Electric Vehicle: Enhancement in Charging Station

Neha jaiswal[1], Shweta nagare[2], Aakash kombale[3]
[1,2,3]*Student, MVP's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering*

Abstract- **An electric vehicle charging station, also called EV charging station, electric recharging point, charging point, charge point, ECS (electronic charging station), and EVSE (electric vehicle supply equipment), is an element in an infrastructure that supplies electric energy for the recharging of electric vehicles, such as plug-in electric vehicles, including electric cars, neighborhood electric vehicles and plug-in hybrids. In this project, modeling and simulation of an electric vehicle charging station for fast DC charging are proposed and formulated in an educational way in order to allow its implementation and further research on the topic. In the following sections, important aspects of an EV charging station model are developed. the design of the circuit is considered. Currently, the charging station can only open to the bus, the postal car and some special transports. As the infrastructure of the EVs, whether the charging station could achieve scale construction and advanced management will directly influence the development of EVs. The distribution of the station is a complex problem, and it is related to the charging needs, city planning, and service level of charging station, geographic location and competitive ability and so on. Now, the construction planning of the charging station has become a focus of research.**

In this project we use two sources of charging sources for fast charging to charge the EV battery, for fast charging. They are as follows.

1) Direct AC supply then converted into DC

2) Station Battery.

I.INTRODUCTION

The need of transport is increase day by day. To fulfill this need petrol cars are used, but due to petrol cars pollution level increases and source of this petrol Decrease rapidly. For that EV are used, but petrol cars are refill in quick time but EV are require more time to charge. Hence we need a smart charger to reduce the charging time of EV .To reduce the use of petroleum vehicles and to decease the pollution EV are used. For that we need to charge this EV in less time, hence we need this project to reduce the time of charging of EV. This project is motivated form the problem of more time to charge electronic vehicles.

II. LITERATURE REVIEW

1] Advanced Electric Vehicle Fast-Charging Technologies

Negative impacts from the dominant use of petroleum-based transportation have propelled the globe towards electrified transportation. With this thrust, many technological challenges are being encountered and addressed, one of which is the development and availability of fast-charging technologies. To compete with petroleum-based transportation, electric vehicle (EV) battery charging times need to decrease to the 5–10 min range. This paper provides a review of EV fast-charging technologies and the impacts on the battery systems, including heat management and associated limitations. In addition, the paper presents promising new approaches and opportunities for power electronic converter topologies and systems level research to advance the state-of-the-art in fast-charging.

2] Fast-Charging Electric Vehicles using AC Master's Thesis, September 2013

Electric vehicles are here. Sales figures are approximately doubling each year, and the growth is projected to continue. The goal is to have 20 million electric vehicles on the roads by 2020. In order to reach this goal, it is now time to make intelligent choices for the next-generation electric drive technologies.

One major challenge with electric vehicles is range anxiety. This project investigates AC fast-charging as a means of mitigating range anxiety while lowering total cost of electric vehicle roll-outs. The benefit of AC charging is that it allows vehicles to charge from an inexpensive AC charging station feeding power directly from the electric grid to the vehicle. Charge rates up to 43kW in Europe and 52kW in US are supported with standard AC cord sets. This power level matches that of the more expensive DC chargers. Hence, AC fast-charging technologies are an effective catalyst for considerably expanding fast-charging infrastructure. With AC fast-charging, high-power electronics are required onboard the vehicle. By reusing traction components for charging purposes, the onboard converter can be made inexpensive with only few additional components. The possible practical challenges with this high-power charger topology have been identified, and no barriers are found. Furthermore, these components allow bidirectional power flow, enabling vehicle-to-grid (V2G), vehicle-to-load (V2L) and grid-forming operation. This serves as an additional economical incentive for deploying AC fast-charging technologies.

III. METHOD

Sensors and components Used:

Arduino uno:

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards; it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer.

Specifications

- Microcontroller: Microchip ATmega328P
- Operating Voltage: 5 Volts
- Input Voltage: 7 to 20 Volts
- Digital I/O Pins: 14 (of which 6 can provide PWM output)
- UART: 1
- I2C: 1
- SPPI: 1
- Analog Input Pins: 6
- DC Current per I/O Pin: 20 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader
- SRAM: 2 KB
- EEPROM: 1 KB
- Clock Speed: 16 MHz

ATmega328:

Features:

- High-performance, Low-power Atmel ®AVR®
- 8-bit Microcontroller Advanced RISC Architecture
- 130 Powerful Instructions – Most Single-clock Cycle Execution
- 32 × 8 General Purpose Working Registers
- Fully Static Operation Up to 16MIPS Throughput at 16MHz
- On-chip 2-cycle Multiplier

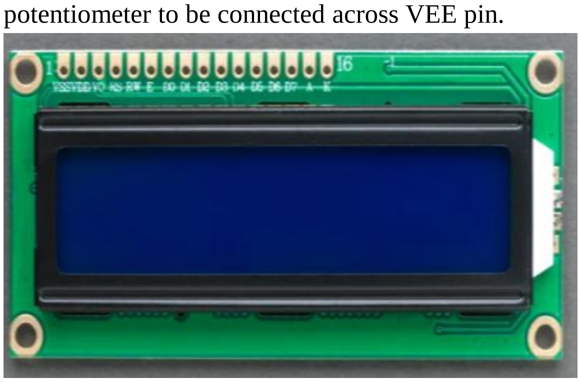
Peripheral Features

- Two 8-bit Timer/Counters with Separate Prescaler, one Compare Mode

- One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture
- Real Time Counter with Separate Oscillator
- Three PWM Channels
- 8-channel ADC in TQFP and QFN/MLF package
- Eight Channels 10-bit Accuracy
- 6-channel ADC in PDIP package
- Six Channels 10-bit Accuracy
- Byte-oriented Two-wire Serial Interface
- Programmable Serial USART
- Master/Slave SPI Serial Interface
- Programmable Watchdog Timer with Separate On-chip Oscillator
- On-chip Analog Comparator

LCD

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data. Command register stores various commands given to the display. Data register stores data to be displayed. The process of controlling the display involves putting the data that form the image of what you want to display into the data registers, then putting instructions in the instruction register. In your arduino project Liquid Crystal Library simplifies this for you so you don't need to know the low-level instructions. Contrast of the display can be adjusted by adjusting the potentiometer to be connected across VEE pin.



RELAY

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. It was invented by Joseph Henry in 1835. Because a relay is able to control an output circuit of higher power than the input circuit, it can be considered to be, in a broad sense, a form of an electrical amplifier.

In this these projects we can use electromagnetic relay.

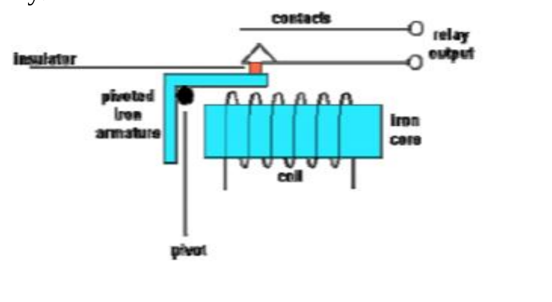


Figure : ELECTROMAGNETIC RELAY

The electromagnetic relay consists of a multi-turn coil, wound on an iron core, to form an electromagnet. When the coil is energized, by passing current through it, the core becomes temporarily magnetized. The magnetized core attracts the iron armature. The armature is pivoted which causes it to operate one or more sets of contacts. When the coil is de-energized the armature and contacts are released.

IV. PROPOSED SYSTEM

1. AC Source of Electricity: in this section we use AC source as an input of
2. charging station then converted into DC and then use for charge the battery.
3. Relay: it is the main component of this charging section. Relay is used to flow the
4. current to the EV battery and Station battery section. When EV is not present then
5. relay is off hence current gets flow through the charge controller.
6. Charge controller: is used to provide sufficient current and after full charge it gets
7. switch off.
8. Station battery: it is used to provide extra current source to charge EV battery.
9. Diode: it is used to flow unidirectional current.

10. Arduino:relay gets on and off as soon as the arduino gets triggered.
11. LCD: LCD is used to monitor the charging process and displays the message.
12. Battery Connector Sensor: it is used to sense EV connected to charging station or not.

V. WORKING OF SYSTEM

1. When vehicle is Not at charging station:
When there isno vehicle coming to charge battery, then arduino makes relay to off condition. Hence common terminal which is connected to AC source, charging point is connected to NC terminal of Relay. This terminal is connected to charge controller to charge the station battery. Charge controller charge the station battery until it is not fully charge. When station battery gets full charge then charge controler stops charging the station battery.
2. when vehicle is at charging station to charge:
When vehicle is connected to charging connector point, then this connection point sensor detects that vehicle is connected to charge the battery. Then arduino gets trigger and relay transistor gets on hence common point of relay is now switch to NO terminal of relay. Then through NO terminal and fully charged station battery are connected in parallel connection hence current is the summation of this two supply.
Hence current gets boosted. Therefore time require to charge the battery is reduced. After charging the battery again arduino makes.

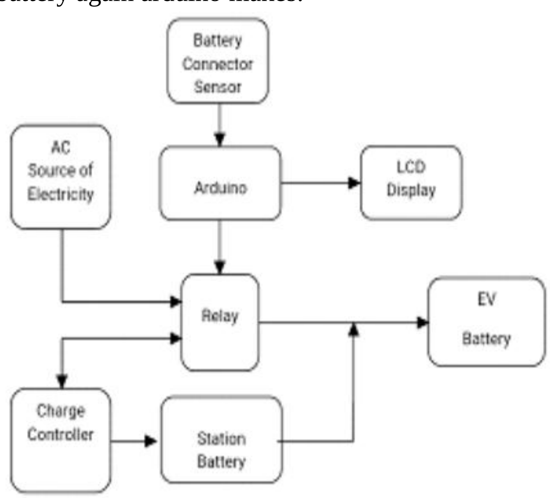
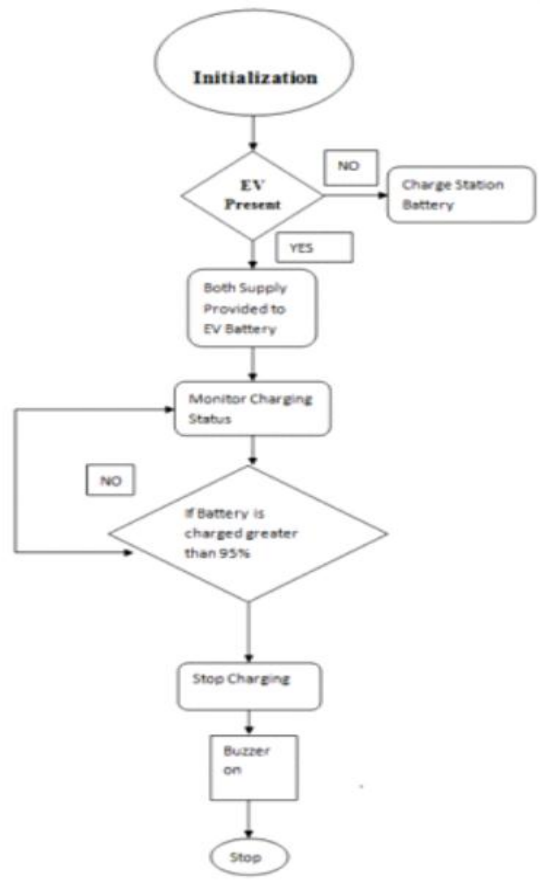


Fig 6:Block Diagram

VI. FLOW CHART



VII. CONCLUSION AND FUTURE SCOPE

Thus we tried to build a prototype for tracking and cleaning the solar panels automatically. It is fully automated and requires little to no human interventions. Therefore tracking mechanism gives proper position of sun as it move from east to west and it increase the efficiency of solar power generation. Thus the cleaning the increases the relay off and hence charging is stop. Efficiency for tracking .It works on a AVR based microcontroller mounted on Arduino NANO board. As it moves on a rail guided system it can clean a complete array of them.

REFERANCE

[1] Ryan Collin 1, Yu Miao, Alex Yokochi, Prasad Enjeti and Annette von Jouanne -“Advanced Electric Vehicle Fast-Charging Technologies”, 15/06/2019.
[2] “Fast-Charging Electric Vehicles using AC Masters Thesis”, September 2013.

[3] Hannisdahl, O.H.; Malvik, H.V.; Wensaas, G.B. "The future is electric! The EV revolution in Norway Explanations and lessons learned.", In Proceedings of the 2013 World Electric Vehicle Symposium and Exhibition (EVS27), Barcelona, Spain, 1720 November 2013; pp. 113. [Cross Ref]Blanning, B. The economics of EVs and the roles of government. In Proceedings of the 2013 World Electric Vehicle Symposium and Exhibition (EVS27), Barcelona, Spain, 1720 November 2013; pp. 16. [Cross Ref].

[4] Energy Information Administration EIA Independent Statistics and Analysis: Does the World Have Enough Oil to Meet Our Future Needs? Available on-line: "https://www.eia.gov/tools/faqs/faq.php?id=38t=6", accessed on 13 February 2019.

[5] Alternative Fuels Data Center: Hydrogen Benefits and Considerations: Electric Vehicle Benefits and Considerations. Available online: