prototype model which is shown in fig.no.1. Initially we charged both the batteries then the car is driven by first single battery (B1) upto distance till it's discharged. After that vehicle run with the help of 2nd battery (B2) during this the 1st battery (B1) will get charged by the use of alternator. These way batteries will get charged simultaneously this process will goes vice versa.

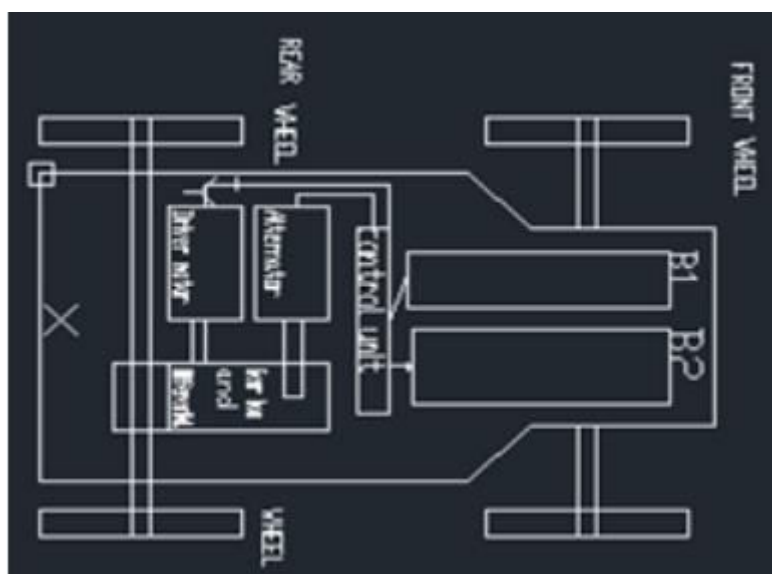


Figure 1: Block diagram of an Expected electric car

V.COMPONENTS DESCRIPTION

- 1) **Alternator** - An alternator is an electrical generator that converts mechanical energy to electrical energy in the form of alternating current.(Alternator 10-24v,0.4 Amp, 2 Phase).
- 2) **Driver Motor / Traction Motors** - Traction motor refers to a type of electric motor. A traction motor is used to make rotation torque on a machine. It is usually changed into a straight line motion. Traction motors are used in electrically powered rail vehicles such as electric multiple units and electric locomotives and cars.(12v DC motor, 2Amp)
- 3) **Control Unit**- This will contains of IOT,automatic battery switcher, potentiometer, fuse box and general electrical components etc.
- 4) **Inverter** – It is an electric device which is used for converting A.C current into D.C. as well as D.C. current into A.C. current.
- 5) **D.C. Batteries** – The most important component or the powerhouse this convert chemical energy into electrical energy. This will consist of two different battery sets as requirement.
- 6) **Frame and Other Mechanical Components**– This will consist of a transmission gear box, a differential gear, suspension system, steering column etc.
- 7) **Benefits** – This will optimally solve the issue of energy require for driving an electric car. A very less or even no other sources are requiring driving a car. The important benefit is it is a complete eco-friendly. In the field of defense automobile and transportation of soldiers and equipment are can be done by it. Although electric engine is very small in size but very powerful as compare to I.C. engines

VI. METHODOLOGY

The arrangement is simple the alternator and driver motor is connected by a shaft parallels so that when wheel starts rotating the alternator will also start rotating with same speed as motor shaft speed due installation of reduction gear box. The block diagram of complete arrangement is shown in figure below. The Working Principle of Battery Switcher

Case 1- When switch 1 ON and switch will keep off the car will run with help of battery no.1 and battery no. 2 will be charging.

Case 2- When switch 1 is off and switch2 will kept on the car will run with help of battery no.2 and battery no. 1 will be charging. And this process will be continued vice-versa for running of car further range without charging from external source.

VII. CONCLUSION

The battery of EV is charged it travels a limited distance, again we have to charge the battery of vehicle, which is a time consuming process. If one self charging EV is assembled using some kind of alternators with other circuitries, which can charge the battery simultaneously when it is moving, then the problem can be solved. We can use a single powerful battery or two batteries for this case. Single battery can be charged in static manner as well as when the vehicle is moving. For this case the circuit connection may be complicated and the battery life may be decreased. But if we use two different batteries one for driving the motor and simultaneously another will charged during first one discharges. After the first battery drained the second battery will drive the motor and the first battery will be charged mean while. This project is aimed to develop a prototype of a self-charging Electric Vehicle. The arrangement of batteries will be done in such a way that the batteries will be charged alternatively. Alternators with mechanical joint with driver motor and gear box with some amplifying circuits with other elements are used in this arrangement. However this will minimize the rate of energy waste and maximize the energy utilization and also the traveling range of Electric Vehicle can be increased and will not be a time consuming process to charge the vehicle for next journey. But there will be a speed limit for this type of vehicle.

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