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Hybrid Charging Station for Authentic Electric Vehicle

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Abstract: *Electric vehicles powered by batteries are becoming increasingly popular around the world. Several causes are driving this trend, including the need to reduce air and noise pollution and reliance on fossil fuels. To have a better understanding of how batteries behave in various situations. It is vital to be aware of certain battery performance factors in certain circumstances. A battery management system includes a battery fuel gauge, an optimal charging algorithm, and circuitry for cell and thermal balance. It estimates essential states and parameters of the battery system, such as battery impedance, battery capacity, state of charge, state of health, power decline, and remaining useful life, using three non-invasive measures from the battery: voltage, current, and temperature. This paper reviews several papers published regarding EV charging types, methods, BMS, state of charge.*

Keywords: Electric vehicles

I. INTRODUCTION

Electric vehicles (EVs) are being considered as a viable solution for ecological and economic concerns such as global warming, glasshouse gas emissions, and fossil fuel resources reduction. In such vehicles, wireless charging has become an emerging challenge. Currently, the widely used method to charge EVs is plug-in charging of Evs but it has serious disadvantages such as proper maintenance, getting shocked while connecting the charger etc. The alternative method that can be utilized to convey energy to the electric vehicle is by using wireless charging. With numerous advantages, electric vehicle technology has experienced various difficulties like battery charging, expanding electric charges, and accessibility of charging stations, and battery life assessment. The smart charging system for EVs is proposed in this project. Vehicle detection at the charging station is detected employing a sensor. The charging system after sensing the vehicle battery voltage is described in the later section. The proposed system provides a highly efficient, cheaper, and environment-friendly solution for charging EVs.

Need of Project

- For the efficient and faster charging of electric vehicle.
- As the system is totally automatic so there is no need to connect charger every time.
- To reduce the losses of energy.
- To avoid the human interference

Objectives:

Aim of our project is to design an automatic electric vehicle charging station to reduce man power. The ultimate goal of the smart charging for electric vehicle using mobility van to other electric car is to provide the equivalent power, range, cost and safety of an electric vehicle. Electric station is operated to solar energy ,wind energy and AC supply.

Theme of Project

Sensor

It is equipment which is used to recognize the actual physical object. If gives output usually in digital form so that in can be easily processed by the machine. The sensor is usually chosen from the sensors which already exist.

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Pre-processing

It helps in the production of an efficient set of data by doing noise filtering, smoothing and normalization. It usually processes larger amount of data and reduces the various variations present in it. It helps in safe keeping of an image from various errors

Feature Extraction

It is basically used to collect the required information from the data input used by the sensor so that the classification can be done easily. It is usually done with the help of software which can be modified according to the sensor.

Classification

It is a technique which is used to do the classification of the object based upon its properties. It uses the various features which have been classified by the feature extraction and assign it to various classes according to its attributes. There are various categories of classification like nearest mean classification, classification using feed forward artificial neural network etc. which are being used according to the requirement

Organization of Project

Chapter 1:- The first chapter of this report contains introduction Also chapter 1 gives brief idea about why this project is necessary, what is the objective of project and theme of the project.
Chapter 2:- Chapter 2 gives the comparison of two similar system and literature review study.
Chapter 3:- Chapter 3 gives brief about System development and it contains block diagram, working of block diagram and circuit diagram showing connections and flowchart to indicate flow of software.
Chapter 4:- This chapter contains Overall analysis and result of project.
Chapter 5:- This chapter contains conclusions, future scope and applications. At the end the references and acknowledgement

II. LITERATURE SURVEY

2.1 Comparison of System

IOT Enabled smart charging stations for Electric Vehicle:

Batteries have become the popular form of electrical energy storage in EVs. The evolution in city transportation has boosted over the last few decades which in turn increased the growth of societies and industry. Since battery is a commonly used device for storage of energy, calculation of Status of Charge plays a vital role in the future. Nowadays, vehicles are essential in the day-to-day life and for industrial use as well. Sufficient effort is being done to withdraw the combustion engines by electric motors. Due to the increase in carbon dioxide (CO2) caused by the industries and transportation, the Kyoto treaty was signed. This treaty was aimed to reduce the level of CO2 and has boosted the findings for new cleaner energy solutions. As a finding, Electrical Vehicles (EVs) appeared as a solution to reduce CO2 emissions. Electric Vehicles are increasing day by day across the globe. When the number of Electric vehicles is increasing, there is a need to implement Electric Vehicles Charging system in parking systems or grid. Automobile major Nissan produced a vehicle-to-grid (V2G) project with Enel, a multinational power company, in the United Kingdom. Nissan has been exploring and doing researches based on V2G systems and this project is the first of its kind in the UK and one of the company"s biggest to date. The Vehicle-to-grid system function as twoway chargers and Electric Vehicle (EV) owners will have the facility to charge the vehicle or sell the excess energy (surplus) stored from their vehicle battery back to the Grid. They will earn a profit from the energy sold back to the grid, while making a markable role in grid stability. In this wide range of array of ideas, these EVs can definitely assure some gains to the energy management, eminently to supply major and important loads like manufacturing shops during power failures and any emergencies. EVs bring benefits to city services and provide indemnity for the viable energy sources intermittency. This new method is effective and more relevant owing to the fact that most of the electric vehicles are halted on an average of 91-95 percentage of their usage period, and most of the Electric vehicles are parked at home amid 9 pm and 6 am. When the EVs are plugged to the power grid, the power can discharge to or from the EV batteries (G2V and V2G). In the truancy of power grid or Electric disruption, the EV can operate as voltage parent to supply the

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necessary loads. This work describes the measurement and performance of EV battery in a smart grid. IoT makes smart grid to contribute the information between multiple users and thus amplifies connectivity by the help of infrastructures. Cloud storage is used for the data storage where the data is sent through Internet gateway. Fig1 shows the V2G architecture and Fig2 Shows the IoT architecture. This Paper is discussing about the involvement of IoT in V2G and G2V.

Optimal Dispatching of Electric Vehicles Based on Smart Contract and Internet of Things: Power grid energy is gradually diversifying as the Internet and new energy technology continues to develop. Distributed energy shares the power supply of the power grid and reduces environmental pollution, but because of its dependence on the environment, it increases the instability of power system. As the use of EVs increases, the large-scale charging of EVs will also have a significant impact on the stable operation and planning of the power system. This impact is particularly evident when a large number of users select fast charging modes. Such modes are different from diffusive and low-power residential charging, which is more suitable for long-distance and energy-consuming residential charging. Because of the need for specific charging facilities, vehicle charging mainly occurs at fixed commercial charging stations, which results in increased centralization and scale of the charging station load. The associate editor coordinating the review of this manuscript and approving it for publication was Jun Wu. Faced with the increasing number of charging piles, user privacy protection and transaction security of decentralized power transactions must also be urgently solved. Block-chain technology provides a new solution for distributed resource storage, data protection and historical traceability, which can ensure the storage security and traceability of all historical data. To reduce the deviation between predicted load and actual load, users sign intelligent contracts with charging stations. By using block-chain intelligent contract technology, contracts are saved on block-chain in the form of computer code and automatically triggered to execute, providing a simple and effective settlement process.

A Review on IoT based Electric Vehicle Charging and Parking System: Now-a-days Electrical vehicle is a trending topic and it is also an important part of this smart world. Drawback of electric vehicles is cruising range is typically limited. So, it requires frequent recharging. Not only for electric vehicle but Population is increasing exponentially and 1th1e problem is due to this is, increasing traffic volume. All we know that we have limited stock of the fuel on our earth so it is need of time that we must switch to another way and electricity is the best option for it and electric vehicle is example of it. For charging the electric vehicles, Now-a-days mostly used charging method is plug in charging, this method consists of a plug which needs to be connected to the vehicle for start charging. In wireless charging there is no need to ON-OFF the plug. Hence there will be less human interaction; it reduces risk of electric shock due to wired connections. Plug-in EVs have limited travel range and need large and heavy batteries. The wireless charging technology has main advantages is, it increases the traveling range, reduces the battery size and waiting time for charging the vehicle will mitigate. Such advantages will increase the economic and environmental benefits as well as the adoption rates of EVs [16]. Electrical vehicles require a charging station similar to current fuel car require a petrol pump and obviously charging takes some time so it is better to charge the car when it is parked, therefore it is efficient to combine both the charging and parking system which is based on the IoT technology which makes the system user friendly. One can upload information on cloud and simultaneously on smart phones. Car safety while parking is one of the issues faced by people. The internet of things (IoT) is best platform for monitoring the status of WPT system which is able to provide the wider connectivity, modified sensing, information processing and greater flexibility [17]. So, With the help of IoT, it is easy to monitor vehicle parking as well as charging of vehicles when they are parked at the same time that means it helps in synchronized parking. Another important factor of using IoT

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III. SYSTEM DESIGN

Block Diagram:

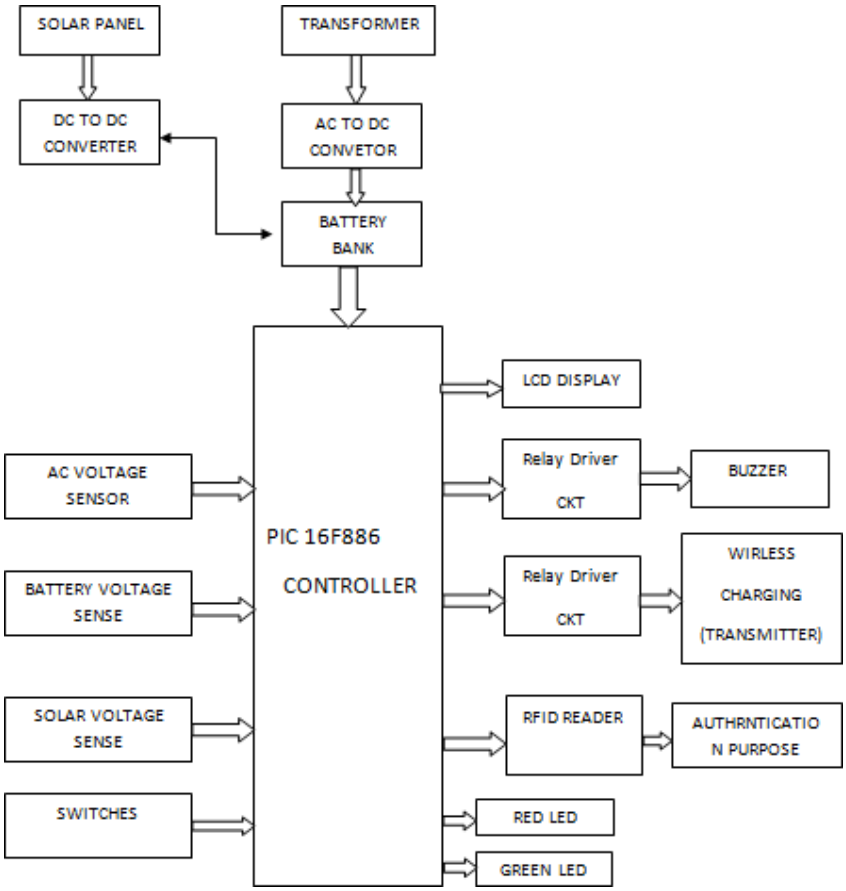

Fig 3.1: Block diagram

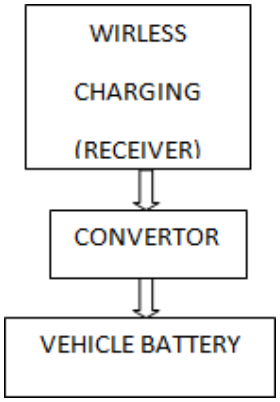

Figure 3.2: electric vehicle unit

Developed Block Diagram Schematics :

3.2.1 PIC16f886:

This powerful yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into a 28 pin package. The PIC16F886 features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 11 channels of 10- bit Analog-to-Digital (A/D) converter, 1

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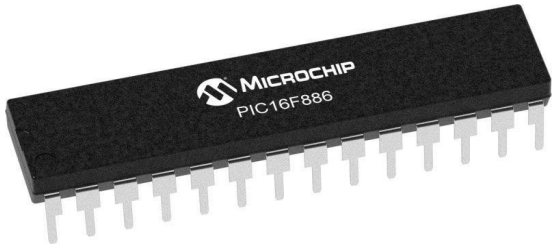
capture/compare/PWM and 1 Enhanced capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2- wire Inter-Integrated Circuit (I²C™) bus and an Enhanced Universal Asynchronous Receiver Transmitter (EUSART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances or consumer applications



Feature:

- Factory calibrated to ±1%
- Software selectable frequency range of 8 MHz to 32 kHz
- Software tunable
- Two-Speed Start-Up mode
- Fail-safe clock monitoring for critical applications
- Clock mode switching during operation for low-power operation
- Power-Saving Sleep mode
- Power-on Reset (POR)
- Selectable Brown-out Reset (BOR) voltage
- Extended Watchdog Timer (WDT) with its own on-chip RC oscillator for reliableoperation
- In-Circuit Serial Programming™ (ICSP™) via two pins
- In-Circuit Debug (ICD) via two pins
- 100,000 erase/write cycle enhanced Flash program memory, typical
- 1,000,000 erase/write cycle data EEPROM memory, typical
- Data EEPROM retention > 40 years
- Self-reprogrammable under software control
- Programmable code protection
- Peripheral Features: Device Features: 1 input only pin 25 I/O High sink/source current25 mA Interrupt-on-pin change option
- 1 input only pin
- 25 I/O
- High sink/source current 25 mA
- Interrupt-on-pin change option
- TMR0: 8-bit timer/counter with 8-bit prescaler
- TMR1 enhanced: 16-bit timer/counter with prescaler, External Gate Input mode anddedicated low-power 32 kHz oscillator
- TMR2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- Capture/Compare/PWM (CCP) module
- Enhanced Capture/Compare/PWM (ECCP) module with auto-shutdown and PWMsteering
- Master Synchronous Serial Port (MSSP) module SPI™ mode, I2C™ mode withaddress mask capability
- Supports RS-485, RS-232 and LIN compatibility.

16*2 LCD DISPLAY:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are

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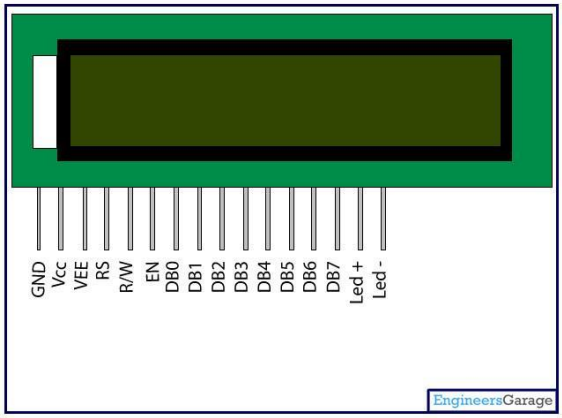
preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.



6. Interface pin description

Pin no.	Symbol	External connection	Function
1	Vss	Power supply	Signal ground for LCM
2	V_{DD}		Power supply for logic for LCM
3	V_0		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

V0 (Set Lcd contrast)

Set lcd contrast here. Best way is to use variable resistor such as potentiometer. Output of the potentiometer is connected to this pin. Rotate the potentiometer knob forward and backward to adjust the lcd contrast.

RS(Register select)

Their are two registers in every lcd

- Command Register
- Data Register

Command Register

When we send commands to lcd these commands go to Command register and are processedtheir.

Commands with their full description are given in the picture below.

When RS=0 Command Register is Selected.

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Data Register

When we send Data to lcd it goes to data register and is processed their.

When RS=1 Data Register is selected.

RW(Read - Write)

When RW=1 We want to read data from lcd.When RW=0 We want to write to lcd.

When you select the register(Command and Data) and set RW(read - write) now its time toexecute the instruction. By instruction i mean the 8-bit data or 8-bit command present on Data lines of lcd.

This requires an extra voltage push to execute the instruction and EN(enable) signal is usedfor this purpose. Usually we make it en=0 and when we want to exectue the instruction we make it high en=1 for some milli seconds. After this we again make it ground en=0.

Data which we send to our lcd can be any alphabet(small or big) , digit or ASCII character. **NOTE:** we can not send an integer,float,long,double type data to lcd because lcd is designedto display a character only. The 8 data pins on lcd carries only ASCII 8-bit code of the character to lcd. How ever we can convert our data in character type array and send one by one our data to lcd. Data can be sent using lcd in 8-bit 0r 4-bit mode. If 4-bit mode is used, two nibbles of data (First high four bits and then low four bits) are sent to complete a full eight-bit transfer. 8-bit mode is best used when speed is required in an application and at leastten I/O pins are available. 4-bit mode requires a minimum of seven bits. In 4-bit mode, only the top 4 data pins (4-7) are used.

No.	Instruction	Hex	Decimal
1	Function Set: 8-bit, 1 Line, 5x7 Dots	0x30	48
2	Function Set: 8-bit, 2 Line, 5x7 Dots	0x38	56
3	Function Set: 4-bit, 1 Line, 5x7 Dots	0x20	32
4	Function Set: 4-bit, 2 Line, 5x7 Dots	0x28	40
5	Entry Mode	0x06	6
6	Display off Cursor off (clearing display without clearing DDRAM content)	0x08	8
7	Display on Cursor on	0x0E	14
8	Display on Cursor off	0x0C	12
9	Display on Cursor blinking	0x0F	15
10	Shift entire display left	0x18	24
12	Shift entire display right	0x1C	30
13	Move cursor left by one character	0x10	16
14	Move cursor right by one character	0x14	20
15	Clear Display (also clear DDRAM content)	0x01	1
16	Set DDRAM address or coursor position on display	0x80+add	128+add

Command 0x30 means we are setting 8-bit mode lcd having 1 line and we are initializing it to be 5x7 character display.Now this 5x7 is some thing which every one should know what it stands for. usually the characters are displayed on lcd in 5x8 matrices form. where 5 is total number of coulombs and is number of rows.Thus the above 0x30 command initializes the lcdto display character in 5 coulombs and 7 rows the last row we usually leave for our cursor to move or blink etc.

The Character is displayed on lcd screen in 5x8 or 5x7 matrix. Where 5 represents number of coulombs and 7,8 represent number of rows. Maximum size of the matrix is 5x8. You can notdisplay character greater then 5x8 dimension matrix. To display character greater than this dimension you have to switch to graphical lcds. To learn about graphical lcds here is a good tutorial GRAPHICAL LCD WORKING AND PINOUT.

The command 0x38 means we are setting 8-bit mode lcd having two lines andcharacter shape between 5x7 matrix.

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- The command 0x20 means we are setting 4-bit mode lcd having 1 line and character
- shape between 5x7 matrix.
- The command 0x28 means we are setting 4-bit mode lcd having 2 lines and character shape between 5x7 matrix.
- The command 0x06 is entry mode it tells the lcd that we are going to use you'
- The command 0x08 dispalys cursor off and display off but with out clearing DDRAMcontents.
- The command 0x0E displays cursor on and dispaly on.
- The command 0x0c dispaly on cursor off(displays cursor off but the text will appearon lcd)
- The command 0x0F dispaly on cursor blink(text will appear on screen and cursor willblink).
- The command 0x18 shift entire dispaly left(shift whole off the text on the particularline to its left).
- The command 0x1C shift entire dispaly right(shift whole off the text on the particularline to its right).
- The command 0x10 Moves cursor one step left or move cursor on step a head to leftwhen ever new character is displayed on the screen.
- The command 0x14 Moves cursor one step right or move cursor on step a head torigh when ever new character is displayed on the screen.
- The command 0x01 clear all the contents of the DDRAM and also clear the lcdremoves all the text from the screen.
- The command 0x80 initialize the cursor to the first position means first line firstmatrix(start point) now if we add 1 in 0x80+1=0x81 the cursor moves to secondmatrix.
- 16x1 lcd displays 16 characters only. The first will appear on 0x80 second 0x81 third0x82 and so on until last, the 16 once on address 0x8F.

Battery:

12V 2Ah Rechargeable Lead Acid Battery is normally use for robots in competition. Wiredor Wireless Robots runs for a long time with high speed with this type of battery. Seal Lead
Acid (SLA) Rechargeable battery is the most common general purpose battery.
Low cost, robust and less maintenance required are the advantages of SLA. But it is considered heavy weight for certain robotic application. To charge SLA batteries, you can use any general DC power supply as long as it provides the correct voltage to your battery

Features:

- Rechargeable Recyclable
- No Memory Effect
- Able to use for most of the 12V controllers, motors or any other appliances

Specification:

- Voltage: 12V Capacity: 2Ah
- Size: 98mm x 43mm x 52 mm
- Weight:0.450kg

Package Includes:
1 x 12V 1.2Ah Rechargeable Lead Acid Battery

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Relay:

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signa

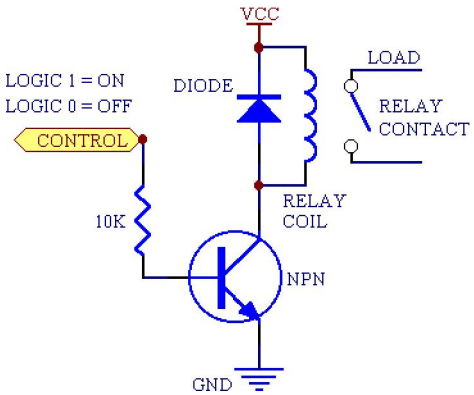
Fig. 4.3 Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this currentand a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. For further information about switch contacts and the terms used to describe them please see thepage on switches. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay.

The supplier's catalogue should show you the relay's connections. The coil will be obvious and it may be connected either way round. Relay coils produce brief high voltage 'spikes' when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage you must connect a protection diode across the relay coil. Thefigure shows a relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts.



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There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.
on. COM = Common, always connect to this; it is the moving part of the switch.
NC = Normally Closed, COM is connected to this when the relay coil is off.
NO = Normally Open, COM is connected to this when the relay coil is

Applications of relays

Relays are used for:

- Control a high-voltage circuit with a low-voltage signal, as in some types of modems oraudio amplifiers.
- Control a high-current circuit with a low-current signal, as in the starter solenoid of anautomobile.
- Detect and isolate faults on transmission and distribution lines by opening and closingcircuit breakers.

Resistor

A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current, that is, in accordance with Ohm's law:
V = IR
Resistors are used as part of electrical networks and electronic circuits. They are extremely commonplace in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel/chrome).
The primary characteristics of resistors are their resistance and the power they can dissipate. Other characteristics include temperature coefficient, noise, and inductance. Less well-known is critical resistance, the value below which power dissipation limits the maximum permitted current flow, and above which the limit is applied voltage. Critical resistance depends upon the materials constituting the resistor as well as its physical dimensions; it's determined by design.
Resistors can be integrated into hybrid and printed circuits, as well as integrated circuits. Size, and position of leads (or terminals) are relevant to equipment designers; resistors must be physically large enough not to overheat when dissipating their power.

Fig. 4.6 Resistor

A resistor is a two-terminal passive electronic component which implements electrical resistance as a circuit element. When a voltage V is applied across the terminals of a resistor, a current I will flow through the resistor in direct proportion to that voltage. The reciprocal of the constant of proportionality is known as the resistance R, since, with a given voltage V, a larger value of R further "resists" the flow of current I as given by Ohm's law:

$$I = \frac{V}{R}$$

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in most electronic equipment. Practical resistors can be made of variouscompounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel-chrome). Resistors are also implemented within integrated circuits, particularly analog devices, and can also be integrated into hybrid and printed circuits.
The electrical functionality of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than 9 orders of magnitude. When specifying that resistance in an electronic design, the required

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precision of the resistance may require attention to the manufacturing tolerance of the chosen resistor, according to its specific application. The temperature coefficient of the resistance may also be of concern in some precision applications. Practical resistors are also specified as having a maximum power rating which must exceed the anticipated power dissipation of that resistor in a particular circuit: this is mainly of concern in power electronics applications. Resistors with higher power ratings are physically larger and may require heat sinking. In a high voltage circuit, attention must sometimes be paid to the rated maximum working voltage of the resistor.

The series inductance of a practical resistor causes its behavior to depart from ohms law; this specification can be important in some high-frequency applications for smaller values of resistance. In a low-noise amplifier or pre-amp the noise characteristics of a resistor may be an issue. The unwanted inductance, excess noise, and temperature coefficient are mainly dependent on the technology used in manufacturing the resistor. They are not normally specified individually for a particular family of resistors manufactured using a particular technology. A family of discrete resistors is also characterized according to its form factor, that is, the size of the device and position of its leads (or terminals) which is relevant in the practical manufacturing of circuits using them.

Units

The ohm (symbol: Ω) is the SI unit of electrical resistance, named after Georg Simon Ohm. An ohm is equivalent to a volt per ampere. Since resistors are specified and manufactured over a very large range of values, the derived units of milliohm (1 mΩ = 10^{-3} Ω), kilohm (1 kΩ = 10^{3} Ω), and megohm (1 MΩ = 10^{6} Ω) are also in common usage.

The reciprocal of resistance R is called conductance G = 1/R and is measured in Siemens (SI unit), sometimes referred to as a mho. Thus a Siemens is the reciprocal of an ohm: $S = \Omega^{-1}$. Although the concept of conductance is often used in circuit analysis, practical resistors are always specified in terms of their resistance (ohms) rather than conductance.

Variable resistors Adjustable resistors

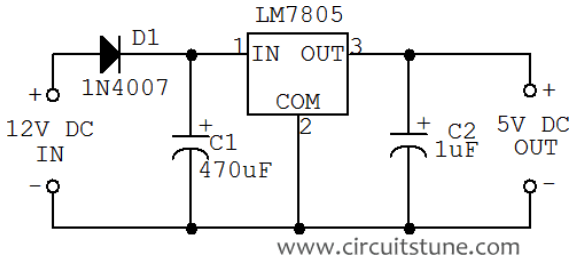
A resistor may have one or more fixed tapping points so that the resistance can be changed by moving the connecting wires to different terminals. Some wirewound power resistors have a tapping point that can slide along the resistance element, allowing a larger or smaller part of the resistance to be used.

Where continuous adjustment of the resistance value during operation of equiment is required, the sliding resistance tap can be connected to a knob accessible to an operator. Such a device is called a rheostat and has two terminals

Potentiometers

A common element in electronic devices is a three-terminal resistor with a continuously adjustable tapping point controlled by rotation of a shaft or knob. These variable resistorsare known as potentiometers when all three terminals are present, since they act as a continuously adjustable voltage divider. A common example is a volume control for a radio receiver. Accurate, high-resolution panel-mounted potentiometers (or "pots") have resistance elements typically wire wound on a helical mandrel, although some include a conductive-plastic resistance coating over the wire to improve resolution. These typically offer ten turns of their shafts to cover their full range. They are usually set with dials that include a simple turns counter and a graduated dial. Electronic analog computers used them in quantity for setting coefficients, and delayed-sweep oscilloscopes of recentdecades included one on their panels.

Power Supply



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The 7805 Voltage Regulator IC. A regulated power supply is very much essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate.

One of the important sources of DC Supply are Batteries. But using batteries in sensitive electroniccircuits is not a good idea as batteries eventually drain out and loose their potential over time.

Also, the voltage provided by batteries are typically 1.2V, 3.7V, 9V and 12V. This is good for circuitswhose voltage requirements are in that range. But, most of the TTL IC"s work on 5V logic and hence we need a mechanism to provide a consistent 5V Supply. Here comesthe 7805 Voltage Regulator IC to the rescue. It is an IC in the 78XX family of linear voltage regulators that produce a regulated 5V as output. 7805 is a three terminal linear voltage regulator IC with a fixed output voltage of 5V which is useful in a wide range of applications. Currently, the 7805 Voltage Regulator IC is manufactured by Texas Instruments, ON Semiconductor, STMicroelectronics, Diodes incorporated, Infineon Technologies, etc.

Some of the important features of the 7805 IC are as follows:

- It can deliver up to 1.5 A of current (with heat sink).
- Has both internal current limiting and thermal shutdown features.
- Requires very minimum external components to fully function.

The above circuit shows all the components required for a 7805 IC to work properly. The0.22µF Capacitor near the input is required only if the distance between the regulator IC and the power supply filter is high. Also, the 0.1µF Capacitor near the output is optional and if used, it helps in the transient response. In this circuit, VIN is the input voltage to the 7805 IC and the source can be from either a battery of an unregulated DC. VOUT is the output of the 7805 IC, which is a Regulated 5V.

Design of Power supply:

All electronic circuits use DC power supply of adequate voltage for theiroperation.

To obtain this DC voltage from 230V AC mains, we need to use a „rectifier". Therectified DC voltage is „pulsating " in nature. We know that a combination of rectifier &filter can produce a dc voltage which is almost pure i.e. ripple free.

However, the problem with such a power supply is that its output voltage will not remain constant in the event of fluctuations in ac input voltage or changes in load current. This type of power supply is called as unregulated power supply.

The power supply, which provides a constant output voltage irrespective of everything iscalled, regulated power supply. So we have to design a regulated power supply using series voltage regulator IC 7805.

Following figure shows general block diagram of regulated power supply.

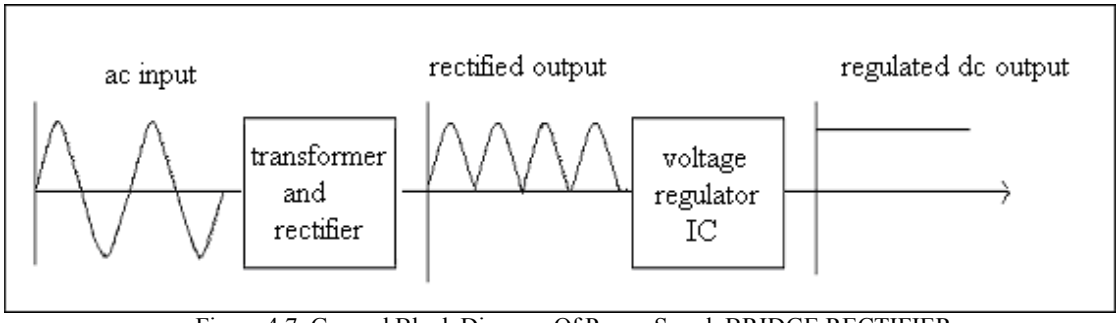

Figure 4.7: General Block Diagram Of Power SupplyBRIDGE RECTIFIER

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Bridge rectifier circuit consists of four diodes arranged in the form of a bridge as shownin figure.

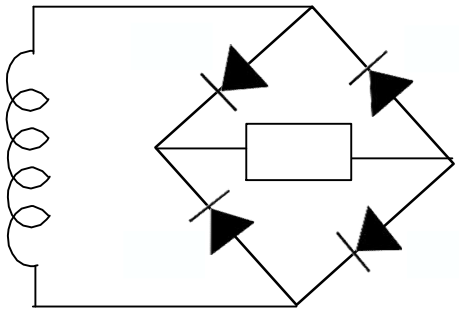

Fig. 4.8: Bridge Rectifier

OPERATION

During the positive half cycle of the input supply, the upper end A of the transformersecondary becomes positive with respect to its lower point B. This makes Point1 of bridge

Positive with respect to point 2. The diode D1 & D2 become forward biased & D3 & D4 become reverse biased. As a result a current starts flowing from point1, through D1 the load & D2 to the negative end

During negative half cycle, the point2 becomes positive with respect to point1. DiodesD1 & D2 now become reverse biased. Thus a current flow from point 2 to point1.

Transformer

Transformer is a major class of coils having two or more windings usually wrapped around a common core made from laminated iron sheets. It has two cols named primary and secondary. If the current flowing through primary is fluctuating, then a current will be inducted into the secondary winding. A steady current will not be transferred from one coil to other coil.

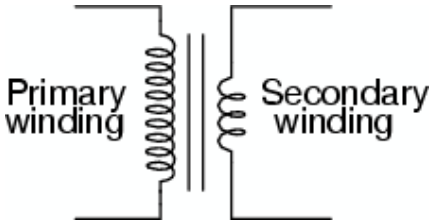

Fig. 4.9: Basic Transformer

Design of C1:

The maximum current that can be drawn from this IC is 1A.

But our circuit requires maximum current of Imax, which is summation of all the current required to driveindividual IC,s.

Im = 100 mA

For safety purpose, we consider the maximum current limit exactly double of the circuit requirementImax=2Im.

Therefore, Imax = 200 mA.

We know that,

Q = CV (1)

Where,

Q = charge on capacitor. C = capacitance.V = voltage applied to capacitor.

Also,

Q = I t. (2)

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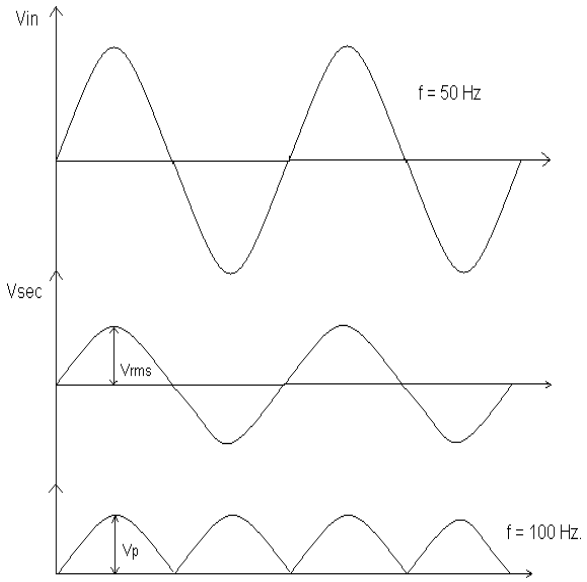
Where,
I = Imax.
t = period of output voltage of rectifier.

Equating equations (1) & (2), we get
CV = Imax t. (3)
Now, at input of transformer, applied voltage frequency is 50 Hz.
As we have used step down transformer of 9-0-9 V, we get output voltage having same frequency of 50 Hz but amplitude step down to 9V (rms).
After rectification, frequency doubles & amplitude becomes Vpeak, as shown in figure
Vin(rms) = 230 v. Vsec(rms)= 9v.
Therefore, Vpeak = Vp = Vsec / 0.707. Vp = 12 v.



And, t = 1 / 2f.
= 1 / 100.
= 0.01 sec.
From equation (3),
CV = I t.
Therefore,
C = Imax t / V.
= 200 * 0.01 / 12
= 166.66 uF.
Select, C1= 470 uF.

Design of C2:
We know that, due to internal circuitry of IC 7805 and load connected at the output of power supply; various types of noises are generated at its output, such as thermal noise, flicker noise, shot noise, white noise etc. Hence in order to bypass all these noises, we have to connect a capacitor C2.
It can take value between 0.1uF to 100uF. Here we have connected C2 = 100 uF.

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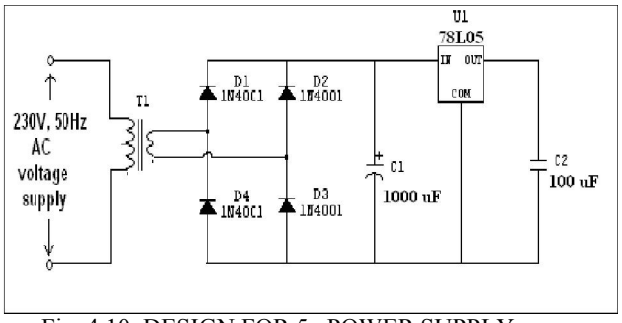
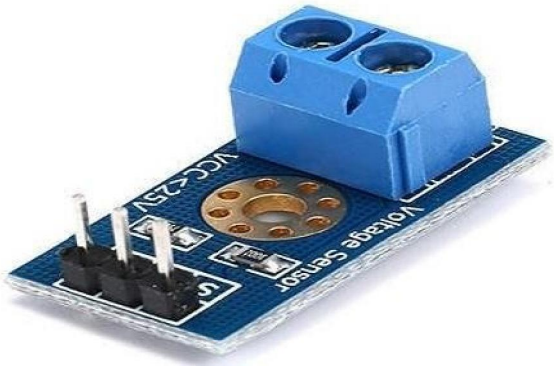


Fig. 4.10: DESIGN FOR 5v POWER SUPPLY

Voltage Sensor

This sensor is used to monitor, calculate and determine the voltage supply. This sensor can determine the AC or DC voltage level. The input of this sensor can be the voltage whereas the output is the switches, analog voltage signal, a current signal, an audible signal, etc. Some sensors provide sine waveforms or pulse waveforms like output & others can generate outputs like AM (Amplitude Modulation), PWM (Pulse Width Modulation) or FM (Frequency Modulation). The measurement of these sensors can dependon the voltage divider.



This sensor includes input and output. The input side mainly includes two pins namely positive and negative pins. The two pins of the device can be connected to the positive & negative pins of the sensor.The device positive & negative pins can be connected to the positive & negative pins of the sensor. The output of this sensor mainly includes supply voltage (Vcc), ground (GND), analog o/p data

Design Procedure of Power Supply:-

DESIGNING REQUIRED REGULATED POWER SUPPLY 5V/1A: -

Almost all electronic circuits require a DC source for power supply unit may be defined as a piece of equipment, which converts the alternating waveforms from the power lines (A C supply) into an essentially direct voltage A rectifier with filter gives out unregulated supply An unregulated power – supply consists of a transformer, a rectifier, and filter circuit .There are three reasons why such a simplesystem is not good enough for same.

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The first is its poor regulation i.e. the output voltage is for from constant as the load varies.
The second is that the D.C output voltage varies with the A.C input directly in many locations the line voltage for nominal value 230 v may vary as wide a range as 150 v to 270 v and yet it is necessary that the D.C voltage remains essentially constant.
The third is that the D.C voltage varies with temperature particular if semi conductor devices are used.
For any regulated power supply unregulated input voltage should beVin=1.5 X Vout (1)
For output 5V input should be 8-9 V

Transformer
Required o/p voltage will depend upon the Vm rating of transformer Selected step down transformer of rms voltage rating 0-9V/500ma or 0-12V.
Vin=1.414 x Vrms Vin=1.414 x 9 Vin=13-14 Volts (2)
eqn(2) satisfies eqn(1)
Vdc=2xVm/3.14 Vdc=2x13/3.14 Vdc=8.2V

Diode 1N4007
Rectifier diode PIV rating should be greater than Vm rating of transformer and current capacity should be up to required current.
PIV=2xVm
=2x1.414xVrms
=25 Volt.
Pdmax = Avergae current x On state drop Assume average current to be 500ma from diode. Hence Pdmax
=500ma x 0.7 V
Pdmax = 350 mw
Specification of Selected diode: 1N4007 PIV=700V
Iavr=1Amp
Power dissipation =Pdmax=400mWatt

Filter Capacitor:
Filter Capacitor design on the basis of ripple. To have a minimum ripple C should have maximum valuebecause ripple is inversely proportional to capacitor value. The voltage rating of capacitor should be greater than Vm rating of transformer. Assumption of ripple will be from 5% to 10%.
Assume allowed ripple is 10%. Hence o/p voltage may have extreme change from 5.5V to 4.5 V meanscapacitor can charge up to 5.5V (V1) and discharge to 4.5V (V2).
V2=4.5V= √2 x (9-0.7V).Sinwt.
0.7 V considered as on state drop across diode.
Capacitor will discharge up to 4.5V after 90 deg as from the waveform of fullwave rectification.Hence
Sinə =4.5 / √2 x (9-0.7V) Sinə =4.5/11.73
Sinə =0.38
Sine inverse of this factor will give us angle 22 deg. 90 deg.=5 msec Hence total time = 5+1.2=6.2msec
Cap=ΔQ/ ΔVΔQ=I x t
=500 ma x 6.2 msec
= 3100 micro Cap= 3100micro/1.0 V
=3100 mf
=3100 uf/25V
Hence selected capacitor may be higher than this capacity. 2200uf/25V

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Three pin voltage regulator.
A voltage regulator is a circuit that supplies a constant voltage regardless of changes in load current. The 78XX series consists of three – terminal positive voltage regulators with seven voltage options. These ICs are designed as fixed voltage regulators with adequate heat sinking can deliver output currents in excess of1A.
Three-pin regulator 78XX series 7805

FEATURES OF 7805 SERIES:-
Output current in excess of 1A. Internal thermal over load protection.No external component requires.
Output transistor safe area protection.Internal short circuit current limit.
Available in plastic to 202 package
Special circuitry allows start up even it output is pulled to negative voltage (and supplies).

ABSOLUTE MAXIMUM RATINGS – OF 78XX SERIES
Max. Input Voltage - 37V.
Operating temp. Range - 0 C-100
Maximum junction temp. - +124^{0}C Storage temp. Range - 65^{0}C to +150^{0}C
Lead temp. (Soldering 10- second) - +230^{0}C

Filter capacitor :
10uf–100uf additional filter capacitor will improve the load regulation characteristics. It is connected at theoutput.
Decoupling capacitor:
0.01uf To 0.1uf capacitor will remove the high frequency noise superimposed at output.

LED for indication:-
At the output of power supply led in series with 330 for 5 V is connected to indicate the on state of powersupply.
I forward led= 2V
I forward led=10ma.
V=Is x Rs + V forward led 5V= 10 ma x Rs + 2 V Rs= 5 V-2 V/ (10ma)Rs= 330
For 5 V Rs is up to 220 to 470 ohm.

Proteus
Proteus was initially created as a multiplatform (DOS,Windows, Unix) system utility, to manipulate textand binary files and to create CGI scripts. The language was later focused on Windows, by adding hundreds of specialized functions for: network and serial communication, database interrogation, systemservice creation, console applications, keyboard emulation, ISAPI scripting (for IIS). Most of these additional functions are only available in the Windows flavour of the interpreter, even though a Linux version is still available.
Proteus was designed to be practical (easy to use, efficient, complete), readable and consistent.
Its strongest points are:
powerful string manipulation; comprehensibility of Proteus scripts;
availability of advanced data structures: arrays, queues (single or double), stacks, bit maps,sets, AVL trees.
The language can be extended by adding user functions written in Proteus or DLLs createdin C/C++.

IV. PROJECT PLAN

WeekNo.	Action plan
1	Searching of Project information
2	Collection of components required for project
3	Designing of PCB, printing ofcopper for interior layer
4	Etching, drilling, layer alignment of PCB

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5	Mounting components on PCB asper circuit diagram
6	Soldering components on PCB
7	Software Development for the project
8	Testing circuit is proper or not
9	Troubleshooting for any problems
10	Checking project is properly working or not if not then correct
11	Presentation of report
12	Presentation of PPT
13	Checking project from projectguide
14	Checking report & PPT fromproject guide
15	Confirmation from project guide,co-ordinator , HOD
16	Submission of Project model,Project report, PPT

V. ADVANTAGES & APPLICATION

Advantages:

- Emergency services get the information about accident in time, and then many livescould have been saved.
- Real time location tracking is possible
- We can find the location of the vehicle.
- Alert message to mobile phone for remote information.
- This project is user-friendly and reliable

Disadvantages:

- Costlier.
- Sending data not secure.
- This system is not applicable for poor network connection places.

Application:

- Automotive and transport vehicles.
- Security, remote monitoring and transportation and logistics.
- This system also can be interfaced with vehicle alerting system

VI. CONCLUSION & FUTURE SCOPE

Conclusion

With some great features and functionalities, we expect to get many electric vehicles on the market in the future. The rising demand for EVs increases the need for charging stations and station locator apps also. So, if you are planning to create such an app to meet users expectations and win the competition, hire an experienced app development company in no time.

Future Scope:

The future scope of a project focused on hybrid charging stations for authentic electric vehicles (EVs) holds several promising opportunities. As the EV market continues to grow and technology advances, here are some potential areas for future development and expansion:

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