

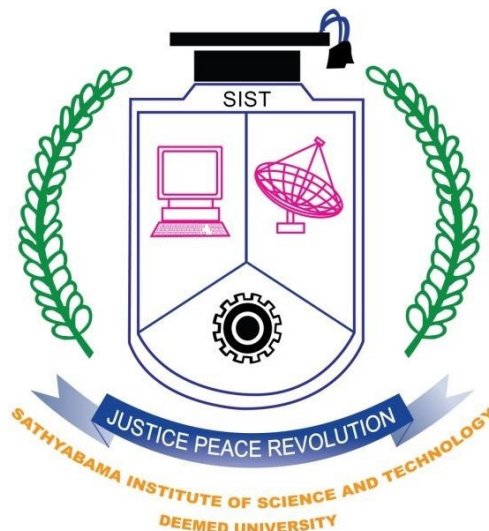
DYNAMIC CHARGING FOR ELECTRIC VEHICLE USING WIRELESS POWER TRANSFER

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in
Electrical and Electronics Engineering

by

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

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APRIL 2021



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **M. NANDHINI** (Reg. No. 37140057) and **S. PAVITHRA** (Reg. No. 37140063) who carried out the project entitled "**DYNAMIC CHARGING FOR ELECTRIC VEHICLE USING WIRELESS POWER TRANSFER**" under our supervision from December 2020 to April 2021.

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DECLARATION

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ABSTRACT

Wireless Power Transfer (WPT) can rise the driving scope of EVs by charging EVs in shopping centres, parking garages etc., As a substitution structure in the street transportation framework, electric vehicle (EV) can help decline the petroleum product utilization. Notwithstanding, the interaction of EVs is constrained by the restricted limit of battery. Dynamic remote charging of electric vehicles is turning into an ideal technique since it grants power trade between the vehicle and the matrix while the vehicle is moving. Dynamic charging, up until this point, has been founded on fixed charging stations that can be apportioned to parking areas or transport stations. Notwithstanding, the cycle of EVs is constrained by the restricted limit of battery. at the point when they remain over a remote charging path installed in a stage. The measure of force that can be given by a charging path at an at once.

WPTs are extremely appealing for some modern applications in light of their advantages contrasted with the wired partner, like no unprotected wires, simplicity of charging, and bold transmission of force in contradicting ecological conditions. WPT is accomplished through the reasonable inductive coupling between two curls called as transmitter and beneficiary loop. Reception of WPTs to charge the on-board batteries of an electric vehicle (EV) has stood out enough to be noticed from certain organizations, and efforts are being made for advancement and improvement of the different related geographies. In EV charging applications, transmitter loops are covered in the street and beneficiary curls are situated in the vehicle. Inductive WPT of thunderous kind is generally utilized for medium-high force move applications like EV charging in light of the fact that it shows a more prominent proficiency.

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LIST OF SYMBOLS AND ABBREVIATIONS

WPT -Wireless Power Transfer

EV - Electric Vehicle

PWM - Pulse Width Modulation

LCD - Liquid Crystal Display

GND - Ground

MOSFET- Metal oxide semiconductors field effect transistor

CHAPTER 1

1.INTRODUCTION

In any case, for electric vehicles (EVs), the high adaptability makes it hard to get power similarly. For energy, environment, and various features, the shock for transportation has been finishing. In light of everything, a high power and gigantic cut-off battery pack is reliably set up as an energy storing unit to make an EV to work for an agreeable distance. Owner requirements to go up against some amazing circumstances by strategies for this wired EV. So far, the EVs are not so appealing to customers even with various organization motivation programs. Far off charging strategy is depend on the norm of Inductive Power Transfer (IPT) or appealing resonation. Government sponsorship and evaluation stimulus are one key to improvement the slice of the pie of EV today. This is the procedure for sending an electrical stream between two things utilizing twists to incite an electromagnetic field. Supply voltage is changed over into high recurrence substituting current which is shipped off the transmitter loop by the transmitter circuit. At that point the substituting current convinces a period changing attractive field in the transmitter loop. In rail course structures, the electric trains have successfully been especially created for quite a while. The hard for an electric vehicle isn't anything else with the exception of the force cargo space advancement, which requires a battery which is the bottleneck today due to its undesirable energy thickness, limited life time and huge cost. Rotating current streaming inside the transmitter loop convinces an attractive field which keeps an eye on the beneficiary curl (when inside a predetermined distance). The attractive field makes current inside the collector curl. The technique wherein the energy is sent between the transmitter and collector loop is additionally referenced to as attractive or resounding coupling and is reached by the two curls reverberating at a similar frequency.

An RFID framework comprises of labels, peruses, correspondence conventions, PC organizations, and databases. The label comprises of miniature chip containing item data with a fastened radio antenna. The tag is joined to a thing or its bundling and holds a remarkable chronic number called an electronic item code which issued to extraordinarily distinguish the bed, case, or thing. For ease labels, a peruse communicates a radio sign to the labels to stimulate them so the tag can send its code. A peruse can be either fixed in a fixed state or portable. There are correspondence conventions that characterize the trading of messages from the tag to peruse and vice versa. The peruses are associated with a PC network so they can be asked by an administration framework. At that point the management system can ask a data set dictated by the electronic item code to discover more data about the thing to which the tag is joined.

CHAPTER 2

Literature Survey

Optimization of solar-wind energy system power for battery charging using MPPT

Publisher: IEEE

Authors: Ligase Gitanjali Vasant; V. R. Pawar

Force age cost and hypothesis become uncommon issue. The assortment is continually seen with sun situated and wind fuel sources concerning spot, time and season. power request is really extending all over world. Non-manageable force resources as per coal, petroleum, combustible gases and nuclear, etc. are used for time of electrical power. Sun based Wind set up blend electrical power age structure is used for power age to overcome the above issues. Sun arranged energy and Wind energy are joint to outline a sun-based breeze hybrid force age structure, using both of these in get-together will decrease this issue generally. Boundless resources of energy as daylight based and wind are all the more notable and are trademark resources open luxuriously. It is key to get uniform and consistent voltage with most noteworthy power at yield. This paper makes reference to smoothing out procedure for period of power using daylight-based breeze blend energy age system used for battery energizing set on MPPT (Maximum Power Point Tracking) estimation for steady voltage strategy. The objective of preparation this system is to extend the security and viability.

Solar panel and Battery Street light monitoring system using GSM wireless communication system

Publisher: IEEE

Author(s) Simon Sidebar ; Daddy Siegwart

The utilization of single force nearby planetary group in age of power for streetlamps these days is broadly utilized. The troublesome that can be arise for such a streetlight is the way to control and guarantee the ideal system [1]. By and large, a significant number of this sort of streetlamp is utilizing one sunlight-based board framework to control its light. The use of ACS712 current sensor and voltage sensor using voltage divider circuit with GSM correspondence system grants checking [2] both the battery and the daylight-based board. The data from the current sensor and voltage sensor at that point took care of by a microcontroller. Microcontroller then coordinates the information through a GSM correspondence framework to a worker, through short message administration (SMS). This worker at that point prepared the information by parsing the data from the

SMS, and sends the information to a web worker data set. This data at that point can be gotten to by web. The normal result of this observing framework is a framework that can be utilized in checking little sun-oriented force plants framework as the streetlamps.

Experiment validation of vertical axis wind turbine control system based on wind energy utilization coefficient characteristics

Publisher: IEEE

Author(s) Chong yang Zhao; Jun Luo ; Sharing Xin; Chengyu Li

A This paper, wind power age framework exploratory stage is perceived, and wind generator outside qualities are estimated. Vertical hub wind turbine framework highlights boundaries are estimated straightforwardly by the test stage, so yield power, input wind energy, tip speed proportion and wind energy usage coefficient et al. boundaries are determined by the deliberate information, and draw the proper yield trademark bend and investigate the trial results.

Advanced Home Automation Using ZIGBEE Technology

International Journal of Computer Application (2250-1797) Volume 5–No. 5, August 2015

Authors: Neha, Monoi Kumar, Mukesh Kumar

This examination paper essentially centers around the remote detecting organization, Zigbee Technology. Zigbee innovation is utilized in remote correspondence. It works over 802.15 norms for checking and controlling the gadgets. Zigbee is intended for keen home robotization. Zigbee gives ease and low force availability. It likewise empowers self-association and self-mending organizations. For industry Zigbee is utilized for far off checking and robotized producing.

CHAPTER 3

METHODOLOGY

Point of the undertaking is to Design and build up the Electric vehicle charging framework to charge an Electric Vehicle battery utilizing Wireless Power Transfer Technique.

3.1 An Objectives The objectives of project are given below

- To get satisfactory force move productivity subsequent to carrying out the hardware with loops in a smaller than expected model
- To plan a force electronic circuit for changing AC over to DC and charging Electric Vehicle (EV) battery.
- To plan a remote force, move hardware and acquiring its presentation qualities.
- To compose an installed program to realize the charge level of the battery.

3.2 ADVANTAGES:

- Electrically protected
- Charging is advantageous.
- Pollution free
- Light weight vehicles
- 80% diminished working expense
- Lower upkeep costs than gas-controlled vehicles
- Zero re-energizing time and limitless reach

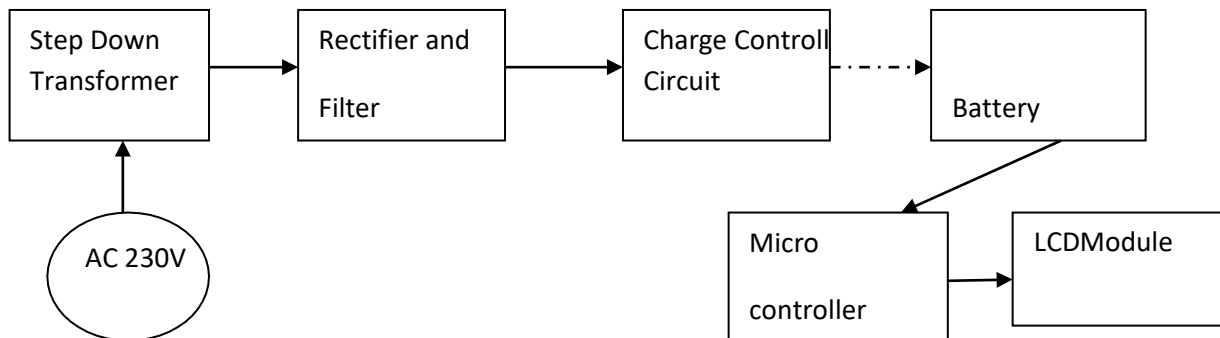
3.3 APPLICATIONS

- Wireless implantable clinical gadgets
- In vehicle charging
- Radio charging

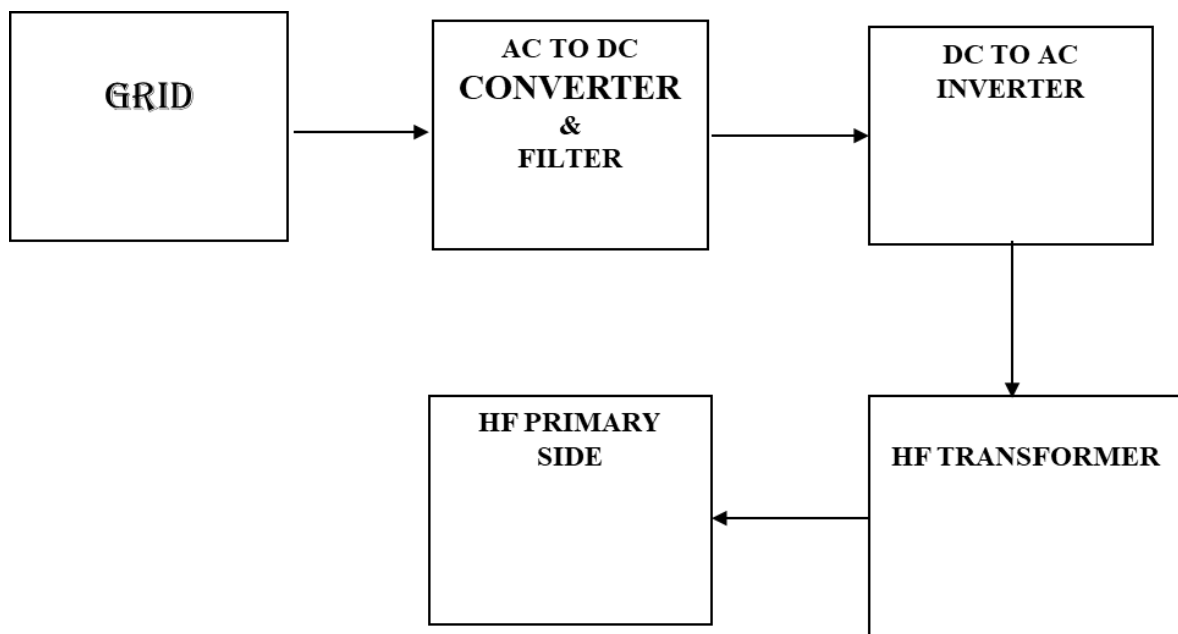
- Ultra wideband

3.4 EXISTING SYSTEM AND PROPOSED SYSTEM

3.4.1 Diagram of Existing System

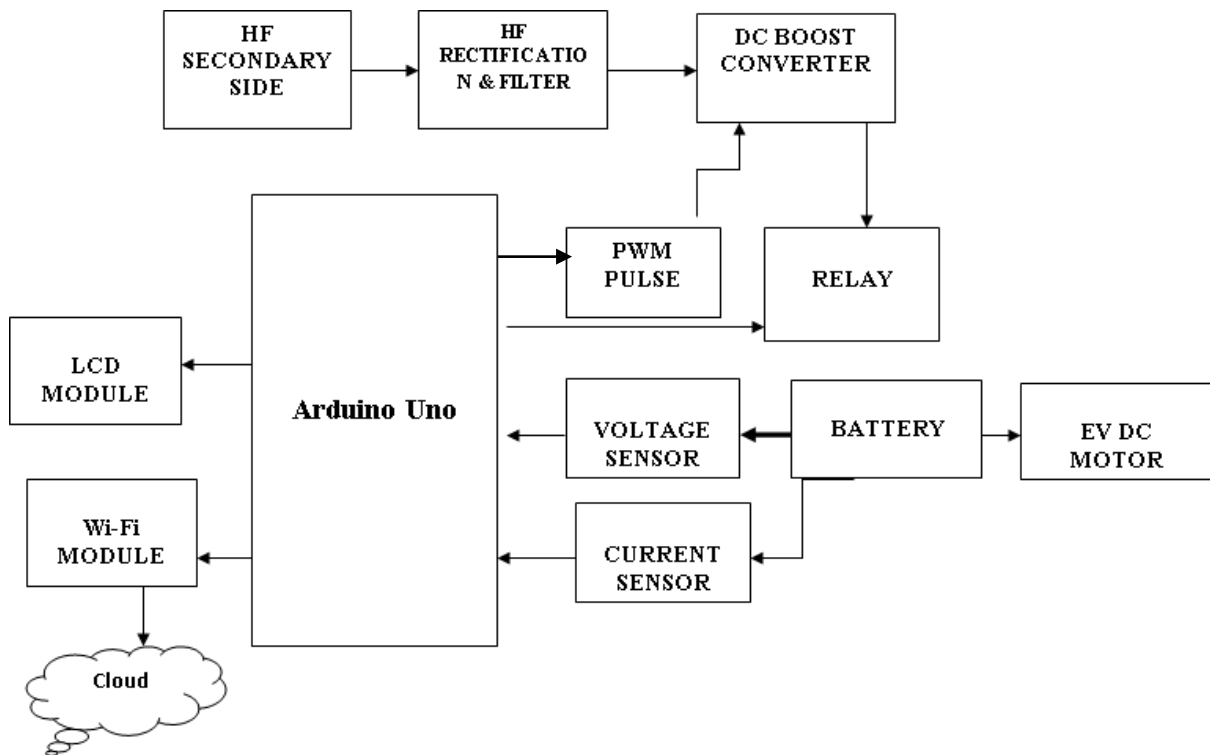


3.4.1 Diagram of proposed System Transmitter section of Proposed System



Square outline is a graph of a framework, wherein the chief parts or capacities are addressed by blocks associated by lines that show the connections of the blocks. They are intensely utilized in the designing scene in equipment plan, electronic plan, programming plan, and interaction stream diagrams. The ordinary force lattice and to work with the consistent activity of the power conveyance framework even in brutal climate, diminishing the likelihood of disappointments. utilizing lattice network for conveying power from makers to consumers. This circuit consolidates the elements of the rectifier and DC to DC converter, as opposed to utilizing the rectifier to change AC over to DC and afterward providing the necessary voltage with controller as in the momentary technique. This alteration can lessen the force utilization and the space of the circuit. Its equipped for changing AC voltage over to DC voltage. It will go to the DC to AC channel. we need to utilize 2 channels, in light of the fact that we have 2 loops. The high-recurrence inverter (DC-AC) associates with a TX curl and a remuneration network that goes about as a receiving wire. The TX curl is liable for creating the ideal electric or potentially attractive fields that couple the energy to the accepting side through a remote medium. It is an electrical gadget which is created and intended to satisfy the need of high recurrence. It gives yield as high recurrence having range up to kHz. at last voltage will go to the essential loop.

3.4.2Receiver Section of Proposed System



Essential loop sends the capacity to HF auxiliary side. at that point HF correction channel, A rectifier is an electrical gadget that converts rotating flow (AC), which occasionally switches course, to coordinate flow (DC), which streams just a single way. Correction may serve in jobs other than to create direct current for use as a wellspring of force. The lift converter is utilized to "venture up" an information voltage to some more elevated level, needed by a heap. This extraordinary ability is accomplished by putting away energy in an inductor and delivering it to the heap at a higher voltage. This short note features a portion of the more normal traps when utilizing support controllers. we need to utilize two transfer; one is charging cut off/on and another is engine/on. hand-off is utilized to when battery charge is filled it will be cut the interaction. PWM can be utilized to control the measure of force conveyed to a heap without causing the misfortunes that would result from direct influence conveyance by resistive means. High recurrence PWM influence control frameworks are effectively feasible with semiconductor switches. A voltage sensor is a sensor used to figure and screen the measure of voltage in an item. Voltage sensors can decide the AC voltage or DC voltage level. The contribution of this sensor is the voltage, though the yield is the

switches, simple voltage signal, a current sign, or a perceptible sign. We need to utilize two sensor, curl voltage sensor and battery voltage sensor. The Battery Voltage Sensor gives clients more exact battery charging giving you tranquility of. mind that the charge regulator is working as adequately as it ought to. On specific applications with sensor. sensor used to quantify the heap flow. A flow sensor is a gadget that recognizes electric flow in a wire and produces a sign corresponding to that flow. battery is utilized to store the charges. Electric engines transform power into movement by misusing electromagnetic enlistment. In LCD module, we can see the yield like how much voltage in battery and loop. what's more, wife module used to share the area in vehicle.

3.5 HARDWARE DESCRIPTION

3.5.1 ARDUINO UNO

Arduino sheets are changed through USB, applied using USB-to-constant connector chips, for instance, the FTDI FT232. A couple of varieties, similar to the Arduino Mini and the casual Boarding, use a divisible USB-to-constant connector board or connection, Bluetooth or various procedures. (Right when used with traditional microcontroller gadgets instead of the Arduino IDE, standard AVR ISP composing PC programs is used.)

Arduino is a lone board microcontroller to make working contraptions in multidisciplinary projects more accessible. The gear contains of an open-source hardware board arranged around an 8-cycle Atmel AVR microcontroller, or a 32-digit Atmel ARM. The item contains of a standard programming language compiler and a boot loader that completes on the microcontroller.

Arduino sheets can be acquired pre-amassed or as DIY units. Hardware plan information is open for the people who should accumulate an Arduino by hand. It was assessed in mid-2011 that in excess of 300,000 power Arduino had been monetarily made.

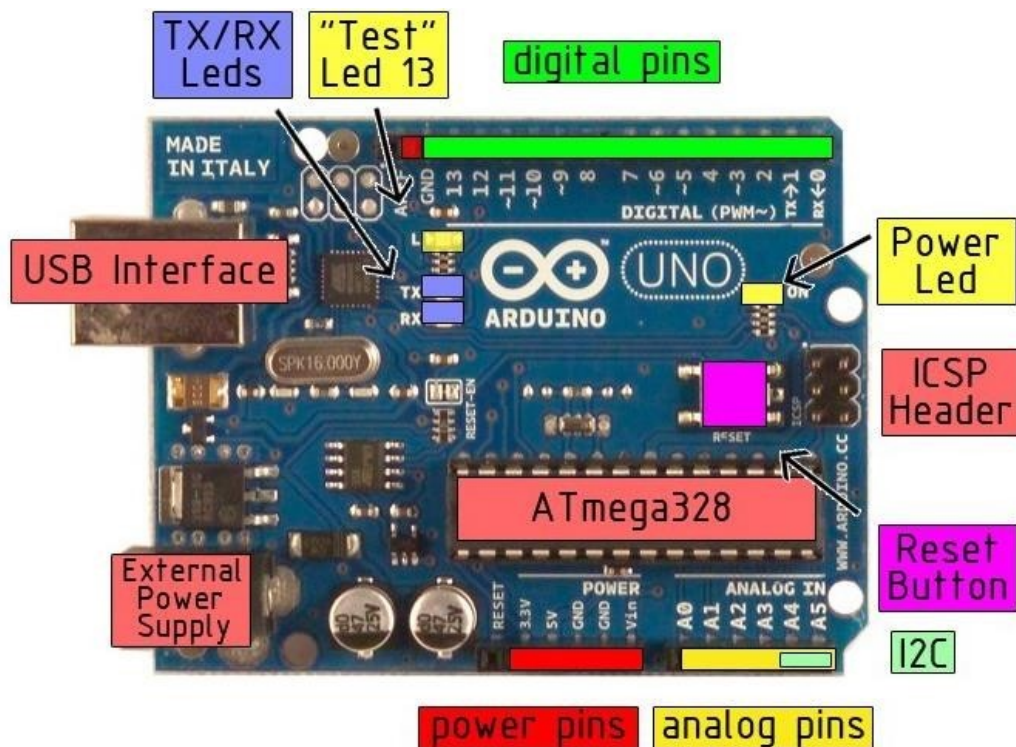


Fig.3.5.1 Arduino Uno board Description

3.5.2. Power

The board can work on an outer stockpile of 6 to 20 volts. Whenever provided with under 7V, notwithstanding, the 5V pin may supply under five volts and the board might be flimsy. In the event that consuming more than 12V, the voltage controller may burn and harm the board. The proposed range is 7 to 12 volts.

External (nonUSB) power can come either from an AC to-DC connector (divider - mole) or battery. The connector can be associated by halting a 2.1mm center - positive connection into the board's power jack. Leads from a battery can be fixed in the Gnd and Vin pin headers of the POWER connector.

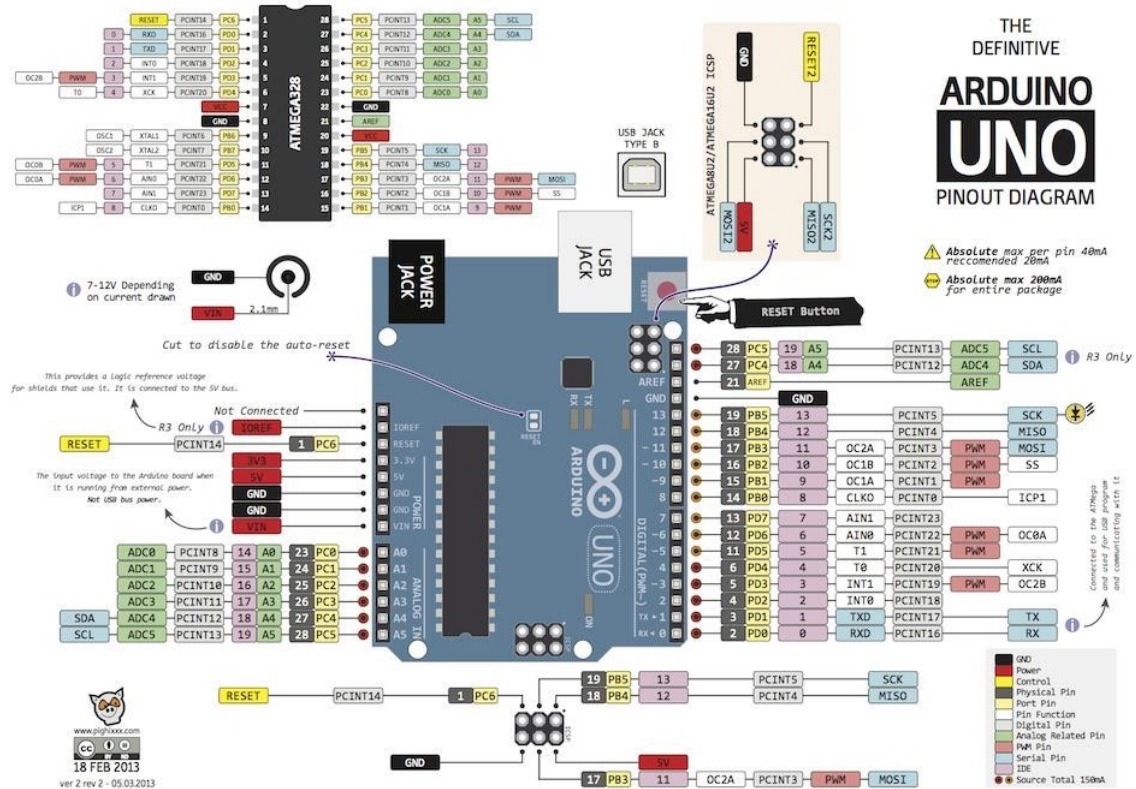


Fig 3.5.2 Arduino Uno Pin Diagram

The Arduino Uno can be controlled through the USB affiliation or with an external power supply. The power source is picked subsequently.

3.5.3 Memory

3.5.3.1 INPUT AND OUTPUT PINS

All of the 14 automated pins on the Uno can be used as an information or yield, using pin Mode () digital Write ()

digital Read () limits.

They work at 5 volts. Each pin can give or gain a restriction of 40 mA and has an internal draw up resistor (separated normally) of 20-50 ohms.

Furthermore, a couple of pins have decided limits:

Successive: 0 (RX) and 1 (TX) Used to get (RX) and impart (TX) TTL consecutive data. These pins are related with the contrasting pins of the ATmega8U2 USB-with TTL Serial chip

PWM: 3, 5, 6, 9, 10, and 11. Outfit 8-digit PWM yield with the analog Write () work.

Driven: 13. There is a characteristic LED related with mechanized pin 13. Precisely when the pin is HIGH worth, the LED is on, when the pin is LOW, the LED is off.

SPI: 10, 11, 12, 13. These pins maintain SPI correspondence, which, although passed on by the essential hardware, isn't at present associated with the Arduino language.

- TWI: Backing TWI correspondence applying the Wire collection

- which, although voltage for the basic data sources. Used with straightforward Reference

The Uno has 6 basic information sources, checked A0 through A5, all of which give 10 bits of objective (for instance 1024 particular characteristics). As usual they measure from ground to 5 volts, anyway is it possible to change the upper completion of their compass using the AREF pin and the straightforward Reference () work. Also, a couple of pins have explicit value:

- Reset. Normally used to add a reset catch to safeguards which block the one on the board.

3.5.4 Communication

The ATmega328 conveys UART TTL (5V) sequential correspondence, which is accessible on advanced pins 0 (RX) and 1 (TX). The Arduino Uno has various offices for speaking with a PC, another Arduino, or other microcontrollers. The '16U2 firmware exploits the typical USB COM drivers, and no outer driver is required. Notwithstanding, on Windows, a .inf document is required. The RX and TX LEDs on the board will streak when information is being sent through the USB to sequential chip and USB association with the PC (yet not for sequential correspondence on pins 0 and 1). The Arduino

programming incorporates a chronic screen which permits basic printed information to be shipped off and from the Arduino board.

3.5.5 Voltage Sensor

The potential gains of sensors over customary systems for assessing basically consolidate less size and weight, high prosperity, high accuracy, no saturable, eco-obliging, etc. It is feasible to mix both the current and voltage assessment into a genuine device with little and solid estimations. This article looks at a blueprint of the voltage sensor and its working. All things considered, a sensor is an electrical device used to recognize similarly as respond to a particular sort of sign like optical or electrical. Execution of sensor procedures in voltage or current has gotten a phenomenal option toward the assessment of voltage and current strategies.

The commitment of this sensor can be the voltage however the yield is the switches, basic voltage signal, a current sign, a noticeable sign, etc. A couple of sensors give sine waveforms or heartbeat waveforms like yield and others can create yields like AM (Amplitude Modulation), PWM (Pulse Width Modulation) or FM (Frequency Modulation). The assessment of these sensors can depend upon the voltage divider This sensor is used to screen, determine and choose the voltage supply. This sensor can choose the AC or DC voltage level.

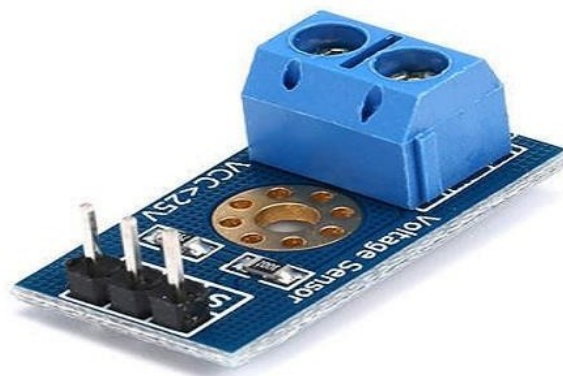


Fig 3.5.5 voltage-sensor

This sensor joins information and yield. The information side essentially consolidates two pins explicitly sure and negative pins. The two pins of the contraption can be related with the positive and negative pins of the sensor. The device positive and negative pins

can be related with the positive and negative pins of the sensor. The yield of this sensor overwhelmingly fuses supply voltage (Vic), ground (GND), basic o/p data

Kinds of Voltage Sensors

These sensors are orchestrated into two sorts like a resistive kind sensor and capacitive sort sensor.

1) Resistive Type Sensor

This sensor basically joins two circuits like a voltage divider and platform circuit. The resistor in the circuit fills in as an identifying segment. The voltage can be disengaged into two resistors like a reference voltage and variable resistor to make a circuit of the voltage divider. A voltage supply is applied to this circuit. The yield voltage can be picked by the resistance used in the circuit. So, the voltage change can be increased.

The platform circuit can be arranged with four resistors. One of these resistors can be presented to the voltage identifier device. The change in voltage can be clearly appeared. This qualification alone can be escalated anyway the differentiation inside the voltage divider circuit not simply improved.

2) Capacitor Type Sensor

This sort of sensor includes an encasing and two conductors inside the middle. As the capacitor is power-driven with 5 Volt, by then the movement of current will be there in the capacitor. This can make repulsiveness of electrons inside the capacitor. The differentiation in capacitance shows the voltage and the capacitor can be related inside the course of action

Applications

The employments of this sensor fuse the going with.

- Finding of power frustration
- Sensing of weight
- Protection trading

- Controlling temperature
- Controlling of power interest
- Finding of issue

Assortment of weight assessment of Temperature

3.5.6 LCD Display

LCD represents fluid precious stone; this is a yield gadget with a restricted survey point. The decision of LCD as a yield gadget was Because of its expense of utilization and is better with letters in order when contrasted and a 7-section LED show. We have such countless sorts of LCD today and our application requires an LCD with 2 lines and 16 characters for each line, this gets information from the microcontroller and presentations the equivalent. It has 8 information lines, 3 control line, a stockpile voltage V_{cc} (+5v and a GND. This makes the entire gadget easy to understand by showing the equilibrium left in the card. This additionally shoes the card that is at present being utilized.

Lately the LCD is discovering boundless use supplanting LED's. This is because of the accompanying reasons:

- The declining costs of LCD's.
- His capacity to show numbers, characters and illustrations. This is rather than LED's, which are restricted to numbers and few characters.
- Incorporation of a reviving regulator into the LCD, there by easing the CPU of the assignment of invigorating the LCD. conversely, the Led should be invigorated by the CPU to continue to show the information.

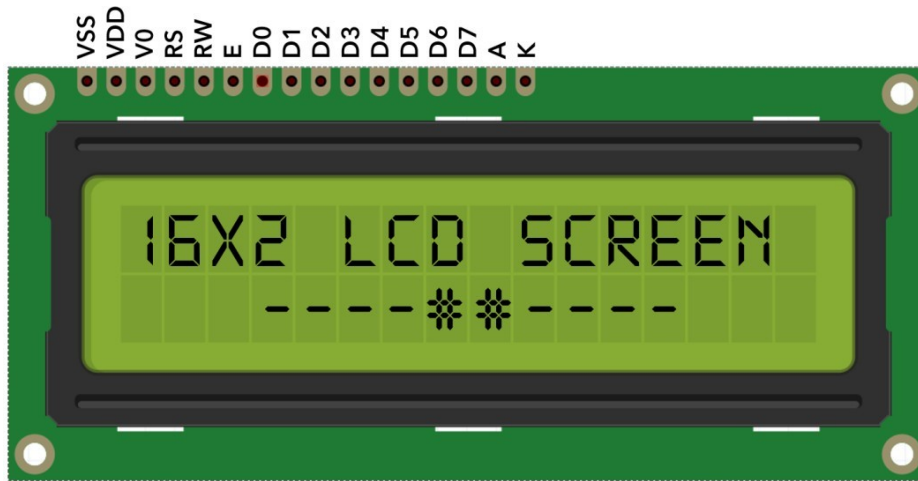


Fig 3.5.6 – 16x2 LCD Screen

LCD Pin Descriptions

VCC, VSS and VEE

While VCC and VSS give +5v and ground independently, VEE is utilized for controlling LCD contrast.

RS, Register Select

There are two imperative registers inside the LCD. The RS pin used for their assurance as follows. If RS=0, the direction request code register is picked, allowing the customer to send a request like clear introduction, cursor at home, etc. IF RS=1 the data register is picked, allowing the customer to send data to be appeared on the LCD.

R/W Read/Write

R/W input permits the customer to make information to the LCD or read information from it. R/W=1 when scrutinizing; R/W=0 when forming.

E, ENABLE

The enable pin is used by the LCD to bolt information present to its data pins. Right when data is given to data sticks, a high to low heartbeat ought to be applied to this pin all together for the LCD to secure in the data present at the data pins. This heartbeat ought to be at any rate 450ns wide.

D0-D7

The 8-cycle data pins, D0-D7, are used to send information to LCD or read the substance of the LCD's inward registers.

The LCD orders codes are as exhibited in table.4. To show letters and numbers, we send ASCII codes for the letters A-Z, a-z, and numbers 0-9 to these pins while making RS=1.

1	Clear display screen
2	Return home
4	Decrement cursor
6	Increment cursor
5	Shift display right
7	Shift display left
8	Display off, cursor off
A	Display off, cursor on
C	Display on, cursor off
E	Display on, cursor blinking
F	Display on, cursor blinking
10	Shift cursor position to left
14	Shift cursor position to right
18	Shift the entire display to the left
1C	Shift the entire display to the right
80	Force cursor to beginning of the 1st line
C0	Force cursor to beginning of the 2nd line

38	2 lines and 2*7 matrix
----	------------------------

TABLE 2.5.3 LCD Command Codes

3.5.7 BATTERY

A battery chips away at the oxidation and decrease response of an electrolyte with metals. At the point when two disparate metallic substances, called anode, are put in a weakened electrolyte, oxidation and decrease response occur in the terminals individually relying on the electron proclivity of the metal of the cathodes. Because of the oxidation response, one terminal gets contrarily charged called cathode and because of the decrease response, another cathode gets decidedly charged called anode. The cathode frames the negative terminal though anode shapes the positive terminal of a battery. To comprehend the fundamental rule of battery appropriately, first, we ought to have some essential idea of electrolytes and electrons proclivity. In reality, when two disparate metals are drenched in an electrolyte, there will be a potential contrast delivered between these metals. It is discovered that, when some particular mixtures are added to water, they get disintegrated and produce negative and positive particles. This kind of compound is called an electrolyte. The famous instances of electrolytes are practically a wide range of salts, acids, and bases and so forth The energy delivered during tolerating an electron by a nonpartisan particle is known as electron proclivity. As the nuclear design for various materials are unique, the electron proclivity of various materials will vary.

In the event that two various types of metals are inundated in a similar electrolyte arrangement, one of them will acquire electrons and the other will deliver electrons. Which metal (or metallic compound) will acquire electrons and which will lose electrons, rely on the electron fondness of these metals. The metal with low electron proclivity will acquire electrons from the negative particles of the electrolyte arrangement. Then again, the metal with high electron proclivity will deliver electrons and these electrons come out into the electrolyte arrangement and are added to the positive particles of the arrangement. Thusly, one of these metals acquires electrons and another loses electrons. Thus, there will be a distinction in electron fixation between these two metals.

This distinction in electron focus causes an electrical potential contrast created between the metals. This electrical likely distinction or emf can be used as a wellspring of voltage in any gadgets or electrical circuit. This is a general and fundamental rule of battery and this is the way a battery works.

and this cell is prominently known as the straightforward voltaic All batteries cells depend just on this fundamental rule. We should talk about individually. As we said before, Alessandro Volta built up the principal battery cell, cell. This sort of basic cell can be made without any problem. Take one compartment and fill it with weakened sulfuric corrosive as the electrolyte. Presently we inundate one zinc and one copper pole in the arrangement and we associate them remotely by an electric burden. Presently your straightforward voltaic cell is finished. Current will begin coursing through the outside load.

Battery-powered batteries = reversible responses

Different engineered substances are used in battery-controlled batteries and they split isolated through inside and out different reactions. The huge qualification is that the substance reactions in a battery-fueled battery are reversible. Right when the battery is delivering the reactions go one way and the battery gives out power; when the battery is charging, the reactions go the alternate way and the battery acclimatizes power. These substance reactions can happen numerous events in the two different ways, so a battery-fueled battery will routinely give you anything from a couple to as much as 10 years of important life .

3.5.8 Lithium-ion batteries

Like some other battery, a battery-powered lithium-particle battery is made of at least one force creating compartments called cells. Every phone has basically three segments: a positive anode (associated with the battery's positive or + terminal), a negative cathode (associated with the negative or – terminal), and a compound called an electrolyte in the middle of them. The positive terminal is regularly produced using a synthetic compound called lithium-cobalt oxide (LiCoO_2) or, in fresher batteries, from lithium iron phosphate (LiFePO_4). The negative cathode is for the most part produced using carbon (graphite) and the electrolyte changes starting with one sort of battery then onto the next—yet isn't too significant in understanding the essential thought of how the battery functions.

The development of particles (through the electrolyte) and electrons (around the outer circuit, the other way) are interconnected cycles, and if either stops so does the other. In the event that particles quit traveling through the electrolyte in light of the fact that the battery totally releases, electrons can't travel through the external circuit either—so you lose your force. Also, on the off chance that you switch off whatever the battery is fueling, the progression of electrons stops thus does the progression of particles. The battery basically quits releasing at a high rate

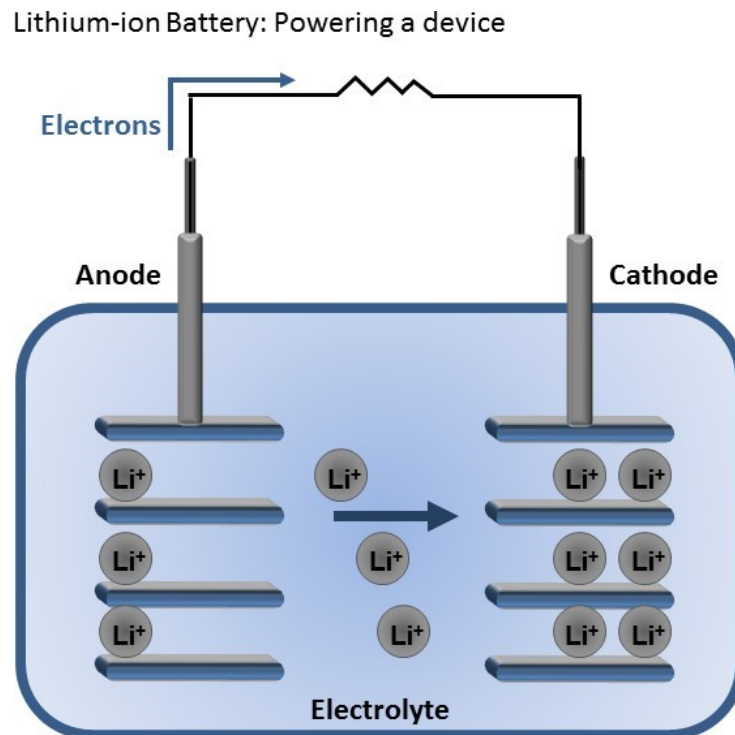


Fig 3.5.8 Working of Lithium-Ion Battery

3.6 INTERNET OF THINGS (IOT)

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

It is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to connect and exchange data. Each thing is uniquely

identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.

Internet of Things (IoT)

A connected world

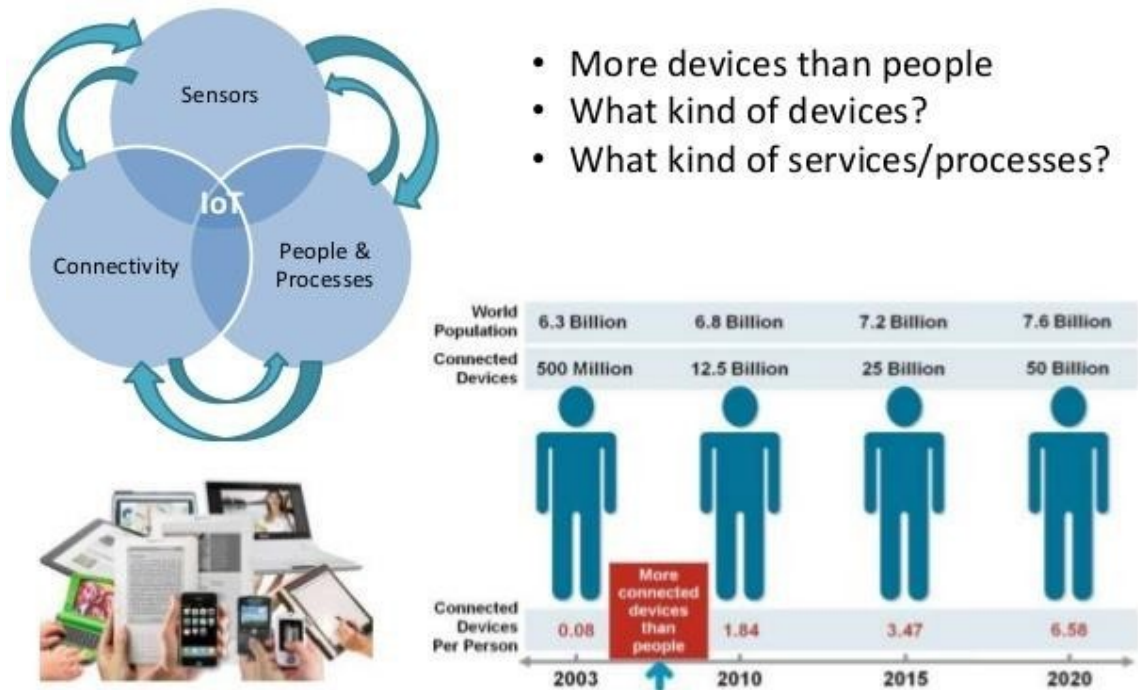


Fig 3.6.1 – IOT Structure

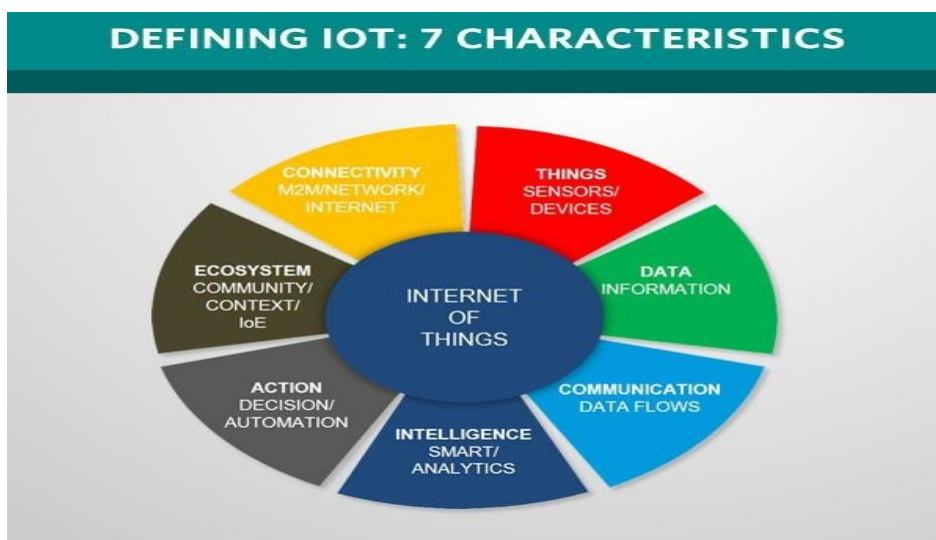


Fig 3.6.2 IOT Characteristics

Experts check that the IoT will contain around 30 billion articles by 2020. It is similarly evaluated that the overall market assessment of IoT will reach \$7.1 trillion by 2020.

The IoT grants objects to be recognized or controlled indirectly across existing association establishment, setting out open entryways for more clear blend of the genuine world into PC based systems, and achieving improved capability, precision and money related benefit despite lessened human intervention. Right when IoT is amplified with sensors and actuators, the development transforms into an instance of the more wide class of computerized genuine systems, which also encompasses headways like insightful organizations, virtual power plants, splendid homes, shrewd transportation and sharp metropolitan networks.

Legitimate scientists prescribe concerning "things" as an "indivisible mix of hardware, programming, data and service". These devices assemble significant data with the help of various existing advances and subsequently self-rulingly stream the data between various contraptions.

"Things", in the IoT sense, can imply a wide grouping of contraptions, for instance, heart checking embeds, biochip transponders on animals, cameras streaming live feeds of wild animals in shoreline waters, vehicles with worked in sensors, DNA assessment devices for environmental/food/microorganism noticing, or field movement devices that help fire fighters in search and rescue undertakings.

What is the Internet of Things? Key attributes

You can characterize the Internet of Things by taking a gander at the different qualities in the more extensive setting. We see these attributes returning most Internet of Things definitions out there (further underneath is an outline with a portion of these IoT definitions).

There are 7 crucial Internet of Things characteristics

Availability. This needn't bother with a lot further clarification. Gadgets, sensors, they should be associated: to a thing, to one another, actuators, a cycle and to 'the Internet' or another organization

Things. Anything that can be labeled or associated as, for example, it's intended to be associated. From sensors and home devices to labeled animals. Gadgets can contain sensors or detecting materials can be appended to gadgets and things.

Information. Information is the paste of the Internet of Things, the initial move towards activity and insight.

Correspondence. Gadgets get associated so they can impart information and this information can be dissected.

Insight. The part of insight as in the detecting abilities in IoT gadgets and the knowledge accumulated from information examination (likewise man-made consciousness).

Activity. The result of insight. This can be manual activity, activity dependent on discusses with respect to wonders (for example in environmental change choices) and robotization, frequently the main piece.

Environment. The spot of the Internet of Things from a point of view of different advances, networks, objectives and the image in which the Internet of Things fits. The Internet

3.7 TA12-100 AC Current Sensor

Description



Fig 3.7 Current Sensor

Assessing AC current with an Arduino can be fairly unsafe. The use of this Itead TA12-100 current transformer makes it possible.

The contraption uses a 1000:1 voltage current transformer. The yield of this transformer has a 200ohm resistor across its yield. The AC current is controlled by assessing the voltage drop across the resistor. It is particularly useful when measure current at line repeat.

3.7.1 TA12-100 Arduino Current Sensor Pin Outs

. This 5A AC current Sensor requires two relationship with your Arduino and it anticipates that you should run the wire that you wish to check current on through the enter of the current transformer.

Use the drawing underneath: The key here is find an AC Load that won't constrain more than 5 amps. For your first test you ought to find something that will draw pretty much an amp (or 1000 mA).

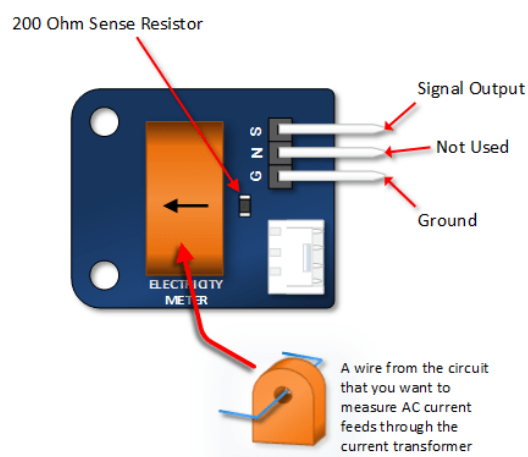


Fig 3.7.1 Current Sensor Pinout

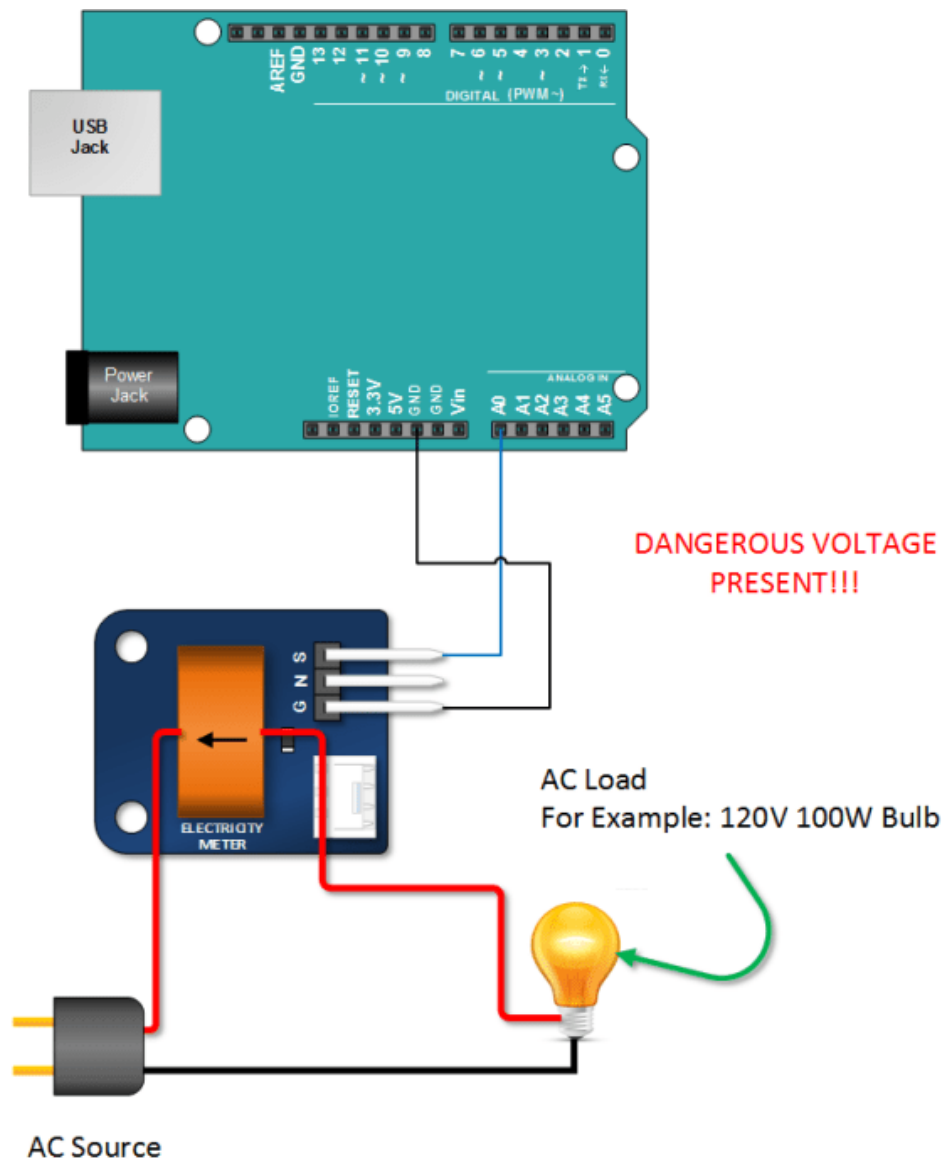


Fig 3.7.2 Current Sensor with Arduino

Different DC to DC Voltage Conversion Methods

DC addresses Direct Current, in which the current stream is unidirectional. The connection of DC change can be wear be DC Converters. The charge carriers in DC supply travels a single way. A DC power supply is used in most of the mechanical assemblies where a predictable voltage is required. Sun fueled cells, batteries and thermocouples are the wellsprings of DC supply. A DC voltage can make a particular proportion of reliable force, which becomes slight when it journeys further more. An AC voltage from the generator can change their fortitude when they travel through a

transformer. An AC power supply is an Alternating Current, where the voltage changes rapidly with time. In AC supply the charge carriers adjust their course irregularly. AC supply is used as utility current for family needs. This utility AC current is changed over to DC by using an equipment which involves a transformer, rectifier and a channel. Moreover, a DC voltage is wandered up or wandered down to needed voltage using such equipment.

3.8 DC-DC Conversion

A DC to DC converter takes the voltage from a DC source and transforms the voltage of supply into another DC voltage level. They are used to augment or decreasing the voltage level. This is normally used vehicles, conservative chargers and flexible DVD players. A couple of devices need a particular proportion of voltage to run the device. A great deal of power can obliterate the contraption or less power will in all likelihood be not able to run the device. The converter takes the power from the battery and cleaves down the voltage level, correspondingly a converter adventure up the voltage level. For example, it might be critical to wander down the power of a gigantic battery of 24V to 12V to run a radio.

The converter takes the power from the battery and slashes down the voltage level, additionally a converter adventure up the voltage level. For example, it might be imperative to wander down the power of a colossal battery of 24V to 12V to run a radio

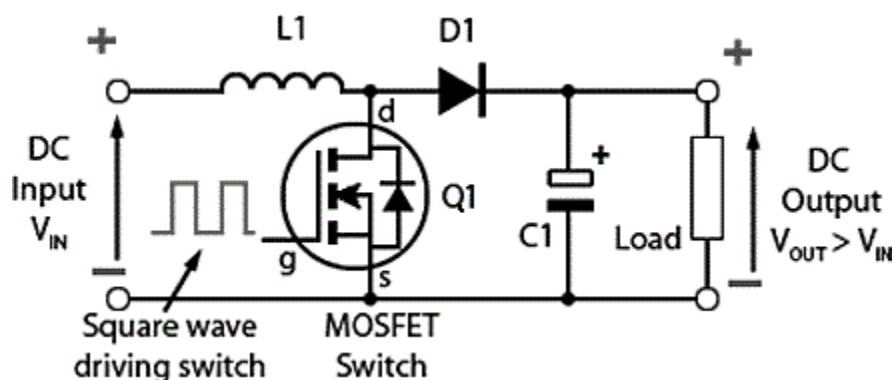


Fig 3.8.1 DC to DC Converter

The high profitability of a traded mode converter reduces the glow sinking required and constructs battery diligence of helpful equipment. Capability has extended as a result of the use of power FETs, which can switch even more profitably with lower trading setbacks at higher frequencies than impact bipolar semiconductors and use less amazing drive equipment.

DC to DC converters in electronic circuits uses trading development. Traded mode DC-DC converter changes over the DC voltage level by taking care of the data energy momentarily and thereafter conveys that energy at different voltage yield. The limit is done either in alluring field parts like an inductor, transformers or electric field sections like capacitors. This change technique can augmentation or decay the voltage level. Trading change is more power gainful than direct voltage rule, which scatters unwanted power as warmth.

Another improvement in DC-DC converters is done by superseding the flywheel diode with facilitated rectification using a power FET, whose 'on obstacle' is a great deal of lower, which diminishes trading adversities. The capability of the converter has extended in view of the use of power FETs, which can switch even more adequately with lower trading incidents at higher frequencies than impact bipolar semiconductors and use less intricate drive equipment.

Most DC-DC converters are proposed to move unidirectionally, from commitment to yield. However, the trading regulator geologies can be planned to move bidirectionally by replacing all diodes with independently controlled powerful revision. For example, in regenerative easing back down of vehicles, where power is given to the wheels while driving, anyway furnished with the wheels while easing back down. Accordingly, a bi-directional change is important.

Another improvement in DC-DC converters is done by superseding the flywheel diode with facilitated revision using a power FET, whose 'on resistance' is a great deal of lower, which diminishes trading incidents.

Step-Down (Buck) Converter

A phase down circuit is used to make a lower voltage than the information. It is moreover called a buck. The polarities are identical to in the data.

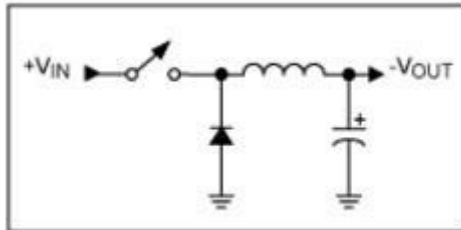


Fig.3.8.2 Buck Converter

Step-Up (Boost) Converter

A phase up circuit is used to make a higher voltage than the data voltage. It is called as a lift. The polarities are same as in the data.

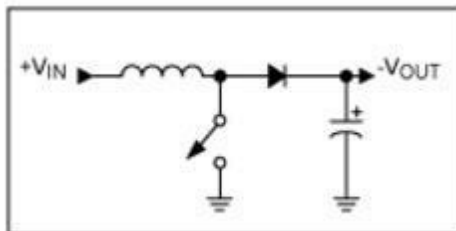


Fig.3.8.3 Boost Converter

Buck-Boost Converter

In Buck-Boost Converter, the yield voltage can be extended or lessened than the data voltage. It endeavors to either boosting or kicking the voltage. The typical utilization of this converter is to reverse the limit.

Cuk: such a converter resembles the Buck-Boost converter. What is important is its name, named after Slobodan Cuk, the person who made it.

Benefits of DC Converter

- Battery space can be diminished by lessening or expanding the accessible voltage.
- A gadget can be driven by kicking or boosting the accessible voltage. Subsequently forestalling the harm of the gadget or breakdown.

Bidirectional DC – DC Converters

Electronic equipment in business areas can-not work without a consistent power supply structure. With the headway of advancement, the amount of kinds of electronic things is reliably growing. The bidirectional DC/DC converter comes from the common unidirectional DC/DC converter and can achieve energy stream two way. The trustworthiness of the power supply structure is imperative to guaranteeing extraordinary working conditions in electronic creation. Also, the introduction of the power supply directly impacts the prosperity and sufficiency of electronic equipment. As of now, different jobs of harmless to the ecosystem power sources, similar to breeze and sun situated energy, have gotten broad thought with respect to a smaller than normal organization system. A little organization system develops rapidly and is a free and controllable power supply structure that includes an energy amassing system, scaled down power supply, energy change contraption, and weight. Specifically, the DC small grid structure works with-out issues in repeat security, responsive power rule, and AC incident and can connect with new energy, electric vehicles, and other stuff. A DC small scale organization can be used for worker ranches, neighborhoods, and other public spots. In the DC smaller than expected lattice system, the energy storing structure is critical, and the bidirectional DC/DC converter is its control community.

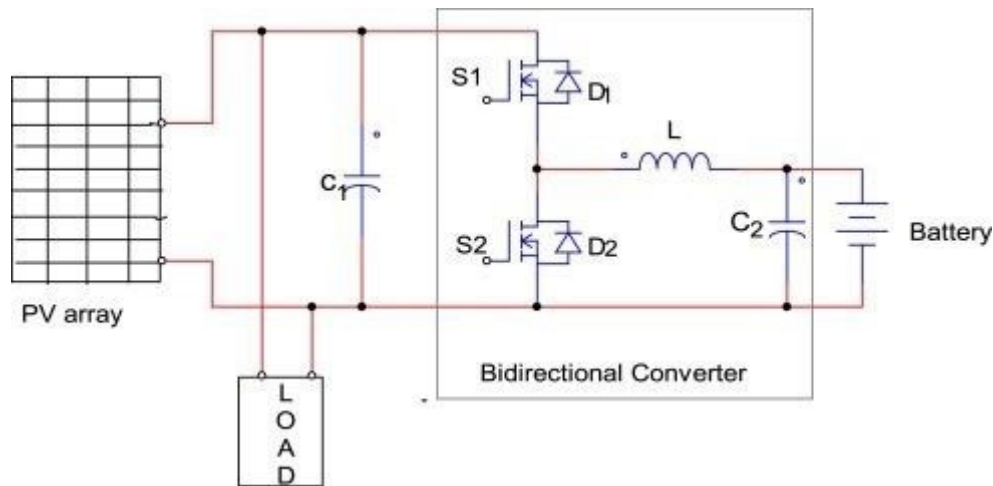


Fig.3.8.4 Bidirectional DC converter

A reasonable arrangement of a DC smaller than normal lattice structure can improve the action of little power supply. In the examination of smaller than normal organization voltage unfaltering quality, the key perspectives are the gear circuit and the controlling procedure in the bidirectional DC/DC converter, which is related to the movement of the energy storing unit. The converters control the energy stream course of the bidirectional DC/DC converter similarly as the energy storing unit to keep up the consistent quality of the DC small scale network voltage, which can satisfy the cross-section movement conditions.

3.9 Pulse Width Modulation (PWM) Basics

There are numerous types of balance utilized for imparting data. At the point when a high recurrence signal has an abundancy changed in light of a lower frequency signal, we have AM (sufficiency balance). At the point when the sign recurrence is shifted in light of the adjusting signal, we have FM (recurrence tweak. These signs are utilized for radio balance on the grounds that the high frequency transporter signal is necessities for effective radiation of the sign. At the point when correspondence by beats was presented, the plentifulness, recurrence and heartbeat width become conceivable tweak alternatives. In many force electronic converters where the yield voltage can be one of two qualities the solitary alternative is balance of normal conduction time.

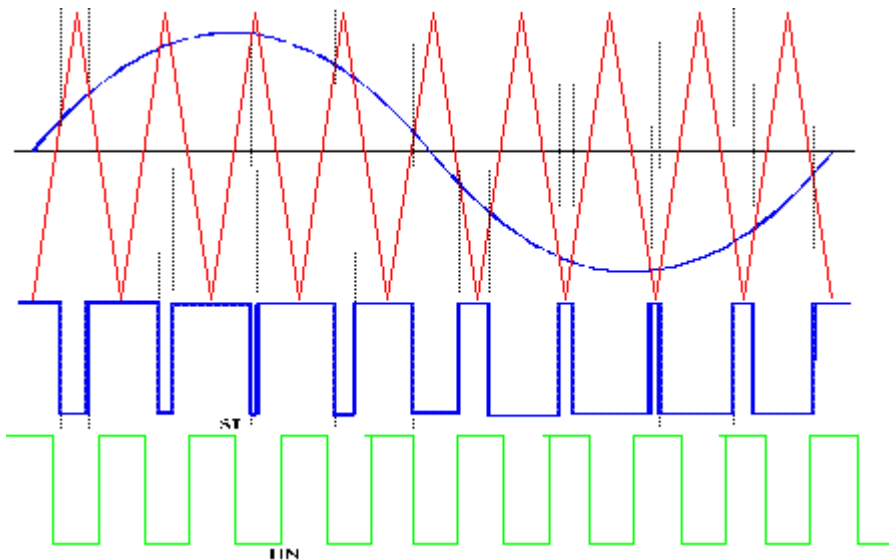


Fig.3.9.1 Unmodulated, sine modulated pulses

Linear Modulation

The easiest regulation to decipher is the place where the normal on schedule of the beats fluctuates relatively with the tweaking signal. The benefit of straight preparing for this application lies in the simplicity of de-tweak. The adjusting sign can be recuperated from the PWM by low pass separating. For a solitary low recurrence sine wave as regulating signal adjusting the width of a fixed recurrence (f_s) beat train the spectra are as demonstrated in Fig 2. Obviously, a low pass channel can extricate the tweaking part f_m .

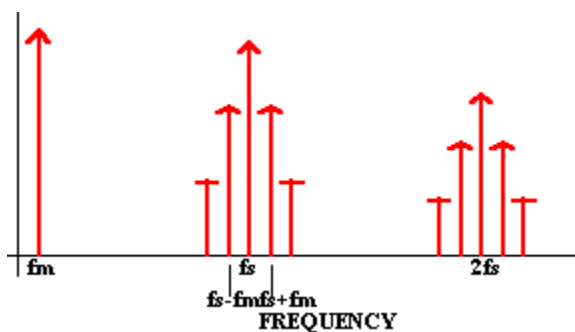


Fig.3.9.2 Spectra of PWM

Sawtooth PWM

The least difficult simple type of creating fixed recurrence PWM is by examination with a direct slant waveform like a sawtooth. As found in Fig 2 the yield signal goes high when the sine wave is higher than the sawtooth. This is executed utilizing a comparator

whose yield voltage goes to a rationale HIGH when ne input is more prominent than the other.

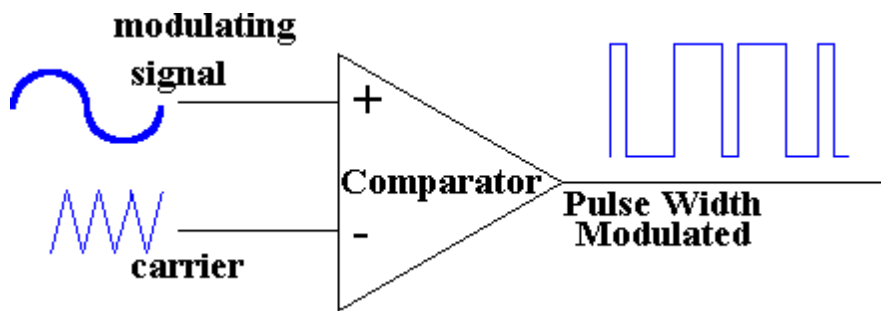


Fig. 3.9.3 Sine Sawtooth PWM

Different signs with straight edges can be utilized for tweak a rising slope transporter will produce PWM with Trailing Edge Modulation.

Regular Sampled PWM

The plan represented above creates an exchanging edge at the moment of intersection of the sine wave and the triangle. This is a simple plan to execute utilizing simple gadgets however endures the imprecision and floats of all simple calculation just as experiencing issues of producing different edges when the sign has even a little added clamor. Numerous modulators are currently executed carefully however there is trouble is processing the exact block of the balancing wave and the transporter. Normal tested PWM makes the width of the beat corresponding to the estimation of the balancing signal toward the start of the transporter time frame. In Fig 5 the block of the example esteems with the triangle decide the edges of the Pulses. For a sawtooth wave of recurrence f_s , the examples are at $2f_s$.

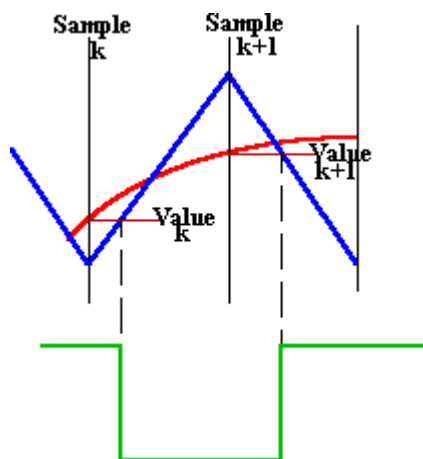


Fig.3.9.4 Regular Sampled PWM

There are numerous approaches to create a Pulse Width Modulated sign other than fixed recurrence sine saw tooth. For three stage frameworks the regulation of a Voltage Source Inverter can produce a PWM signal for each stage leg by examination of the ideal yield voltage waveform for each stage with a similar saw tooth. One elective which is simpler to execute in a PC and gives a bigger modulation depth is utilizing space vector modulation.

Modulation Depth

For a solitary stage inverter balanced by a sine-saw tooth examination, on the off chance that we look at a sine wave of extent from - 2 to +2 with a triangle from - 1 to +1 the straight connection between the info signal and the normal yield sign will be lost. When the sine wave arrives at the pinnacle of the triangle the beats will be of most extreme width and the regulation will at that point immerse. The Modulation profundity is the proportion of the current sign to the situation when immersion is simply beginning. Subsequently sine wave of pinnacle 1.2 contrasted and a triangle with top 2.0 will have an adjustment profundity of $m=0.6$.

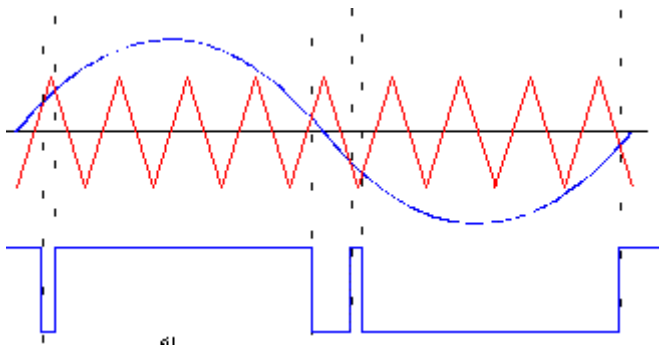


Fig.3.9.5 Saturated Pulse Width Modulation

3.10 MOSFET Working

Introduction:

The MOSFET semiconductor is a semiconductor device which is for the most part used for trading and upgrading electronic signs in the electronic devices. The MOSFET is a four-terminal contraption with source(S), entryway (G), channel (D) and body (B) terminals. The MOSFET is a focal point of consolidated circuit and it will in general be arranged and made in a single chip taking into account these little sizes. The body of the

MOSFET is occasionally connected with the source terminal so making it a three-terminal contraption like field effect semiconductor. The MOSFET is far the most notable semiconductor and can be used in both basic and modernized circuits.

The MOSFET works by electronically contrasting the width of a channel along which charge carriers stream (electrons or openings). The charge carriers enter the channel at source and exit through the channel. The width of the channel is obliged by the voltage on a cathode is called entryway which is arranged among source and channel. It is shielded from the channel near an extremely pitiful layer of metal oxide. As far as possible present in the device is the essential part

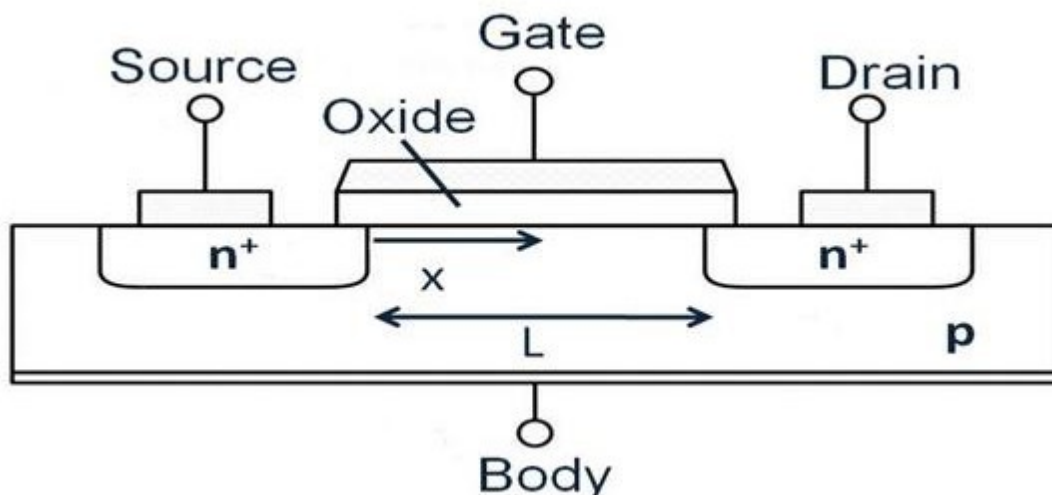


FIG 3.10 MOSFET

The MOSFET can work

Consumption Mode

Improvement Mode

Depletion Mode:

When there is no voltage on the doorway, the channel shows its most prominent conductance. As the voltage on the doorway is either sure or negative, the channel conductivity decreases.

For Example, Using the MOSFET as a Switch:

In this circuit methodology a redesigned mode and N-channel MOSFET is being utilized to turn a model light ON and OFF. The positive entrance voltage is applied to the base of the semiconductor and the light is ON ($V_{GS} = +v$) or at zero voltage level the gadget butchers ($V_{GS} = 0$). o

In case the resistive store of the light was to be superseded by an inductive weight and connected with the exchange or diode which is guarantee to the pile. In the above circuit, it is a direct circuit for trading a resistive weight like light or LED. Be that as it may, while using MOSFET to switch either inductive weight or capacitive weight affirmation is expected to contain the MOSFET device. We are not giving the security the MOSFET device is hurt. For the MOSFET to function as a straightforward trading device, it ought to be traded between its cutoff area where $V_{GS} = 0$ and submersion district where $V_{GS} = +v$.

CHAPTER 4

NECESSITY OF MAXIMUM POWER POINT TRACKING

Most extreme force point related with a particular voltage and current that are provided for a framework can be proficiently followed utilizing MPPT. The kinds proficiency of a module is low around 12%. So, it is important to work it at the peak power point so the most extreme force can be given to the heap regardless of ceaselessly changing natural conditions. This expanded force improves it for the utilization of the sun-oriented PV module. A DC-DC converter which is set close to the PV module extricates greatest force by coordinating with the impedance of the circuit to the impedance of the PV module and moves it to the heap. Impedance coordinating should be possible by shifting the obligation pattern of the exchanging components.

4.2 MPPT ALGORITHM

They are as follows:

- a. Perturb and Observe (P&O) algorithm
- b. Incremental Conductance algorithm
- c. Parasitic capacitance algorithm
- d. Voltage based peak power tracking
- e. Current Based peak power tracking

MPPT's are most effective under these conditions

Winter, and also cloudy or shady days - when the extra power is required the most.

- Low battery charge - the lower the state of charge in your battery, the more current a MPPT places into them - later when the extra power is required the most.
- Long wire runs - If you are charging a 12-volt battery, and your sheets are 100 feet away, the voltage drop and power adversity can be broad with the exception of in the event that you use uncommonly huge wire. That can be expensive. In any case, if you have four 12-volt sheets wired in game plan for 48 volts, the power hardship is

fundamentally less, and the controller will change that high voltage over to 12 volts at the battery. That similarly suggests that if you have a high voltage board plan dealing with the controller, you can use much more humble wire.

- Cold environment - sun situated sheets work better at cold temperatures, anyway without a MPPT you are losing most of that. Nippy environment is probably in winter - when sun hours are low and you need the capacity to re-stimulate batteries the most.

How a Maximum Power Point Tracker Works

The Power Point Tracker is a high-repeat DC to DC converter. They take the DC commitment from the sun-based sheets, change it to high-repeat AC, and convert it back down to another DC voltage and current to definitely organize with the sheets to the batteries. MPPT's work at high stable frequencies, ordinarily in the 20-80 kHz range. The potential gain of high-repeat circuits is that they can be arranged with high-viability transformers and little parts. The arrangement of high-repeat circuits can be incredibly unstable considering the issues with parts of the circuit "broadcasting" really like a radio transmitter causing radio and TV impedance. Upheaval withdrawal and covering ends up being essential.

- There several non-progressed (that is, straight) MPPT's charge controls around. These are much less complex and more affordable to develop and design than the automated ones. They do improve efficiency somewhat, yet overall, the capability can change an incredible arrangement - and we have seen a couple lose their "following point" and truly disintegrate. That can happen rarely if a cloud ignored the board - the straight circuit searches for the accompanying best point anyway then gets exorbitantly out of sight the significant completion to find it again when the sun comes out. Luckily, not many of these around anymore. the exception of some guideline of the yield voltage

4.3 Wireless Power Transfer (WPT)

The fundamentals of remote force transmission contain the inductive energy that can be sent from a transmitter curl to a beneficiary loop through a swaying attractive field. The DC current conveyed by a force source is changed into high recurrence AC current by essentially arranged hardware incorporated into the transmitter.

Precisely the name WPT states that, the electrical force can be migrated from a source to a gadget without utilizing wires. On a very basic level, it contains two curls they are a transmitter loop and a recipient loop. Where the transmitter curl is fuelled by AC current to make attractive field, which thus invigorates voltage in the collector loop. Distant power transmission generally uses three essential systems like microwaves, daylight-based cells and resonation. Microwaves are used in an electrical contraption to spread the electromagnetic radiation from a source to a gatherer.

In the TX area, the AC current ascends a copper wire, that creates an attractive field. When a RX curl is put close to the attractive field, at that point the attractive field can make an AC current in the accepting loop. Electrons in the getting gadget, adjusts the AC current back into DC current that becomes working force

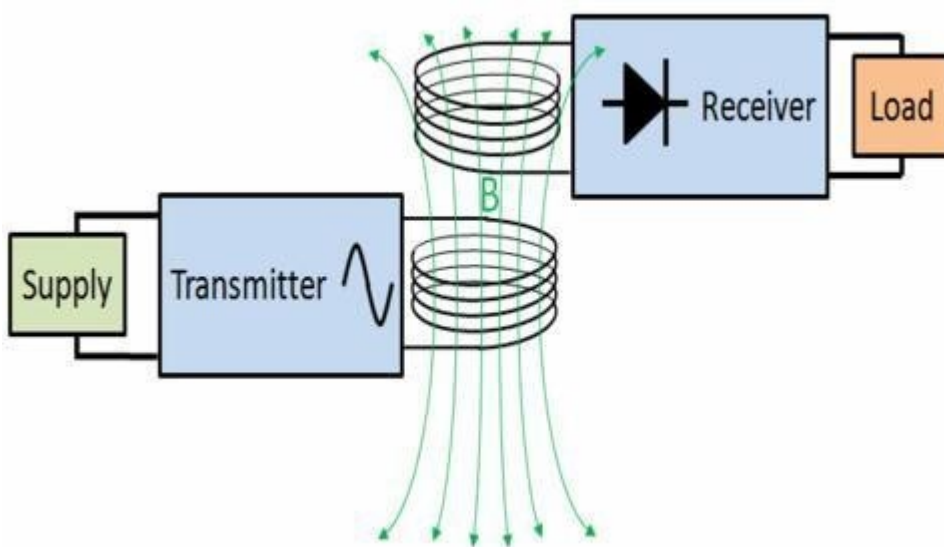


Fig 4.3 Wireless Power Transmission

Application of Wireless Power Transfer

The framework in 3D space (move power inside a little reach) and the square graph of this venture is appeared underneath. The square chart of the principle motivation behind this task is to design a WPT remote force move essentially shapes with HF transformer, capacitors, diode, rectifier, inductor curl busy with air and light.

The individual is necessary to be worked each year to change the battery. This venture is wanted to charge a battery-powered battery remotely. Since charging of the battery is beyond the realm of imagination to expect to be affirmed, we are giving a DC fan that goes through remote force.

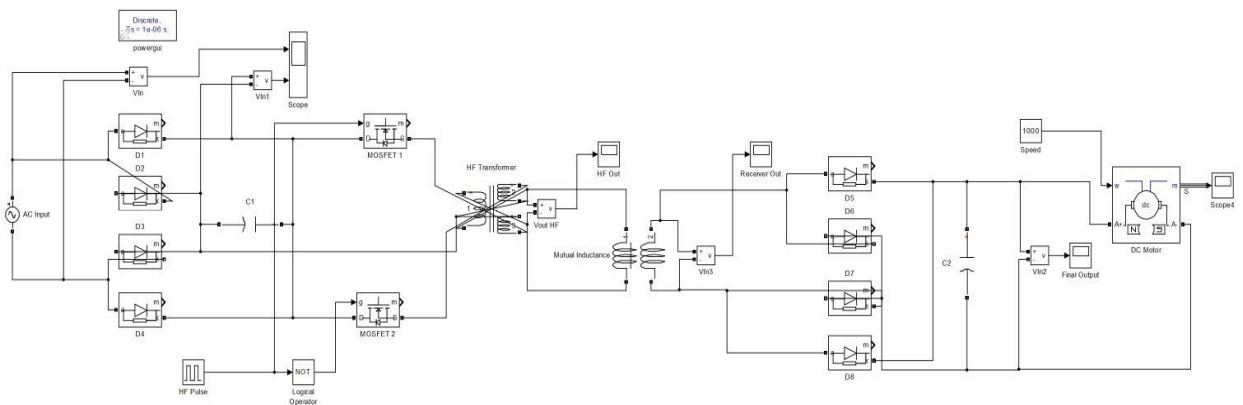
Consequently, the force move can be intensive with the essential to the auxiliary that is isolated by an impressive distance (say 3cm). Along these lines the force move could be viewed as the TX sends and the RX gets the capacity to way a heap.

Additionally, WPT method can likewise be utilized to charge the like cell phone, PC battery, and so forth and furthermore such a charging idea a far lower danger of electrical stun. Moreover, this undertaking can be improved by developing the distance of force move as the examination across the world is as yet going on

CHAPTER 5

SIMULATION SECTION

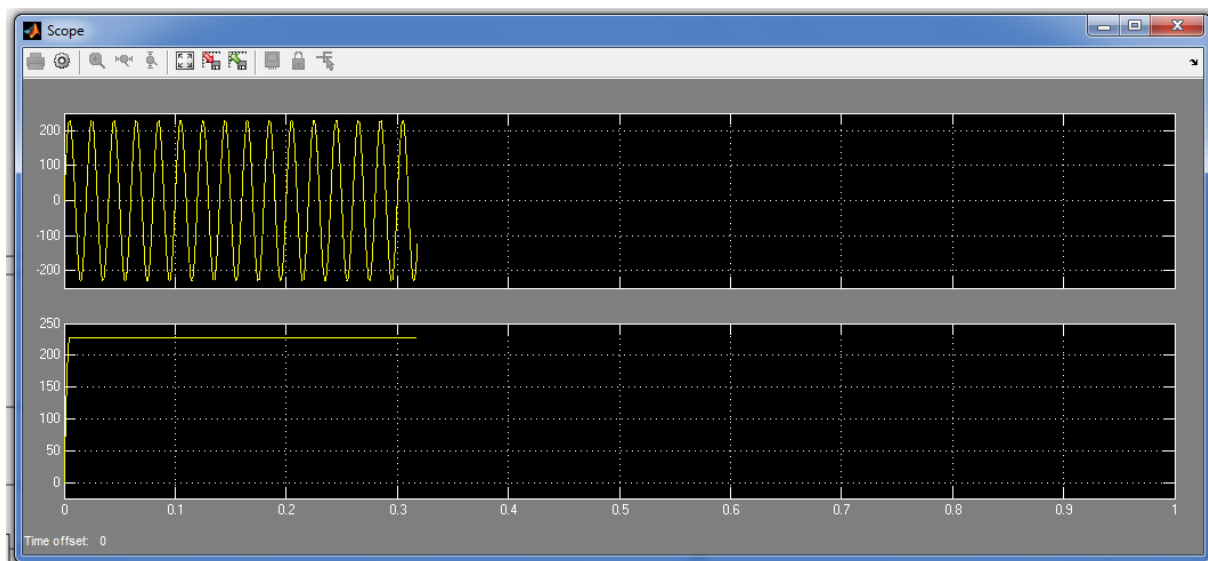
5.1 SIMULATION BLOCK DIAGRAM:



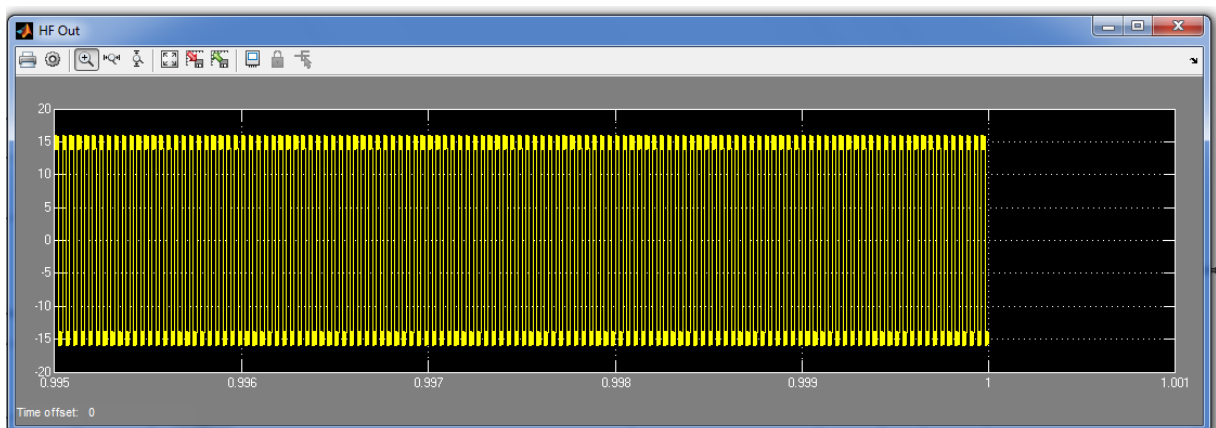
In this picture , the AC input 230v is send to the bridge rectifier . Bridge rectifier used to convert the AC to DC converter ,we can see the output in scope . Next ,It will go the capacitor . Capacitor used to the filter purpose .In modern electric vehicle , mostly used in MOSFET . MOSFET is used to for the DC to AC inverter . High frequency transformer used to store the power . Highfrequency output shown in HF output . We

have to follow inductance coupling method in this project . Secondary coil receive the voltage , it will be shown in receiver output . Then , we have to use bridge rectifier . bridge rectifier used to convert the AC to DC converter . And capacitor used to filter purpose . Finally , we can use see output in final output .

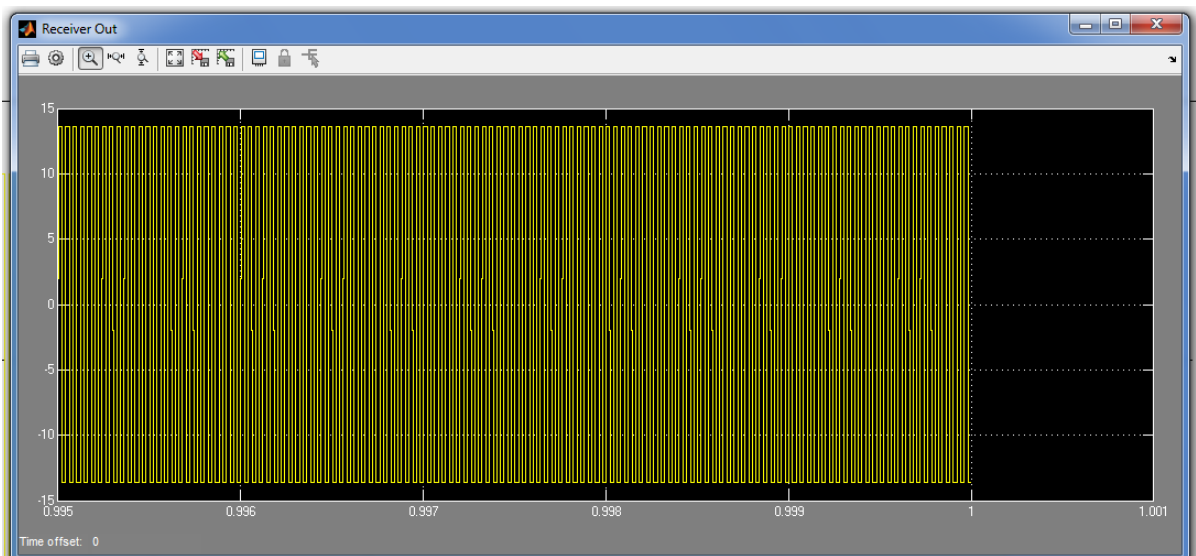
5.1.1 Scope Output:



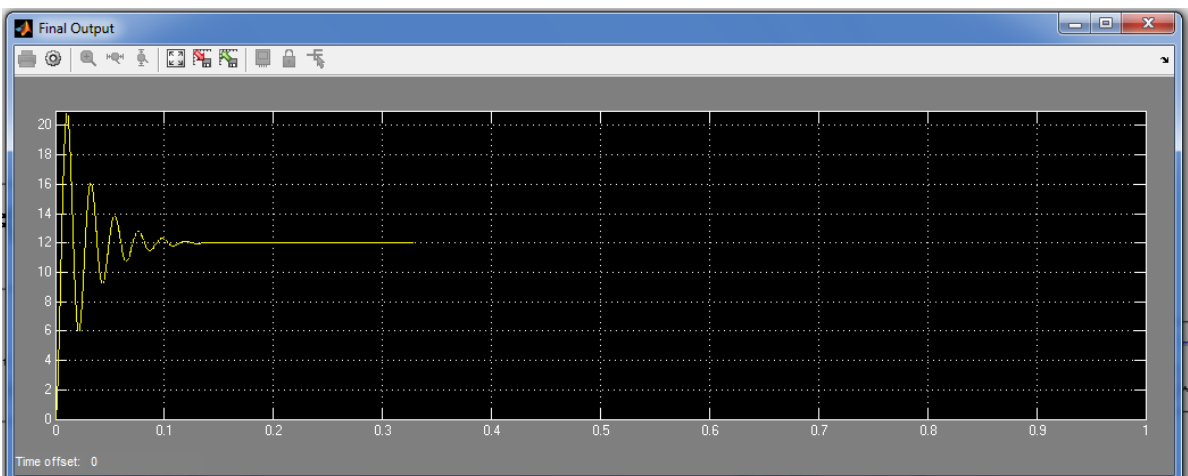
5.1.2 HF Transformer Output:



5.1.3 Receiver Output:

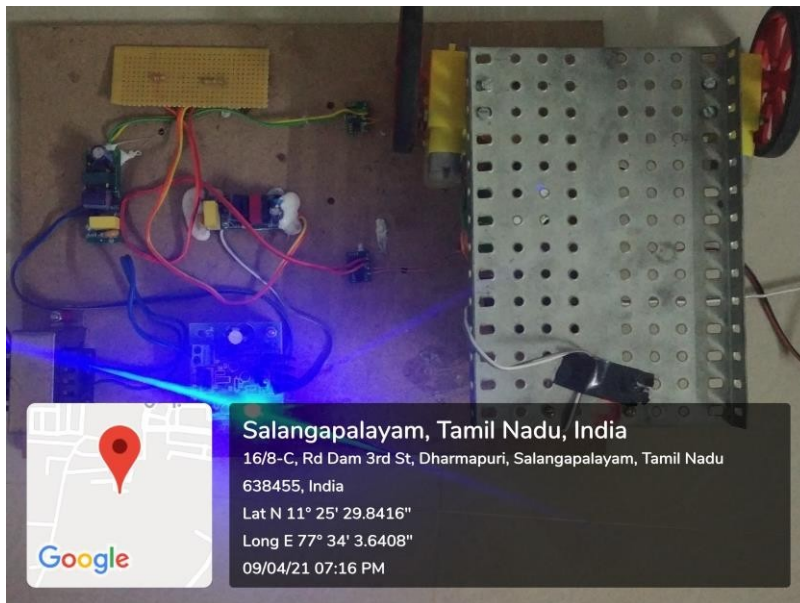


5.1.4 Final Output:



5.2 HARDWARE OUTPUT

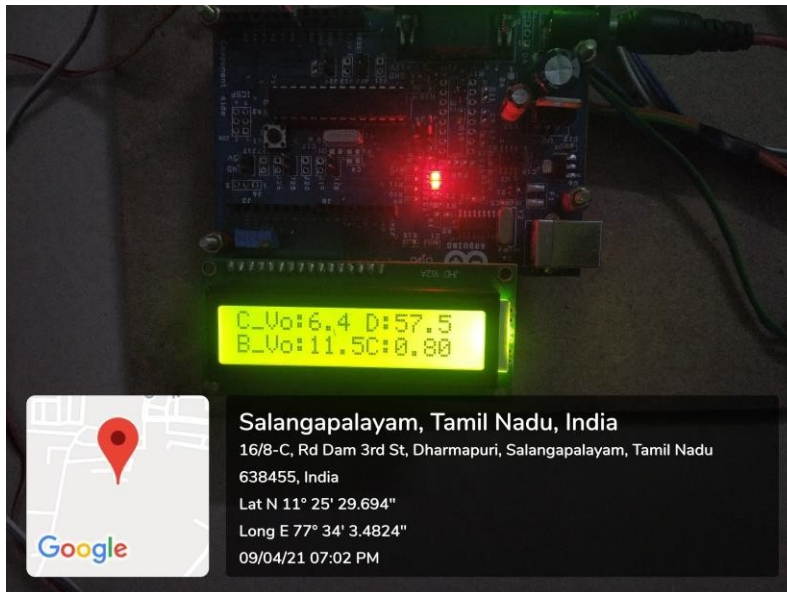
TRANSMITTER:



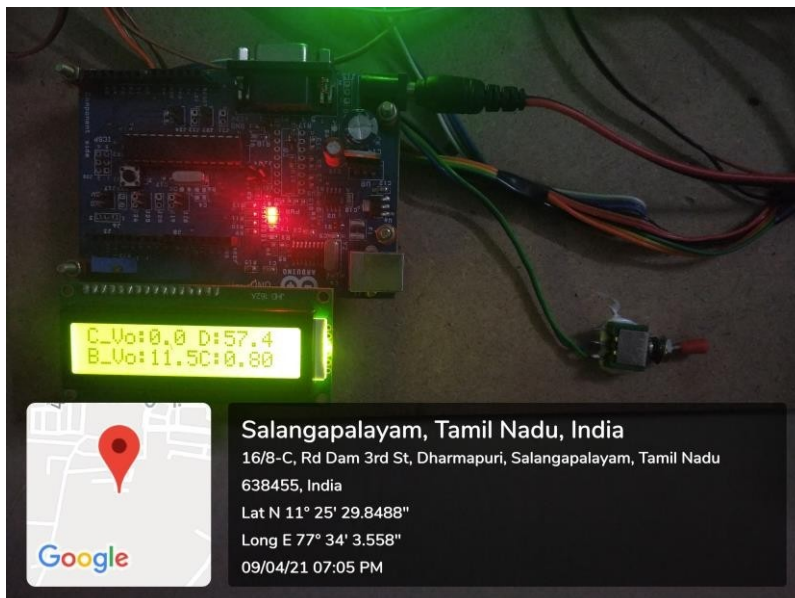
RECEIVER:



EV CHARGING WHILE DRIVING:



WHILE DRIVING WITHOUT CHARGING:



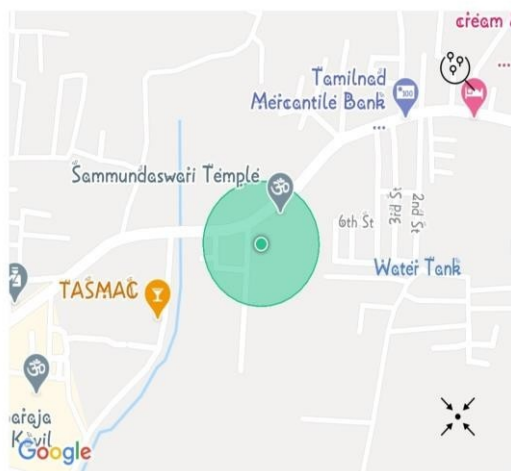
In the transformer (grid) send the 12v voltage to AC to DC converter and filter. It used to convert the alternating current to direct current. the output AC to DC voltage move to the DC to AC inverter. We have to use two inverters, because we have to use two coils. the output of the DC to AC inverter send to the high frequency transformer. In

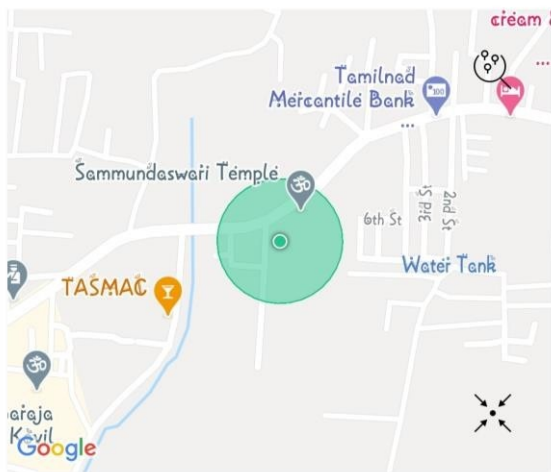
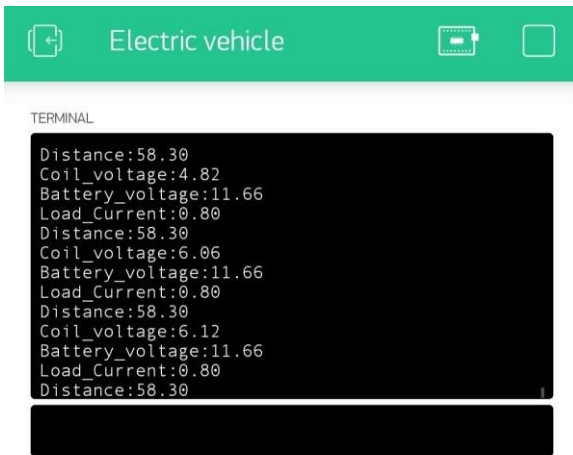
the high frequency transformer used to storage the power. In the DC to AC inverter, we have to receive the 12v. It maybe damage the coil, so we can apply the voltage divider rule, it is used to ground existing voltage. It will be sent to pulse generator. Pulse generator used to make the constant voltage. constant voltage sends to the primary coil.

When the primary coil and secondary coil meeting each other means, secondary coil receive the (1-6) v. Next, voltage will go the HF rectification filter, it used to convert AC to DC. the output of HF rectification filter goes to the DC boost converter in DC boost converter, we have to step up the voltage. We have to use two relays. Relay used for when the battery charge is full means, it will be cut off. And another relay used for motor on/off process. We have to use voltage sensor. One is used to measure coil voltage and another one is used to measure the coil voltage. Current sensor used to measure the load current. Finally, we can see the output in LCD module.

BLYNK APP PHOTOS:

Wifi module used to share the location of vehicle.





CHAPTER 6

6.1 CONCLUSION

In this venture, we executed remote energy move frameworks dependent on thunderous inductive coupling with application to the charging of electric vehicles. In this work we additionally assessed the impacts of metal plates, ferrites and ground contiguous the energy move framework. The principle result is offered along with what ought to be focused on in future investigations. A remote energy moves framework dependent on two inductively coupled resounding circuits partitioned by an air hole. It is showed that the coupled remote energy move framework has two reverberation tops and that the partition of these pinnacles increment with expanding coupling coefficient. To stay away from the self-reverberation of the curls, the length of the loop wire with the end goal that the self-reverberation recurrence shows up at a lot higher frequencies than the recurrence of operations restricted. Metal plates over the optional curl can effectively shield the encompassing from attractive fields. Ferrites, a material with low swirl flows and high porousness, is set on both the primary(transmitter) and auxiliary side(receiver) and it proficiently drop the negative impacts of the protecting plates and improve the coupling coefficient. In any case, the attractive fields prompt vortex flows in the metal plates, which diminish the coupling coefficient and increment the resistive misfortunes.. In light of the exploratory outcome, the investigation on remote force move utilizing inductive coupling has a lot of viewpoint in wording distance of essential and auxiliary curl, number of turns, region of the loop. Composing review on various far off power transmission system and control of power converter circuit gave a wide idea on WPT structures. Real plan and arranging of the twist are refined in this assignment. A little model appearing with power getting moved from fundamental for discretionary is cultivated. A comparable thought could be gotten with scaling features in electric vehicles.

6.2 FUTURE SCOPE

There are not many improvements that can be made to the framework to expand its general exhibition. Our framework can work with lower power. accordingly, one of things to come upgrades could be an execution of same framework for high force.

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