VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELAGAVI

A
PHASE-1 PROJECT REPORT
ON

WIRELESS CHARGING SYSTEM FOR ELECTRIC VEHICLES

Submitted in partial fulfillment of the requirements of the degree of

BACHELOR OF ENGINEERING
in
ELECTRONICS AND COMMUNICATION ENGINEERING
For the academic year
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CERTIFICATE

Certified that the Project work entitled **'Wireless Charging System For Electric Vehicles'** is a bonafide work carried out by Ms.Lubna Anjum 1KN19EC011, Ms.Pavani A.C 1KN19EC014, Mr.Praveen.S 1KN19EC016, Mr.Vinay Kumar.S 1KN19EC023 a bonafide students of **KNS Institute of Technology, Bengaluru** in partial fulfillment for the award of the degree of Bachelor of Engineering in Electronic And Communication Engineering of the **Visvesvaraya Technological University, Belagavi** during the year 2022-2023. It is certified that all corrections/suggestions indicated for the Internal Assessment have been incorporated in the report deposited in the departmental library. The project Phase-I report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said Degree.

Name & Signature of the Guide **Name & Signature of the HOD** **Signature of the Principal**

External Viva

Name of the Examiners **Signature with date**

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ABSTRACT

Internal combustion (IC) engines are used to drive vehicles. As the vehicle population is increased there is a vast increase in the environmental pollution rate. In future days, the concept of pollution free transportation will be of focus.Wireless Power Transfer (WPT) utilizing attractive reverberation is the innovation which could set humans free from the irritating wires.Charging systems for electric vehicles can be both wired and wireless. The heavy cable and bulky mechanical plug are needed in the conductive charger. Wireless charging systems today offer efficiency and flexibility. Electric vehicle battery charging can be done by wireless power transfer and with this power battery will get charged.The aim of our project is to implement a system for wireless charging, that is to transmit power by an electromagnetic field across a given space. This charged battery power will be utilized for motor drive of Electric vehicles. The user will able to see the battery level through LCD display and the health of the battery is monitored .the user will also get to know about the nearby location of the charging station through IOT.

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CHAPTER 1

INTRODUCTION

Nowadays, electric vehicles (EVs) deployment is growing, which can be considered as the next generation vehicles. This is due to their zero tailpipe emissions where the low carbon society is met. They are more energy efficient compared with the traditional internal combustion engine vehicles. Moreover, the running and maintenance costs are much lower. Charging system for EVs can be both conductive (wired) and wireless. The heavy cable and bulky mechanical plug are needed in the conductive charger. In contrast, wireless charger requires no physical contact which provides safety (from electric shock or spark) and is convenient to the user. Furthermore, it is weatherproof, which can be used in hostile environments[1].

Environmental pollution is considered a significant issue for the entire Globe. Global warming, greenhouse gasses, air pollution and acid rains are only some of the consequences to name a few. Large contribution to pollution is obtained from vehicle emissions. Gasoline-powered cars emit greenhouse gasses into the natural atmosphere, which could be the primary cause of global warming. Transition to sustainable technologies is one of the possible solutions to stabilize the climate and a starting point to deal with vehicle pollution . Transition from petrol-powered transports to EVs would be a ponderable contribution to sustain a healthy environment. EV implementation is a relatively global-accepted idea in the transportation industry and a great step to reach eco-friendly technologies. EVs run on electricity obtaining their power from the battery installed in the car, which power the motors and run the wheels. The battery is rechargeable using grid electricity.

Electric vehicles are petrol-free and they are quite economic alternatives as the fossil fuel price increases steadily. Along with eco-friendliness, electric cars considerably reduce noise pollution and require less vehicle maintenance in comparison with conventional cars . These days most commercially available electric cars power by plugging them to the charge station. Such conductive type of recharging faces several issues as physical plugging the wire, safety concerns and charging time. Manually charging can be undesirable with risk of electric spark or hazard. Therefore, there is an increasing need for convenient, safe and still effective ways to charge the car [

The number of electric vehicles has been steadily growing since the beginning of the 21st century. However, the limitations of the charging time of the battery and the autonomy are a hindrance to the use of the technology. The direct consequence is the intrusion of chargers and power cables into our daily lives, which increasingly tends to limit the mobility offered by vehicles .

Much research effort has gone into solving these problems, and wireless power transfer to Electric vehicles has become evident and feasible to solve this problem. Many years ago,wireless power transfer systems using high intensity, time-varying electromagnetic fields were presented. But at that time, there was little need for the WPT, because cable power distribution systems were generally more efficient and less expensive for electrical devices. Today, wireless short-range power transfer devices using electromagnetic induction are used more and more in industrial products for contactless charging [3].

The use of EV is presently extended but there are a few battery associated troubles together with slower charging fee, low electricity storage potential, length, and weight. It is needed to decrease battery related troubles and for the development of EVs. Because of charging related issues many consumers do not have to purchase EVs as a precedence basis To lessen battery related issues, ozone harming substances and to settle the attractive control radiation issue the possibility of remote power transfer(WPT) is developed. Many charging stations are built up at the avenue, when you consider the user's journey, similarly distance by means of recharging their electric powered car. This project will solve all issues for charging reminders and other manual work for charging. Personal vehicles have become an inevitable part of our life. But most of these vehicles use petrol or diesel as fuel and hence there is immense emission of greenhouse gasses which causes global warming which has become a major issue these days. Electric Vehicles are a very promising hope to reduce emissions of harmful gasses. Charging of electric vehicles through rechargeable batteries which can only be charged when the vehicle is parked. Thus, the concept of wireless power transfer is proposed, where a vehicle can be charged portably

CHAPTER 2

LITERATURE SURVEY

[1] Supapong Nutwong, Ekkachai Mujjalinvimut, Sitthisak Maiket, Thanapat Khemkhaeng, and Noraphat Wiraphonsawan "Position Detection with Online Monitoring System for Wireless Charging of Electric Vehicles", This paper presents the technique to detect the aligned position between transmitter and receiver coil, used in the wireless charging for electric vehicles. The retroreflective photoelectric sensor is adopted, which can enhance the accuracy and reliability of the conventional position detection system. The IoT technology is also introduced in the proposed system where remote monitoring and controlling can be achieved online monitoring of battery status and notification of fully charged batteries have been successfully achieved through the IoT platform. The proposed system is simple, accurate, and easy to implement.

[2] Adilet Sultanbek, Auyez Khassenov, Yerassyl Kanapyanov, Madina Kenzhegaliyeva, and Mehdi Bagheri 2017 International Siberian Conference on Control and Communications (SIBCON)" Intelligent Wireless Charging Station for Electric Vehicles", this paper showed the efficiency of resonant inductive coupling for EV charging and discussed techniques to improve wireless charging performance for high-frequency and high power application. Various coil alignment methods were discussed and the fingerprint method was presented as a kind suitable economical technique for making WPT intelligent. The algorithm for coil detection was introduced and described in detail. Practical part was not presented in this study due to lack of space.

[3] NAOUI MOHAMED , FLAH AYMEN , TURKI E. A. ALHARBI , CLAUDE ZIAD EL-BAYEH , SBITA LASSAAD1 , SHERIF S. M. GHONEIM 2022, Research Unit of Energy Processes Environment and Electrical Systems, National Engineering School of Gabes, University of Gabés "A Comprehensive Analysis of Wireless Charging Systems for Electric Vehicles",

This paper presents a comprehensive analysis of the wireless charging systems adapted for EVs by stating the most common charging topologies, and architectures, and by concentrating on the corresponding mathematical models used to calculate the given electrical power as a function of the EV's situation on streets and its speed. Then, it is possible to evaluate the EV autonomy, and an accurate approximation can be determined when EV is on a wireless charging road. Even with the citation and comparison between the two studied models, this paper opens some perspectives for energy transmitter tools and tries to explain how renewable energy can help the deployment of this technology .

[4] Jitendra Kumar Nama, Arun Kumar Verma 2020 Department of Electrical Engineering Malaviya National Institute of Technology Jaipur, India "An Efficient Wireless Charger for Electric Vehicle Battery Charging ",In this paper, an improved ZVS IPT topology and its switching pattern is proposed. ZVS is achieved by optimizing the classical series compensation and additionally, an auxiliary network is employed to achieve wide-range performance independent of loading conditions. The proposed concept is verified by using MATLAB/ SIMULINK based simulations for resistive and battery load. An efficiency of 92.5\% is achieved with ZVS for a full dynamic power transfer .

[5] Saeed D. Manshadi, Student Member, 2016 IEEE, Mohammad E. Khodayar, Member, IEEE, Khaled Abdelghany, Halit Üster "Wireless Charging of Electric Vehicles in Electricity and Transportation Networks",

This paper presents the short-term operation of WCS by capturing the interdependence among the electricity and transportation networks. In the transportation network, the total travel cost consists of the cost associated with the travel time and the cost of utilized electricity along each path. Each EV takes the path that minimizes its total travel cost. In the electricity network, the changes in WCS demand as a result of the traffic flow pattern impacts the price of electricity, which further affects the charging strategy of the EVs and the associated traffic flow pattern. The coordination between electricity and transportation networks would help mitigate congestion in the electricity network by routing the traffic flow in the transportation network.

[6] Morris Kesler IEEE 2018 WiTricity Corporation, Watertown, MA, USA "Wireless Charging of Electric Vehicles",

This paper reviews the application of magnetic resonance based wireless power transfer to the charging of electric vehicles. It includes an overview of the technology for this application, some performance data from a state-of-the-art system, a review of activities in standardization of the technology, and a discussion of some remaining challenges to widespread adoption.

CHAPTER 3

TECHNOLOGY USED

3.1 Block Diagram

The project is divided into 2 sections: transmitter section and receiver section.

3.1.1 Transmitter Block Diagram

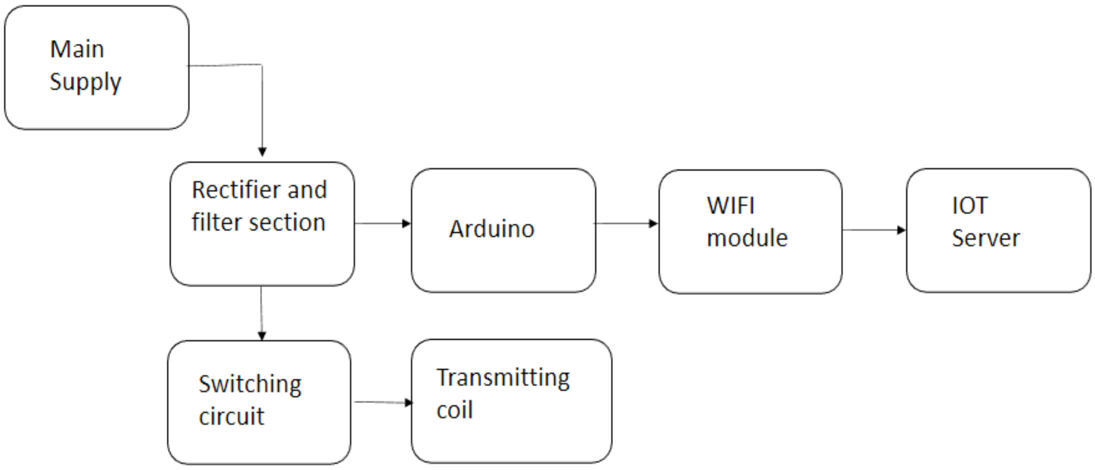

Figure 3.1.1: Transmitter Block Diagram

In the transmitter section, the Transistor is generating high-frequency AC current across the coil and the coil is generating a magnetic field around it. As the coil is center tapped, the two sides of the coil start to charge up. One side of the coil is connected to the resistor and another side is connected to the collector terminal of the NPN transistor.

During the charging condition, the base resistor starts to conduct which eventually turns on the transistor. The transistor then discharges the inductor as the emitter is connected with the ground. This charging and discharging of the inductor produces a very high frequency oscillation signal which is transmitted as a magnetic field.

3.1.2 Receiver Block Diagram

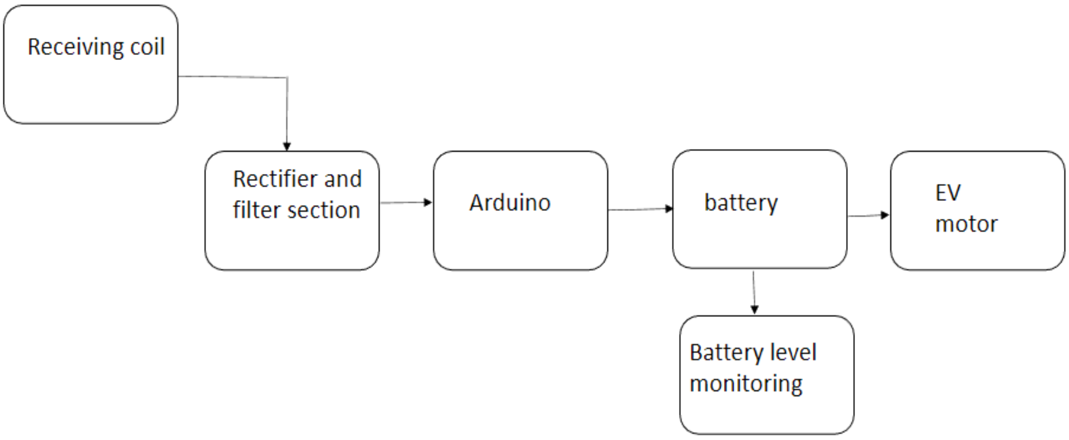

Figure 3.1.2 Receiver block diagram

On the receiver side, that magnetic field is transferred into the other coil, and by Faraday's law of induction, the receiver coil starts producing EMF voltage which is further used to charge the battery. On the receiver unit: receiving coil, rectifier bridge, filtering, battery, in the receiver section side, after receiving this power, converting into pure dc using Rectifier Bridge and filter. After that, storing this into the battery.

This battery power will be utilized for motor drive of EV. The voltage meter will connect with the battery for battery level indication. An Arduino WIFI module will be connected with the IOT protocol and users will be able to see the nearest charging station using this IOT.

3.2 Hardware requirements

3.2.1 Arduino ESP8266 NodeMCU

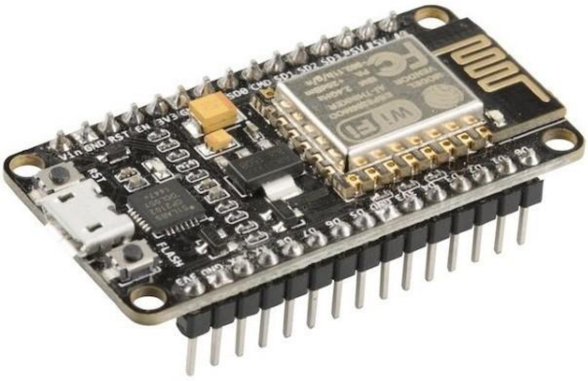

Figure 3.2.1 Arduino ESP8266 NodeMCU

Node MCU is an excellent hardware, which provides just enough versatility for us to do a majority of our developments. It is Arduino compatible, has Wi-Fi on board and has enough kick to power our IOT devices. Whether connecting to gateway or connecting to our cloud solutions.

"Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language."

3.2.2 Transistor TTC500

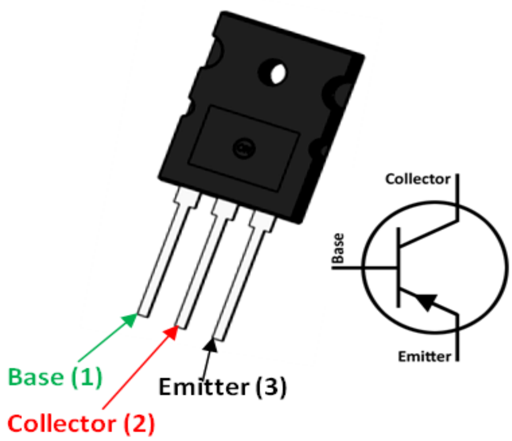

Figure 3.2.2 Transistor TTC500

Probably, the most common transistor type is the BJT. This component includes three material sections and can be constructed as either an NPN or PNP–where N denotes n-type or electrically negative, while P indicates p-type or positive. In addition, BJTs are built with three terminals: the collector, base, and emitter and three operation modes or regions.

BJTs, such as Toshiba's TTC5200, are well suited for high power application and/or signal transfer and fast switching.

As stipulated in the TTC5200 is an NPN triple diffused BJT transistor. The component is recommended for audio applications, especially 100W output stages. And has a very high collector voltage rating of 230V along with other attractive specifications, as shown in the table below.

3.2.3 Rectifier 1N4007

Figure 3.2.3 Transistor TTC500

1N4007 is a PN junction rectifier diode. These types of diodes allow only the flow of electrical current in one direction only. So, it can be used for the conversion of AC power to DC. 1N 4007 is electrically compatible with other rectifier diodes and can be used instead of any of the diodes belonging to the 1N400X series. 1N-4007 has different real life applications e.g. freewheeling diodes applications, general purpose rectification of power supplies, inverters, converters etc.

3.2.4 Step down Transformer 0-12

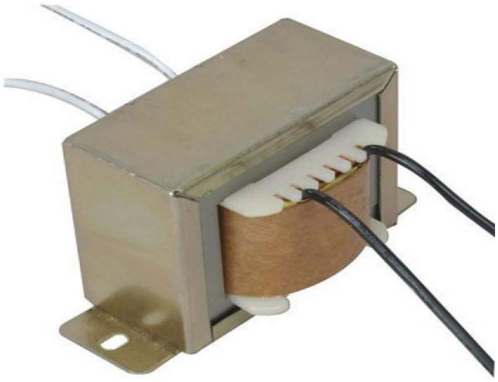

Figure 3.2.4 step down transformer

A step-down transformer is a type of transformer that converts the high voltage (HV) and low current from the primary side of the transformer to the low voltage (LV) and high current value on the secondary side of the transformer. The reverse of this is known as a step up transformer.

3.2.5 Battery 12v 1.3Ah

Figure 3.2.5: battery 12v 1.3Ah

Battery is used to store the charge .The normal voltage is 12v and the capacity of the battery is 1.3Ah.

Application are

Uninterruptible Power Supply (UPS)

Electric Power System(EPS)

Emergency backup power supply

Emergency light

Railway signal,Alarm and security system

Electronic apparatus and equipment and DC power supply.

3.2.6 DC Motor 12v 30 rpm

Figure 3.2.6: DC motor 12v 30rpm

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by induced magnetic fields due to flowing current in the coil. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.the DC motor uses a 12v supply and rotates at 30 rpm.

3.2.7 1000uf 25 volt filter

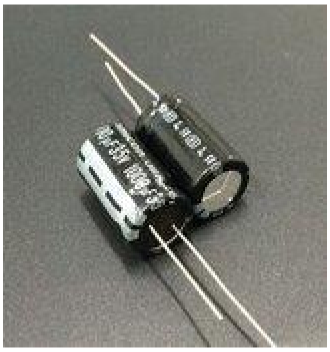

Figure 3.2.7: 1000uf 25 volt filter

capacitor, device for storing electrical energy, consisting of two conductors in close proximity and insulated from each other. A simple example of such a storage device is the parallel-plate capacitor. Capacitors have many important applications. They are used, for example, in digital circuits so that information stored in large computer memories is not lost during a momentary electric power failure; the electric energy stored in such capacitors maintain the information during the temporary loss of power. Capacitors play an even more important role as filters to divert spurious electric signals and thereby prevent damage to sensitive components and circuits caused by electric surges.

3.2.8 LCD Display

Figure 3.2.8: lcd display

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

3.2.9 Copper coil

Figure 3.2.9: lcd display

A copper coil is an electrical conductor such as a wire in the shape of a coil (spiral or helix). Copper coils are used in electrical engineering, in applications where electric currents interact with magnetic fields, in devices such as electric motors, generators, inductors, electromagnets, transformers, and sensor coils. Either an electric current is passed through the wire of the coil to generate a magnetic field, or conversely, an external time-varying magnetic field through the interior of the coil generates an EMF (voltage) in the conductor.A current through any conductor creates a circular magnetic field around the conductor due to Ampere's law.

3.3 Software requirements

3.3.1 Embedded c programming

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in C, such as fixed-point arithmetic, named address spaces, and basic VO hardware addressing. Embedded C uses most of the syntax and semantics of standard C. c.g., main () function, variable definition, data type declaration, conditional statements. (if. switch, case), loops (while, for). functions, arrays and strings, structures and union, bit operations, macros, etc.

3.3.2 Arduino IDE 1.8v

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

The Arduino Software (IDE) makes it easy to write code and upload it to the board offline. We recommend it for users with poor or no internet connection. This software can be used with any Arduino board.

There are currently two versions of the Arduino IDE, one is the IDE 1.x.x and the other is IDE 2.x. The IDE 2.x is new major release that is faster and even more powerful to the IDE 1.x.x. In addition to a more modern editor and a more responsive interface it includes advanced features to help users with their coding and debugging.

CHAPTER 4

METHODOLOGY

4.1 Problem statement

Charging of an electric vehicle can be performed by either conductive (or wired) charging or wireless charging. Wired charging uses connection means between electric supply and charge inlet of the vehicle. Even though wired charging is popular, the problems with messy wires and safety matter in wet environment are a major drawback of this charging. Since a few years, a large interest is growing for the supply of the electric loads through a field to dispense from any wired connection with the grid. The apparatuses that actuate the through the-field supply are termed as wireless power transfer systems (WPTSs). Their deployment has started for the recharge of the batteries that are fitted in grid-detachable equipment. Recharging is executed while the equipment is standing in an on-purpose set but the longtime perspective is the supply of equipment while moving, with the purpose of removing the batteries or at least of reducing their capacity. Wireless charging of the EV batteries offers a number of advantages compared to the wired counterpart; indeed, wireless charging makes it

i) Unnecessary any plug, cable or outlet,

ii) Friendly the charging process,

iii) Fearless the transfer of energy in any environmental condition, and so on.

For these reasons, WPTSs are expected to play a major role in the future charging process for the EVs

4.2 Objectives

The main objective of this project is to implement a system for wireless charging, that is for transmit power by an electromagnetic field across a given space. As electric vehicles are a better alternative to curb the ongoing pollution it is vital to make amendments in the battery charging process to attain greater reliability. Electric vehicle battery charging can be done by wireless power transfer and with this power battery will get charged. This charged battery power will be utilized for motor drive of EV. The user will able to see the battery level using battery voltage monitoring section in this implementation and as well as user will able to search charging station using IOT.

4.3 Background

Personal vehicles have become an inevitable part of our life. But most of these vehicles use petrol or diesel as fuel and hence there is immense emission of greenhouse gases which causes global warming which has become a major issue these days. Electric Vehicles are a very promising hope to reduce emissions of harmful gases. Charging of electric vehicles through rechargeable battery which can only be charged when the vehicle is parked. Thus, the concept of wireless power transfer is proposed, where a vehicle can be charged portably**.**

4.4 Flow chart

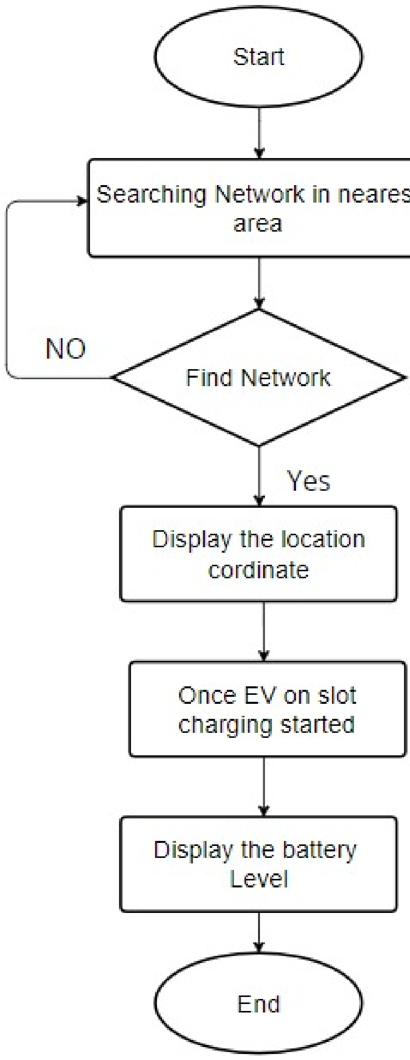

Figure 4.4 :flow chart

CHAPTER 5

APPLICATIONS AND RESULTS

5.1 Advantages of wireless charging system

- Easy to use
- User friendly
- Cost effective
- Time saving
- Charging process is simple and automatic.
- It is small in size and compact compare to wired system.
- As it does not have any contact,there are no exposed electric connections.
- It can avoid electrocution risk typically arising from power cords.

5.2 Applications

5.2.1 Wireless power transfer for EV charging

Electric vehicles constitute an important asset in the sustainable transportation sector. Wireless technology allows for a user-friendly charge/discharge process in EVs. This technology may also prompt an autonomous operation as users' intervention is avoided. In order to promote the use of WPT in EVs, the wireless chargers should be designed so as to meet the requirements established by conductive chargers. This chapter describes the main aspects to consider in relation to conductive charge in EVs. Based on this, the general structure of a wireless charger for EVs is presented.

5.2.2 industrial appliances

The main aim of the technology is to charge industrial devices, personal electronic devices, household appliances, and portable devices wirelessly, without any cable requirement with better efficiency. Adverse to its goal, wireless inductive charging does not work completely without cables when it is not powered through a battery.

The charging stations/transmitters will be still connected with the main power socket via a power cable and remain connected constantly when it does not have a battery. But the small personal electronic gadgets like smartphones recharge wirelessly. It must need to be placed near the wireless station.The charging station incorporates a coil through which AC (alternating current) flows to the receiver coil of the personal gadgets and this electricity generates an electromagnetic field. When the small personal electronic gadgets like the smartphone are within this electromagnetic field area to be charged.

5.2.3 Medical machines and appliances

portable medical devices such as surgical carts, handheld medical devices, glucose meters, wearables, and more, are socket-dependant and tethered to the wall by cumbersome cables that can become a potential hazard and are hard to keep sterile. In contrast, smaller medical devices such as implants and neuromodulators struggle with short battery life challenges, which often require surgical procedures to replace or require using cables that are prone to contamination and infection.

Our wireless charging technology eliminates hazardous cables and removes limitations from access to available sockets. wireless power transfer solutions for medical carts, diagnostic instruments, and handheld medical devices, as well as smaller medical devices that are wearable and implanted, such as pacemakers, defibrillators, neuromodulation devices, and more.

5.3 EXPECTED RESULT

The IOT-cloud based system for the user will be developed to provide information if the battery is properly charged, overcharged or over heated. The current battery charge is displayed to the user and also the total distance how much he can travel based on the current battery percentage can be determined.

Also, the user gets to know the nearest charging point so that battery draining can be avoided. solarized panels are used at the charging station to charge the electric vehicles wireless. The electric vehicles moves once the battery is fully charged.

PLAN OF ACTION

SL.NO	MONTH	PLAN	REMARK
01	1st October-15th October 2022	Topic selection and synopsis preparation	Successfully submitted
02	October 15th -30th October 2022	Survey on exact hardware and software requirements	Successfully done.
03	9th November 2022	Synopsis submission	Successfully submitted .
04	25th November 2022	Zeroth review presentation	Successfully done.
05	3rd December 2022	Collecting the components	Successfully done.
06	08th December 2021	1st phase report submission	To be done.
07	09th December 2021	1st phase presentation	To be done.
08	February 2023	Start developing the module	
09	March 2023	Develop and test the project	
10	March 2023	Report presentation	
11	April-may	Paper presentation and viva exams	

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APPENDIX A

DATA SHEETS

Arduino ESP8266 NodeMCU

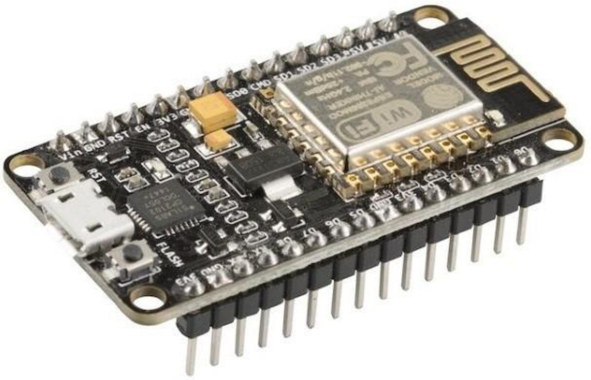

Fig Arduino ESP8266 NodeMCU

Node MCU is an excellent hardware, which provides just enough versatility for us to do a majority of our developments. It is Arduino compatible, has a Wi-Fi on board and has enough kick to power our IOT devices. Whether connecting to gateway or connecting to our cloud solutions. "Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language."

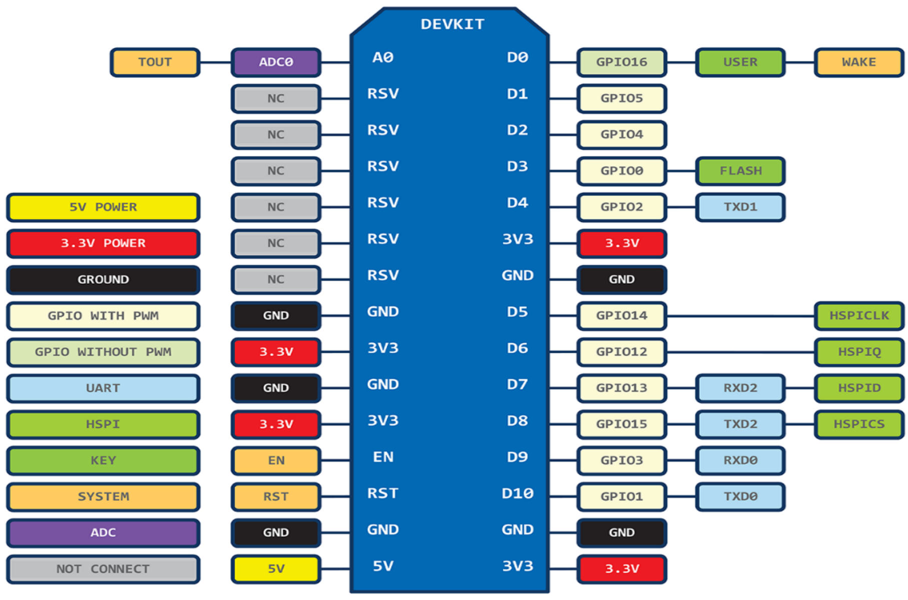

Fig Node MCU Pin details

Please note that this causes quite some confusion. The numbers on the pins DO NOT map to the numbers of pins of the ESP8266. For example - pin D1 of the board does not map to GPIO1 as you would expect, but to GPIO5 instead!

The above layout indicates how to interpret the mapping. For clarity, you can also see the mapping list between Node MCU pins and GPIO below:

D0 = GPIO16

D1 = GPIO5

D2 = GPIO4

D3 = GPIO0

D4 = GPIO2

D5 = GPIO14

D6 = GPIO12

D7 = GPIO13

D8 = GPIO15

D9 = GPIO3

D10 = GPIO1

LED_BUILTIN = GPIO16 (auxiliary constant for the board LED, not a board pin)

Transistor (TTC5200)

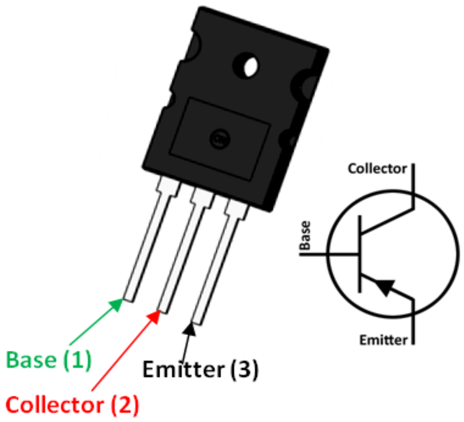

Fig:Transistor

Power Amplifier Applications

• High collector voltage: VCEO = 230 V (min)

• Complementary to TTA1943

• Recommended for 100-W high-fidelity audio frequency amplifier output stage.

Rectifier 1N4007

Fig: Rectifier

FEATURES

• Low forward voltage drop

• Low leakage current

• High forward surge capability

• Solder dip 275 °C max. 10 s, per JESD 22-B106

PRIMARY CHARACTERISTICS

IF(AV) 1.0 A

VRRM 50 V, 100 V, 200 V, 400 V, 600 V, 800 V, 1000 V

IFSM (8.3 ms sine-wave) 30 A

IFSM (square wave tp = 1 ms) 45 A

VF 1.1 V

IR 5.0 μA

TJ max. 150 °C

Package DO-41 (DO-204AL)

Circuit configuration Single.

Filter 1000uf 25 volt

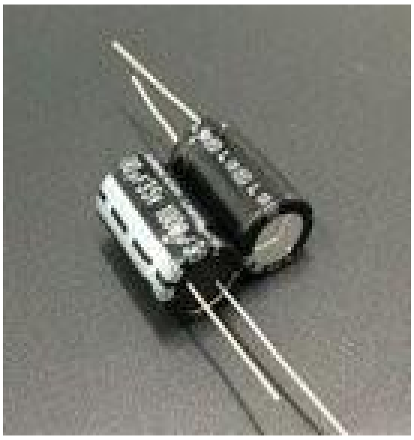

Fig: Filter

Specification

- Operating Temperature Range -40 to +105°C
- Rated Working Voltage Range 10 - 100 V dc

- Nominal Capacitance Range 0.1 - 15,000 μF

Features

- For general purpose.
- Wide CV value range.
- Safely vent construction products, RH series are guaranteed 2,000 hours at 105°C

DC Motor 12 volt 30 RPM

Fig: DC Motor

Specifications

Gear Material	Plastic
Rated Speed (RPM)	30
Operating Voltage (VDC)	12
Rated Torque(kg-cm)	5
Load Current Max	300
No-Load Current (mA)	60
Gearbox Diameter (mm)	37
Motor Diameter(mm)	32
Motor Length (mm)	75

Shaft Diameter (mm)	6
Shaft Length (mm)	22
Weight (gm)	80
Shipment Weight	0.3 kg
Shipment Dimensions	9 × 5 × 5 cm

Battery 12 volt 1.3 Ah

Fig :Battery

Specification

- Nominal Voltage 12V
- Nominal Capacity (20HR) 1.3AH
- Dimensions

    Length 97±1mm (3.82inches)

    Width 43±1mm (1.69inches)

    Container Height 52±1mm (2.05inches)

    Total Height (with Terminal) 58±1mm (2.28inches)

- Approx Weight Approx 0.57kg
- Max. Discharge Current 18A (5s)
- cycle Use

Initial Charging Current less than 0.36A.Voltage 0 0 0 14.4V~15.0V a t 25 C (77 F)Temp. Coefficient -30mV/ C

Applications

- All purpose
- Uninterruptible Power Supply (UPS)
- Electric Power System(EPS)
- Emergency backup power supply
- Emergency light
- Railway signal
- Aircraft signal
- Alarm and security system
- Electronic apparatus and equipment
- Communication power supply
- DC power supply
- Auto control system

Component list

Transistor (TTC5200)

Microcontroller IOT (ESP8266 NodeMCU Arduino)

Coil copper 140 turn

Rectifier 1N4007

Filter 1000uf 25 volt

Battery 12 volt 1.3 Ah

DC Motor 12 volt 30 RPM

Led 5 MM 3V

Switch Toggle

Step down Transformer 0-12

Connecting wire 0.5 MM

LCD display

APPENDIX B

FLOW CHART

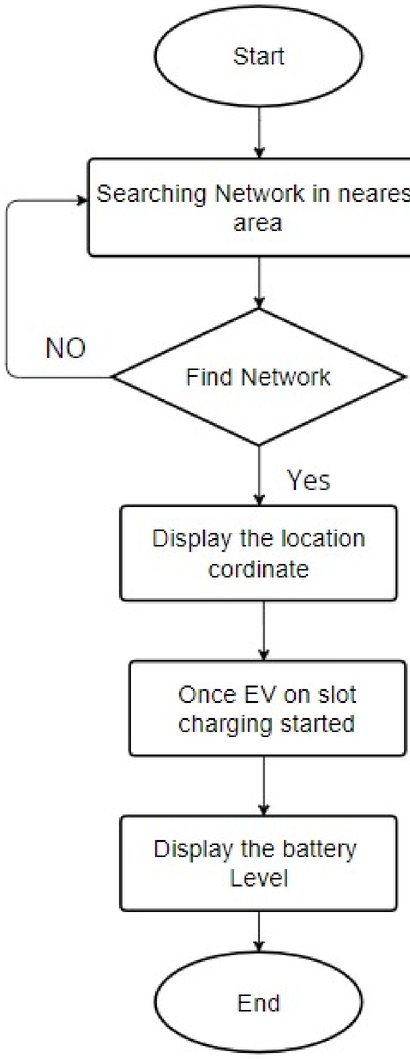

Fig : flow chart

APPENDIX C