

WIRELESS POWER TRANSFER SYSTEM FOR ELECTRIC VEHICLE APPLICATION

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Engineering Degree in
Electrical and Electronics Engineering



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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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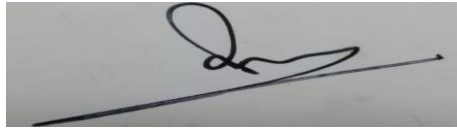
APRIL 2022

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING**

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of
UDAYACHANDRAN.R (39140707) MOHAN RAJ.K (39140032) SURYA.V (39140060)
KESHAV SRIDHAR (39140024) who carried out the project entitled “**WIRELESS POWER**

TRANSFER SYSTEM FOR ELECTRIC VEHICLE APPLICATION" under our supervision from November 2022 to April 2022.



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Internal Guide

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Internal Examiner

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DECLARATION

We **UDAYACHANDRAN.R (39140707), MOHAN RAJ.K (39140032), SURYA.V (39140060), KESHAVSRIDHAR (39140024)** hereby declare that the Project Report entitled **“WIRELESS POWER TRANSFER SYSTEM FOR ELECTRIC VEHICLE APPLICATION”** done by us under the guidance of **Dr. A. Rameshbabu** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electrical and Electronics Engineering.

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SIGNATURE OF THE CANDIDATES









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We convey our thanks to **Dr. N. M. Nandhita., Dean, School of Electrical and Electronics Engineering** and **Dr. V. Sivachidambaranathan, Head of the Department, Dept. of Electrical and Electronics Engineering** for providing us necessary support and details at the right time during the progressive reviews.

We would like to express our sincere and deep sense of gratitude to our Project Guide **Dr. A. Rameshbabu** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of our project work.

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TABLE OF CONTENTS

CHAPTER NO.	TITLE
1	ABSTRACT
2	INTRODUCTION
3	BLOCK DIAGRAM
4	MODULES 1. SENSOR INTERFACING 2. PREPARING POWER SUPPLY UNIT 3. MICRO-CONTROLLER PROGRAMMING 4. READING ANALOG DATA 5. TEST AND DEBUG 6. SUBMISSION
5	LITERATURE SURVEY
6	HARDWARE DESCRIPTION ARUDINO
7	WPT MODULE CIRCUIT DIAGRAM

8	VOLTAGE SENSOR
	1. AC VOLTAGE SENSOR
	2. DC VOLTAGE SENSOR
9	SINGLE CHANNEL RELAY
10	IR SENSOR
11	BATTERY (12 V)
12	LCD DISPLAY
13	SOFTWARE DESCRIPTION
	1. ARDUNIO IDE
	2. EMBEDDED C
14	CONCLUSIONS
15	FUTURE SCOPE

AN EFFICIENT WIRELESS POWER TRANSFER SYSTEM TO BALANCE THE STATE OF CHARGE OF ELECTRIC VEHICLES

ABSTRACT

As an alternate form in the road transportation system, electric vehicle (EV) can help reduce the fossil-fuel consumption. However, the usage of EVs is constrained by the limited capacity of battery. Wireless Power Transfer (WPT) can increase the driving range of EVs by charging EVs in motion when they drive through a wireless charging lane embedded in a road. The amount of power that can be supplied by a charging lane at a time is limited. A problem here is when a large number of EVs pass a charging lane, how to efficiently distribute the power among different penetrations levels of EVs? However, there has been no previous research devoted to tackling this challenge. To handle this challenge, we propose a system to balance the State of Charge (called BSoC) among the EVs. It consists of three components: i) fog-based power distribution architecture, ii) power scheduling model, and iii) efficient vehicle-to-fog communication protocol. The fog computing center collects information from EVs and schedules the power distribution. We use fog closer to vehicles rather than cloud in order to reduce the communication latency. The power scheduling model schedules the power allocated to each EV. In order to avoid network congestion between EVs and the fog, we let vehicles choose their own communication channel to communicate with local controllers.

INTRODUCTION;

The reduction of fossil fuels and the need to reduce urban pollutants have made electric vehicles as an appropriate alternative to domestic combustion engines . Electric vehicles can act as a source of energy by using vehicle-to-home (V2H) and

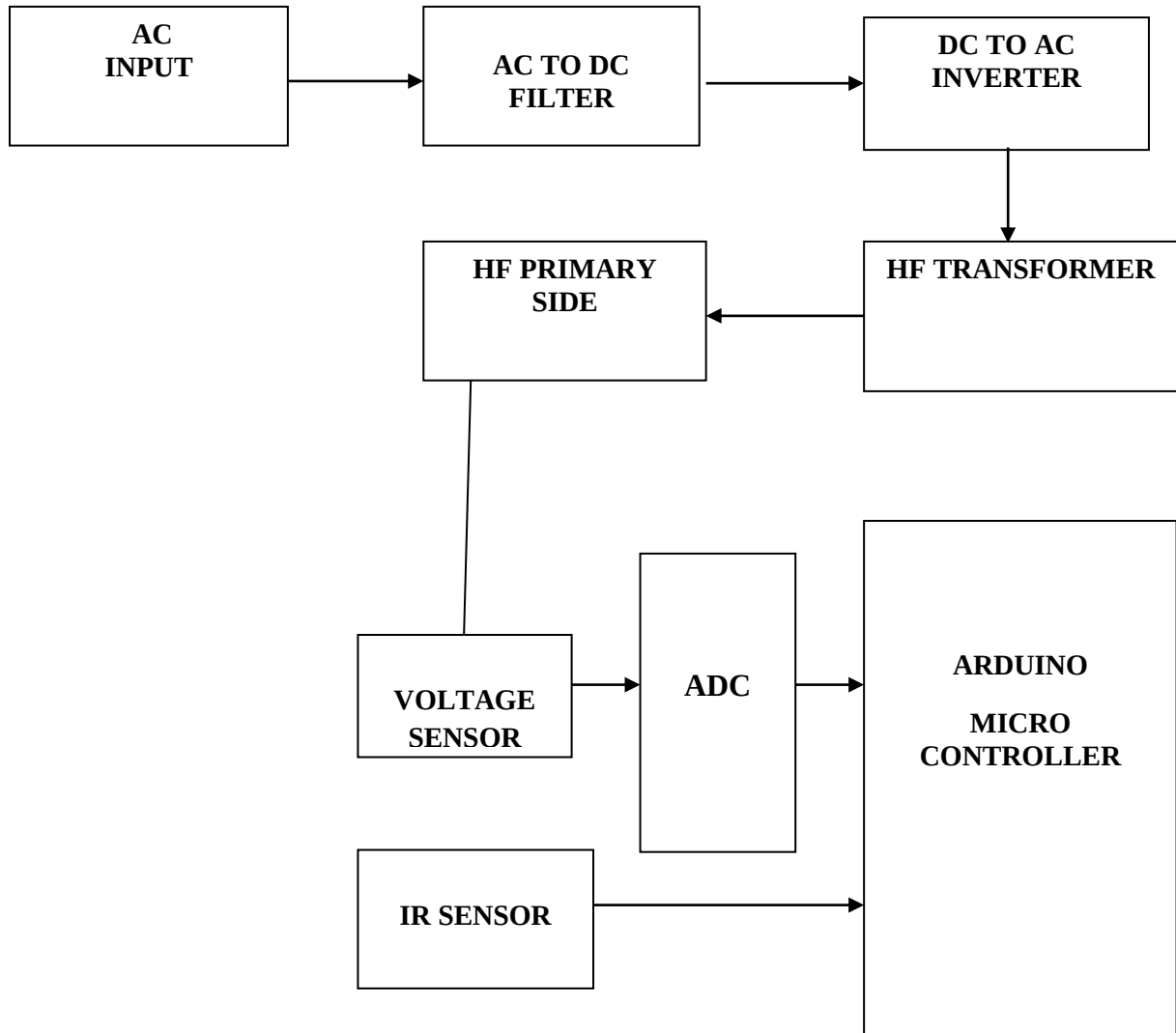
vehicle-to-grid (V2G) capabilities. The V2G capability allows vehicles to act as a mobile storage device which can inject the storage energy into the grid [3]. The V2G capability allows for active power regulation, reactive power support, load modulation, flow harmonic filtering and peak charge correction. These factors provide services such as spinning reservations and voltage and frequency control for the power grid [4]. In addition to the aforementioned, electric vehicles can participate in electricity markets and provide many economic benefits to their power grid and owner via the correct implementation of the V2G

However, it is important to note that the economic benefits of V2G capability depend on how to charge and discharge electric vehicles ,. If the charging process is not controlled, charging time periods will intersect with the peak load time of the distribution system , thereby increasing peak load , and the distribution system faces with problems such as overload, excessive loss of power and voltage violation . Therefore, charging patterns should be designed in such a way to persuade users to transfer charge periods to off-peak periods . The effects of the presence of plug-in hybrid electric vehicles (PHEV) have been studied in several articles..

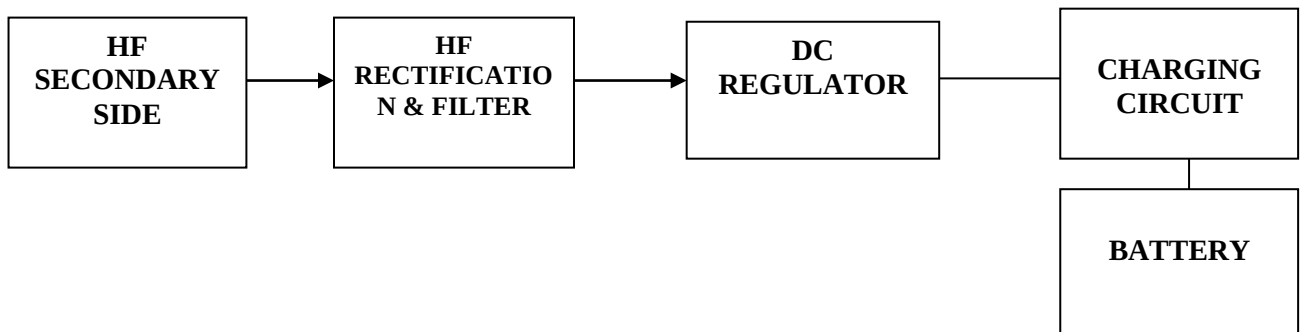
In this paper, various strategies for coordinating the charging/discharging of PHEVs are proposed in electric vehicle parking with V2G capability. The proposed strategies include constraints on the amount of power exchange the distribution system, as well as the random and unpredictable nature of quantities . Finally, the impact of each strategy on the amount of parking dividend is analyzed.

BLOCK DIAGRAM

TRANSMITTER



RECEIVER



EXISTING SYSTEM

- The efficient vehicle-to-fog communication protocol to address the shortcoming of existing CSMA/CA technique used in DSRC protocol.
- The research challenges based on existing technologies with their possible future impacts.
- The average packet drop rate in channel allocation technique is higher than our channel allocation technique when the number of EVs increases.

PROPOSED SYSTEM

- Our proposed power scheduling method in BSoC can balance EVs' SOC better than other two methods.
- Passive metallic plate shield and active shield are proposed to minimize the leakage electromagnetic field from the wireless power transfer system in a (on-line) electric vehicle.

HARDWARE REQUIREMENTS

- MICROCONTROLLER
- WIRELESS POWER TRANSFER
- ULTRASONIC SENSOR
- VOLTAGE SENSOR
- RELAY
- ROBO

SOFTWARE REQUIREMENTS

- ARDUINO IDE
EMBEDDED C

MODULES:

1. SENSOR INTERFACING
2. PREPARING POWER SUPPLY UNIT
3. MICRO-CONTROLLER PROGRAMMING
4. READING ANALOG DATA
5. TEST AND DEBUG
6. SUBMISSION

MODULE DESCRIPTION:

1. SENSOR INTERFACING

Sensor interfacing is a mix of amplification, filtering, and other signal conditioning as well as analog-to-digital conversion. The analog-to-digital converter (ADC) may be in your microcontroller, but you will still need to make the sensor compatible with the ADC input.

2. PREPARING POWER SUPPLY UNIT

A power supply unit (or PSU) converts mains AC to low-voltage regulated DC power for the internal components of a controller. A power supply is used to reduce the mains electricity at 240 volts AC down to something more useable, say 12 volts DC. There are two types of power supply, linear and switch mode. A linear power supply uses a transformer to reduce the voltage. The AC signal is rectified and regulated to produce a high DC voltage.

An AC adapter, AC/DC adapter, or AC/DC converter is a type of external power supply, often enclosed in a case similar to an AC plug. Adapters for battery-powered equipment may be described as chargers or rechargers (see also battery charger). AC adapters are used with electrical devices that require power but do not contain internal components to derive the required voltage and power from main power. The internal circuitry of an external power supply is very similar to the design that would be used for a built-in or internal supply.

3. MICRO-CONTROLLER PROGRAMMING

A microcontroller is a programmable IC, capable of multiple functions depending on how it's programmed. Many different kinds of microcontrollers exist that offer a wide range of functionality. The versatility of the microcontroller is what makes it one of the most powerful tools in modern design. This guide will explain the basics of microcontrollers and how they are programmed.

4. READING ANALOG DATA

The microcontroller of the board has a circuit inside called an analog-to-digital converter or ADC that reads this changing voltage and converts it to a number between 0 and 1023. When the shaft is turned all the way in one direction, there are 0 volts going to the pin, and the input value is 0. When the shaft is turned all the way in the opposite direction, there are 5 volts going to the pin and the input value is 1023. In between, `analog Read()` returns a number between 0 and 1023 that is proportional to the amount of voltage being applied to the pin.

5. TEST AND DEBUG

Testing means verifying correct behavior. Testing can be done at all stages of module development: requirements analysis, interface design, algorithm design, implementation, and integration with other modules. In the following, attention will be directed at implementation testing. Implementation testing is not restricted to execution testing. An implementation can also be tested using correctness proofs, code tracing, and peer reviews, as described below.

Debugging is a cyclic activity involving execution testing and code correction. The testing that is done during debugging has a different aim than final module testing. Final module testing aims to demonstrate correctness, whereas testing during debugging is primarily aimed at locating errors. This difference has a significant effect on the choice of testing strategies.

6. SUBMISSION

Submitting the prototype for the presentation to the faculty guide for review purpose

LITERATURE SURVEY:

TITLE: &KDUJLQJDQGGLVFKDUJLQJFRRUGLQDWLRQRIHOHFWULF
YHKLFOHVLQDSDUNLQJORW

AUTHOR: Fatemeh Jozi, Kazem Mazlumi, Hadi Hosseini

DESCRIPTION:

With the extensive use of electric vehicles, the need to charge them has become one of the important issues in the distribution system. Also, these vehicles are able

to play the role of energy-generating sources by utilizing vehicle-to-grid (V2G) capabilities. Therefore, coordination of the charging /discharging process of electric vehicle batteries is essential in order to optimally use these energy storage resources. In this paper, different strategies are proposed for charging /discharging electric vehicles regarding variable power costs, parking constraints for electric vehicles and the random and unpredictable nature of quantities, such as the entrance and exit of electric vehicles to the parking lot. Such strategies address the time and state of charge of vehicles in order to increase the profit of electric vehicle parking lot, because parking lot is the responsible of charging and discharging. The results show that different strategies have different profits for parking.

TITLE: CatchEnergySavingOpportunityinChargeDepletionMode, AReal-TimeControllerfor Plug-inHybridElectricVehicles

AUTHOR: Amir Rezaei, Jeffrey B. Burl, Mohammad Rezaei, and Bin Zhou

DESCRIPTION:

—The energy management (EM) of plug-in hybrid electric vehicles (HEVs) is commonly divided into two modes: charge-depletion mode and charge-sustaining mode. This paper presents the optimal adaption law for any type of adaptive energy consumption minimization strategy (ECMS) in charge-depletion mode for plug-in HEVs. To present the optimal law, a particular adaptive ECMS is selected, known as CESO. CESO has previously been introduced for series and parallel HEVs in charge-sustaining mode. Here, by introducing the optimal adaption law in charge-depletion mode, CESO strategy is expanded to charge-depletion mode for plug-in HEVs.

TITLE: Design of a High Power Transfer Pickup for On-Line Electric Vehicle (OLEV)

AUTHOR: Boyune Song, Jaegue Shin, Seokhwan Lee, Seungyong Shin, Yangsu Kim, Sungjeub Jeon and Guho Jung.

DESCRIPTION:

Recent electric vehicle technology with battery has faced many problems: high cost, weight, driving distance, long charging time and danger of electric shock. An inductive power transfer pickup for electric vehicles such as pickup of traditional transformer enables electric vehicles to overcome these problems by using contactless power transfer. Also, inductive power transfer pickup has many advantages including high efficiency, high power, a large air gap and lightweight. In this paper, proposed inductive power pickup was developed using series capacitor with ferrite cores and multi-windings and was tested for its ability to transfer electricity wirelessly. When tested for output power and efficiency of pickup, output power of 20kW and efficiency of 86.7% were achieved at 20 kHz and 250mm air gap.

TITLE: Reserving Charging Strategy for Electric Vehicles Based on Combined Model of Road-Charging Station-Electric Vehicle

AUTHOR: Haoming Liu, Man Niu, Weijie Wang

DESCRIPTION:

Charging resources in the charging stations are limited. How to make electric vehicles get charging service with small cost is worth studying. The reserving charging model for electric vehicles is built based on the customer requirement model, considering the road condition of traffic system and available charging

resources in the charging stations. All factors that influence the reserving charging are translated into weights and then being assigned to corresponding edges of traffic network graph. The Dijkstra algorithm is introduced to achieve the solution of the model built in this paper. Finally, a supposed traffic network is used to conduct a simulation, and the results show that the proposed optimization model of reserving charging for electric vehicles can satisfy users' different demands.

HARDWARE DESCRIPTION:

ARDUINO

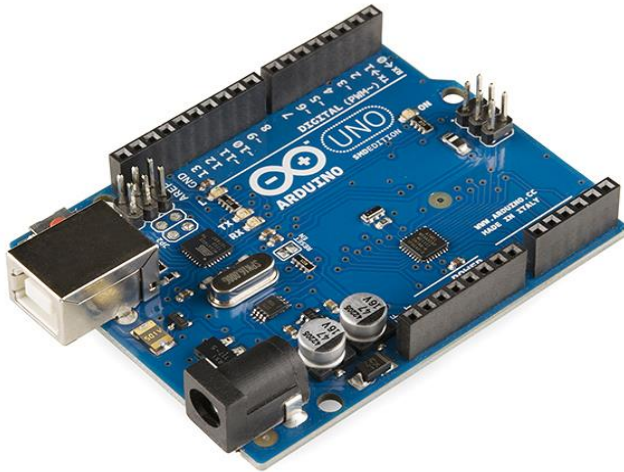
DESCRIPTION

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures Single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

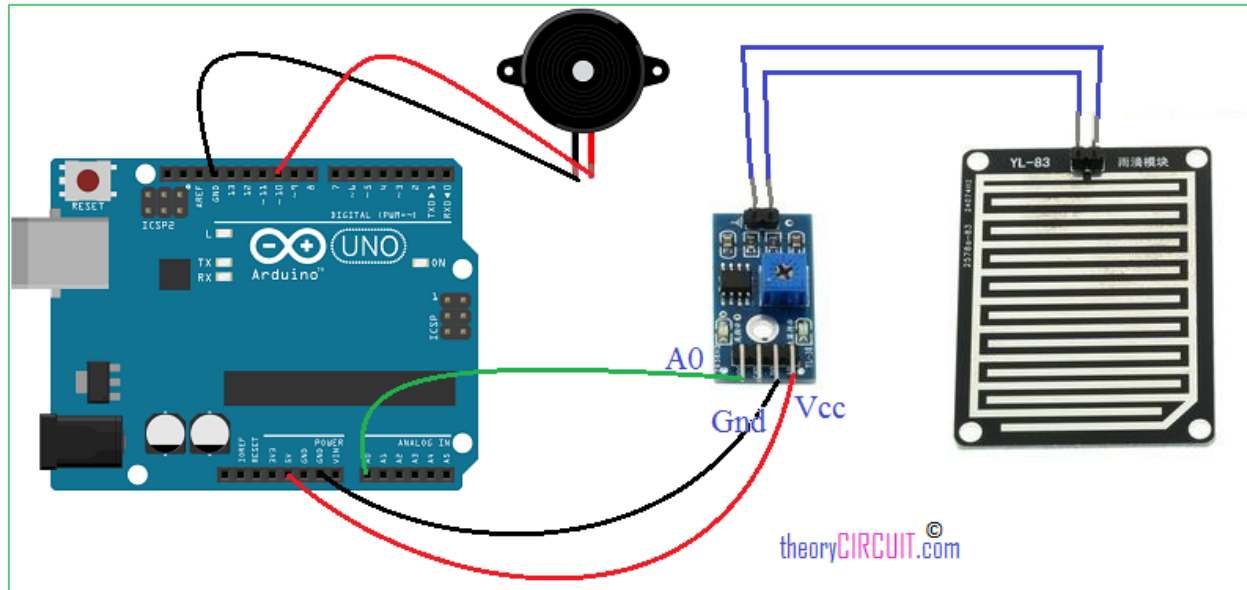
The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM

outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.



ARDUINO UNO

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.



ARDUINO UNO INTERFACE WITH SENSOR & BUZZER

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.

FEATURES

- Microcontroller: ATmega328P
- Operating voltage: 5V
- Input voltage: 7-12V
- Flash memory: 32KB
- SRAM: 2KB
- EEPROM: 1KB

APPLICATIONS

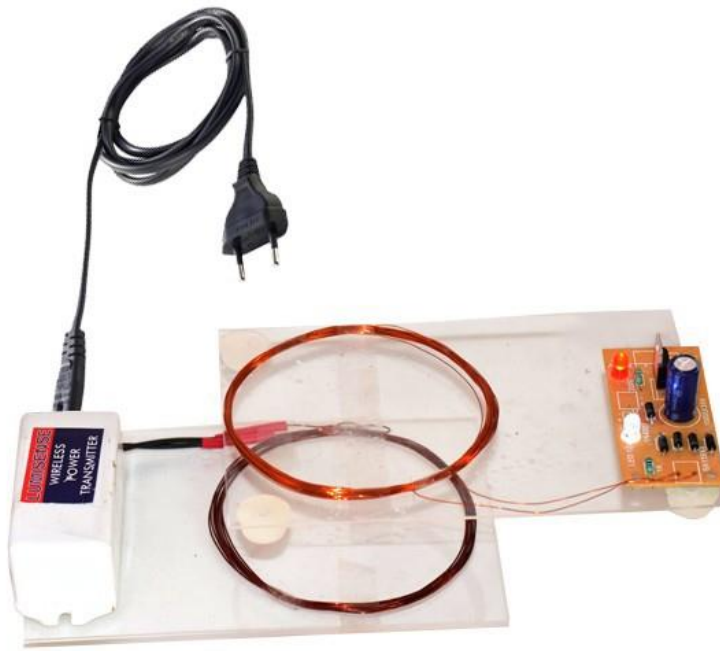
- Real time biometrics
- Robotic applications
- Academic applications

WIRELESS POWER TRANSFER

DESCRIPTION

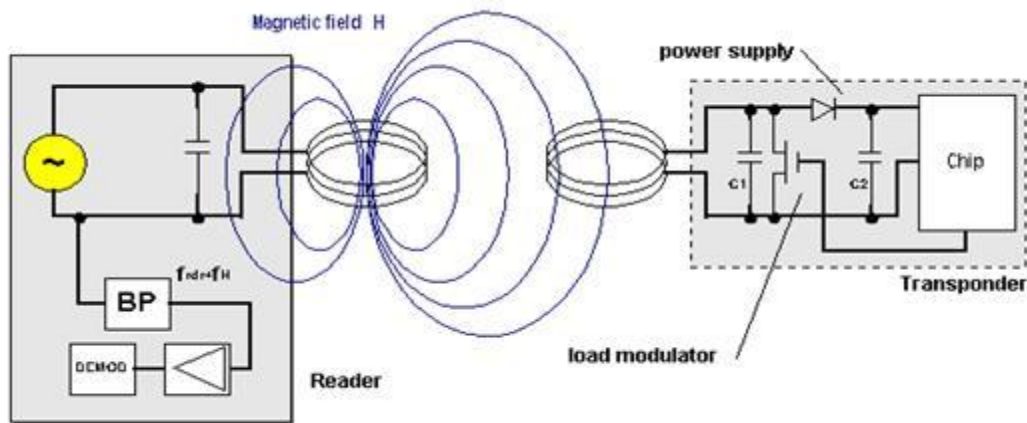
Wireless power transfer (WPT), wireless power transmission, wireless energy transmission, or electromagnetic power transfer is the transmission of electrical energy without wires. Wireless power transmission technologies use time-varying electric, magnetic, or electromagnetic fields.

The term “wireless charging” usually refers to inductive charging. This technology uses a charging station that creates an alternating magnetic field. A device with the proper induction coil will receive energy from that field when it is placed nearby, making it receive power without a physical connection. An important issue associated with all wireless power systems is limiting the exposure of people and other living things to potentially injurious electromagnetic fields. Wireless power transfer is the transmission of AC power from a power source to an electrical load, without the use of discrete human made conductors.



WPT MODULE

The Wireless Power Transfer and Charging Module can be used in electronic equipments in common use for close wireless charging. This module uses an electromagnetic field to transfer electric energy between a transmitter circuit and a receiver circuit.



CIRCUIT DIAGRAM

An induction coil creates an alternating electromagnetic field from within the transmitter circuit powered with 12V. The second induction coil takes power from the electromagnetic field and converts it back into AC current to the receiver circuit. Increase the number of turns of the receiver coil to increase the transmission distance, when low current is suitable in your application. As distance increase current capacity of receiver will drop.

FEATURES

- Transmitter input voltage: 12v DC
- Receiver output power: 3W-5W
- Maximum receiver current capacity: 600mA (based on distance)
- Coil inductance: 30 μ H
- Transmit receive distance: 1-20mm

APPLICATIONS

- Power grid
- Power mesh
- Mobile charging
- LED power

VOLTAGE SENSOR

DESCRIPTION

A voltage sensor is going to be able to determine and even monitor and measure the voltage supply. It is then able to take those measurements and turn them into a signal that one will then be able to read. The signal will often go into a specialized electronic device for recording, but sometimes, an observer will be present to manually read the sensor output.

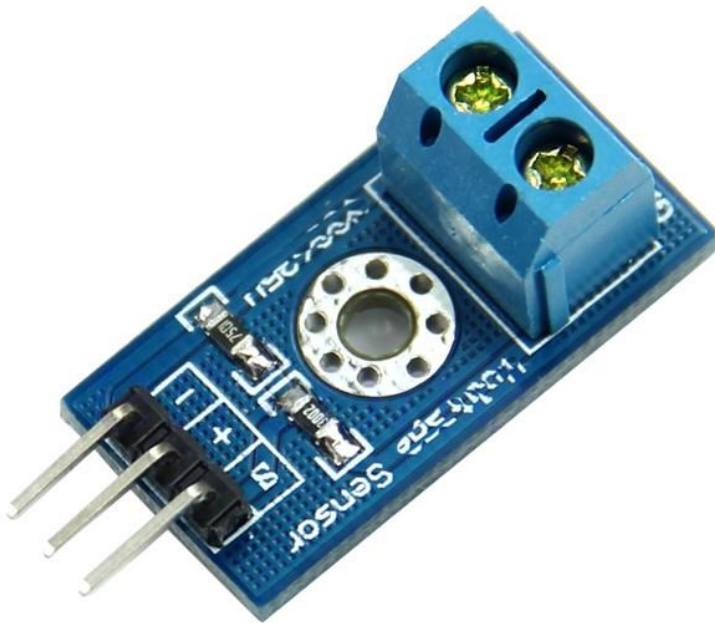


AC VOLTAGE SENSOR

The Voltage Sensor block represents an ideal voltage sensor, that is, a device that converts voltage measured between two points of an electrical circuit

into a physical signal proportional to the voltage. Connections + and – are electrical conserving ports through which the sensor is connected to the circuit. Connection V is a physical signal port that outputs the measurement result.

AC voltage sensor works according to Magnetic Modulation and is designed for AC voltage measurement. The output signal of this sensor is proportional to the input AC voltage. It can be used for continuous ac voltage monitoring of the system.



DC VOLTAGE SENSOR

DC Voltage Sensors are used to measure the potential difference between the ends of an electrical component. This can be used to measure the DC voltage in the circuits. The sensor is mechanically fixed by soldering the secondary circuit pins to the PCB. The primary connection can also be integrated in the sensor. Pulsating voltage with a galvanic insulation between primary and secondary circuits. The voltage detector indicates the presence of a voltage higher than a limit. The Voltage Sensors are equipped with a micro controller that greatly improves the sensor accuracy, precision and consistency of the readings. They are supplied calibrated and the stored calibration (in Volts) is automatically loaded when the Voltage Sensor is connected.

A DC voltage sensor is going to be able to determine and even monitor and measure the voltage supply. It is then able to take those measurements and turn them into a signal that one will then be able to read. The signal will often go into a specialized electronic device for recording, but sometimes, an observer will be present to manually read the sensor output. For reasons of accuracy, if more than one Voltage Sensor is being used in a circuit, ensure that they share a common earth. DC voltage sensor works according to Magnetic Modulation and is designed for DC voltage measurement. The output signal of this sensor is proportional to the input DC voltage. It can be used for continuous dc voltage monitoring of the system.

FEATURES

- Under-voltage, over-voltage, or voltage band models
- Powered from sensing input lines or from separate DC supply
- Available with time delays on pull-in and/or drop-out or with customized

- voltage-time trip curves

APPLICATIONS

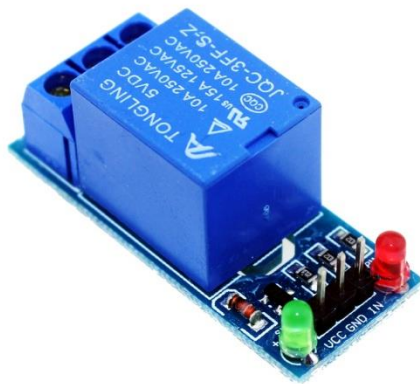
- Power generation unit
- Power transmission unit
- Industry and other applications

SINGLE CHANEL RELAY

DESCRIPTION

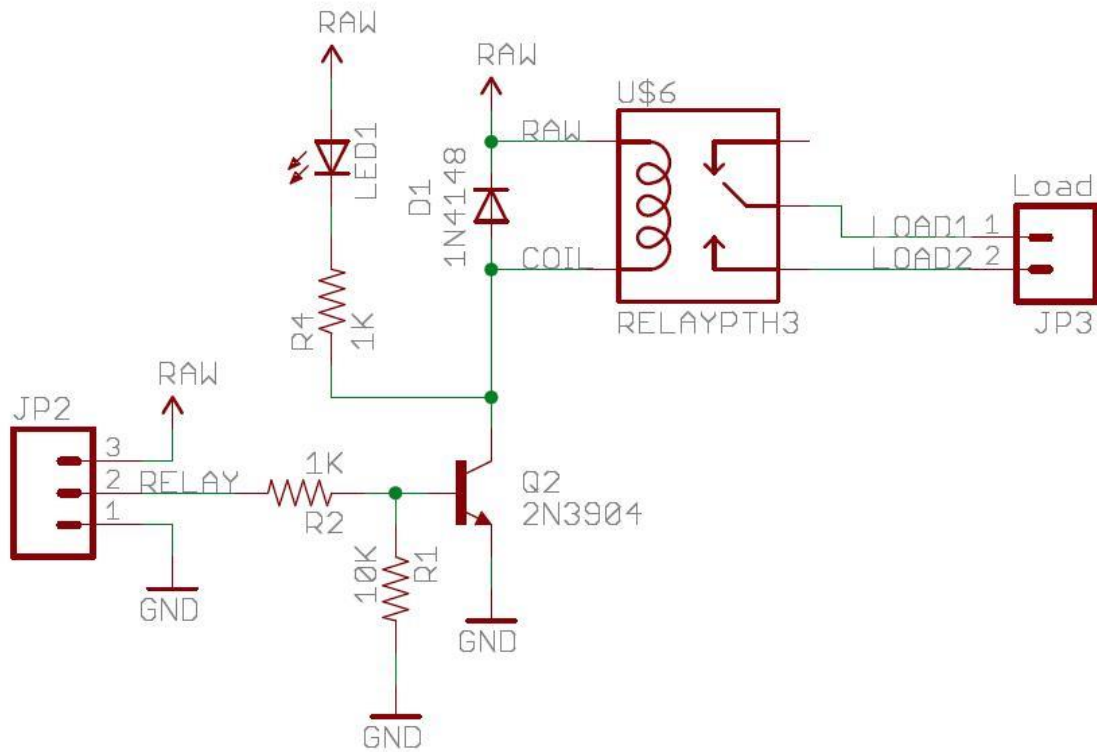
A relay is an electrically operated device. It has a control system and (also called input circuit or input contactor) and controlled system (also called output circuit or output contactor). It is frequently used in automatic control circuit.

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. ... When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized.



SINGLE CHANEL RELAY

Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. They were used to switch the signal coming from one source to another destination. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.



CIRCUIT DIAGRAM

A relay is an electromechanical switch which is activated by an electric current. A single relay board arrangement contains driver circuit, power supply circuit and isolation circuit. A relay is assembled with that circuit. The driver circuit contains transistors for switching operations. The transistor is use for switching the relay. An isolation circuit prevents reverse voltage from the relay which protects the controller and transistor from damage. The input pulse for switching the transistor is given from the microcontroller unit. It is used for switching of a single device.

FEATURES

- Input voltage: 12VDC
- Driver unit: ULN2003A
- Isolation unit: In4007
- Fast switching

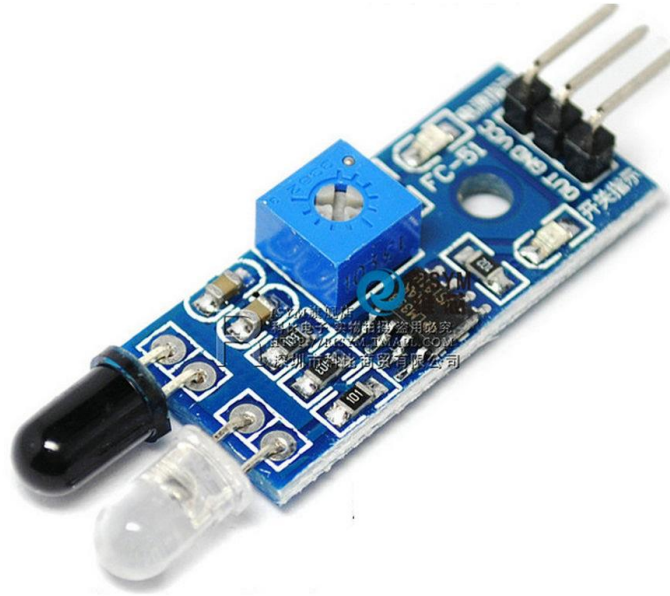
APPLICATIONS

- Ac load Switching applications
- Dc load Switching applications
- Motor switching applications

IR SENSOR

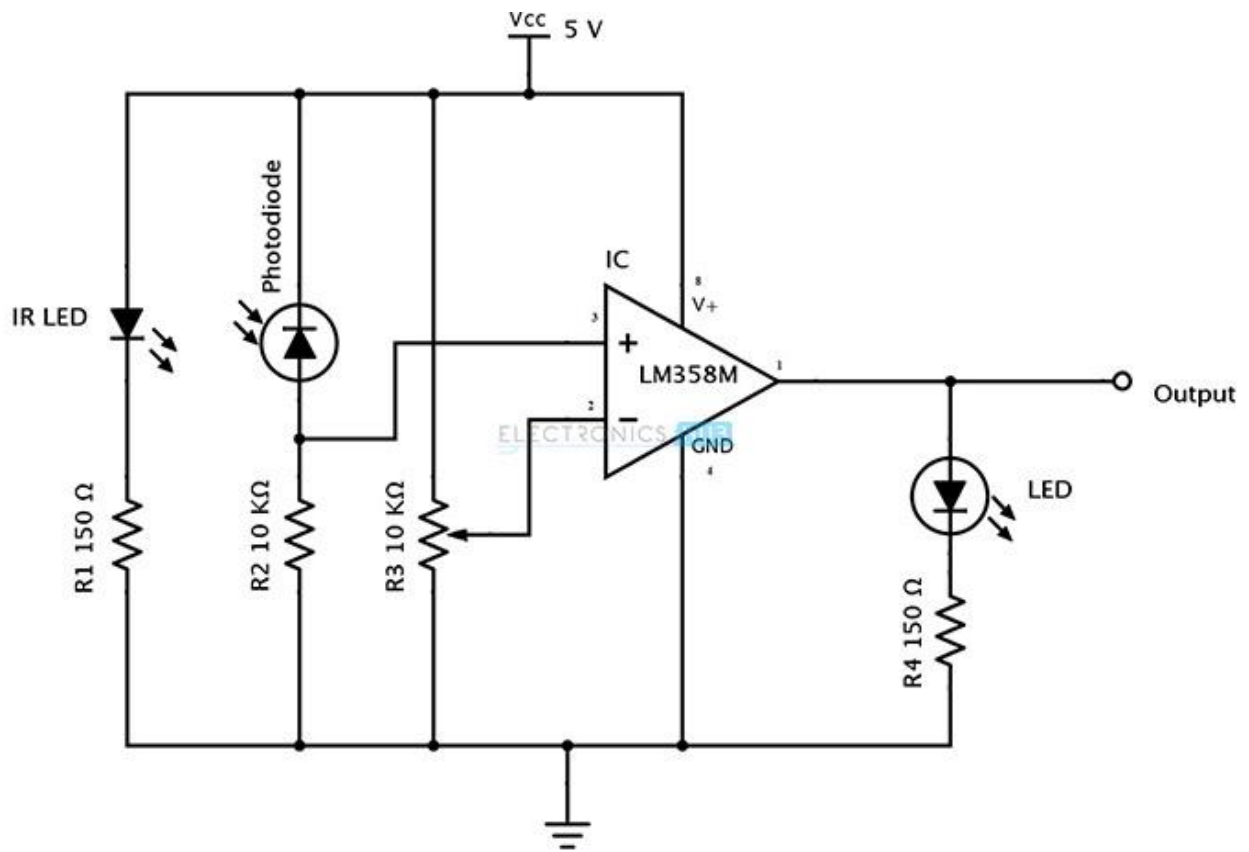
DESCRIPTION

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.



IR SENSOR

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received.



CIRCUIT DIAGRAM

FEATURES

- Input voltage : 3.3v
- Output : analog

APPLICATION

- Radiation Thermometers
- Flame Monitor
- Moisture Analyzers
- Gas Analyzers

BATTERY(12 V)

DESCRIPTION

Batteries are a collection of one or more cells whose chemical reactions create a flow of electrons in a circuit. All batteries are made up of three basic components: an anode (the ‘-’ side), a cathode (the ‘+’ side), and some kind of electrolyte (a substance that chemically reacts with the anode and cathode).

When the anode and cathode of a battery is connected to a circuit, a chemical reaction takes place between the anode and the electrolyte. This reaction causes electrons to flow through the circuit and back into the cathode where another chemical reaction takes place. When the material in the cathode or anode is consumed or no longer able to be used in the reaction, the battery is unable to produce electricity. At that point, your battery is “dead.”

Batteries that must be thrown away after use are known as **primary batteries**. Batteries that can be recharged are called **secondary batteries**.

12-volt battery, in its most common form was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a

polarized snap connector at the top. This type is commonly used in walkie talkies, clocks and smoke detectors. They are also used as backup power to keep the time in certain electronic clocks.

This format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel cadmium, nickel-metal hydride and lithium-ion. Mercury oxide batteries in this form have not been manufactured in many years due to their mercury content.

12V battery has a rectangular prism shape with rounded edges and a polarized snap connector at the top. A zinc-carbon (6F22) battery is a dry cell battery that delivers a potential of 1.5 volts between a zinc metal electrode and a carbon rod from an electrochemical reaction between zinc and manganese dioxide mediated by a suitable electrolyte.

It was introduced for the early transistor radios. It is usually conveniently packaged in a zinc can which also serves as the anode with a negative potential, while the inert carbon rod is the positive cathode. An advantage is that several nine-volt batteries can be connected to each other in series to provide higher voltages.

FEATURES

- Output voltage: 12v
- Current capacity: 2.5Ah
- Approximate Volume: 0.2 cu. in. (3.3 cu. cm.)
- Approximate Weight: 0.4 oz. (11 gm.)

APPLICATIONS

- Walkie talkies.

- It is used to assorted electronics projects.
- Use a 12V battery clip to easily connect your 9V battery to your Arduino.
- The "12V clip" is also used on some batter holders of assorted voltages.

LCD DISPLAY

DESCRIPTION

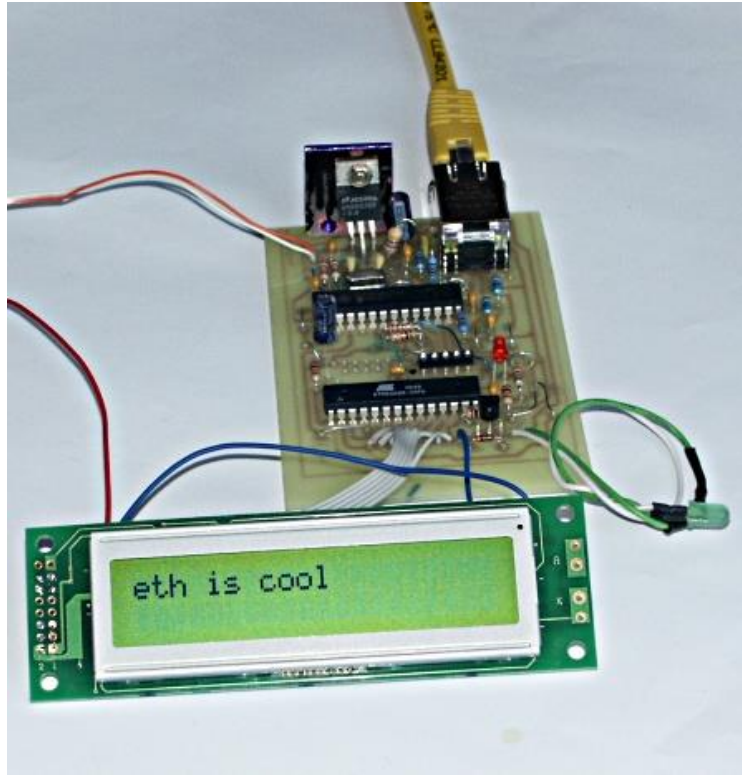
LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology.

Flat screen LCD and plasma screens work in a completely different way. In a plasma screen, each pixel is a tiny fluorescent lamp switched on or off electronically. In an LCD television, the pixels are switched on or off electronically using liquid crystals to rotate polarized light



16X2 LCD DISPLAY

LCD stands for liquid crystal display. They come in many sizes 8x1 , 8x2 , 10x2 , 16x1 , 16x2 , 16x4 , 20x2 , 20x4 , 24x2 , 30x2 , 32x2 , 40x2 etc . Many multinational companies like Philips Hitachi Panasonic make their own special kind of LCD'S to be used in their products. All the LCD'S performs the same functions (display characters numbers special characters ASCII characters etc). Their programming is also same and they all have same 14 pins (0-13) or 16 pins (0 to 15). Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc.



LCD INTERFACE WITH MICROCONTROLLER

This is an LCD Display designed for E-blocks. It is a 16 character, 2-line alphanumeric LCD display connected to a single 9-way D-type connector. This allows the device to be connected to most E-Block I/O ports. The LCD display requires data in a serial format, which is detailed in the user guide below. The display also requires a 24V power supply. Please take care not to exceed 5V, as this will cause damage to the device. The 24V is best generated from the E-blocks Multi programmer or a 24V fixed regulated power supply.

The 24 x 8 inch intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. A full list of the characters and symbols is printed on pages 7/8 (note these symbols can vary between brand of

LCD used). This booklet provides all the technical specifications for connecting the unit, which requires a single power supply (+24V).

FEATURES

- Input voltage: 24v
- E-blocks compatible
- Low cost
- Compatible with most I/O ports in the E-Block range
- Ease to develop programming code using Flow code icons

APPLICATIONS

- Monitoring

LCD INTERFACE BOARD

DESCRIPTION

LCD board is specially designed for interfacing with Arduino. This board consists of two sections namely data and control sections. This board is provided with a potentiometer to adjust the LCD. The supply voltage to the board is given from the controller or from a separate source.



LCD INTERFACE BOARD

The communication extension board provides a set of communication features and pin outs as well as an external power connector. The LCD-Board is ideal as an extension board for the Hitex LPC2478-Stick or the Hitex LPC3250- Stick. LCD module [STM32F4DIS-LCD] - consists of 3.5 inch LCD and driver board. This module is designed for Embest STM32F4DIS-BB board.

FEATURES

- Supply voltage: 5VDC
- Separate data lines
- Separate control lines

APPLICATIONS

- Display applications for Arduino and other controller

SOFTWARE DESCRIPTION:

ARDUINO IDE:

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

Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

Before uploading your sketch, you need to select the correct items from the **Tools** > **Board** and **Tools** > **Port** menus. The boards are described below. On the Mac, the serial port is probably something like **/dev/tty.usbmodem241** (for an Uno or Mega2560 or Leonardo) or **/dev/tty.usbserial-1B1** (for a Duemilanove or earlier USB board), or **/dev/tty.USA19QW1b1P1.1** (for a serial board connected with a Keyspan USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5, COM7, or higher (for a USB board) - to find out, you look for USB serial device in the ports section of the Windows Device Manager. On Linux, it should be **/dev/ttyACMx** , **/dev/ttyUSBx** or similar. Once you've selected the correct serial port and board, press the upload button in the toolbar or select the **Upload** item from the **Sketch** menu. Current Arduino boards will reset automatically and begin the upload. With older boards (pre-Diecimila) that lack auto-reset, you'll need to press the reset button on the board just before starting the upload. On most boards, you'll see the RX and TX LEDs blink as the sketch is uploaded. The Arduino Software (IDE) will display a message when the upload is complete, or show an error.

When you upload a sketch, you're using the Arduino **bootloader**, a small program that has been loaded on to the microcontroller on your board. It allows you to upload code without using any additional hardware. The bootloader is active for a few seconds when the board resets; then it starts whichever sketch was most recently uploaded to the microcontroller. The bootloader will blink the on-board (pin 13) LED when it starts (i.e. when the board resets).

EMBEDDED C

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems.

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors are manufactured as components of embedded systems.

Examples of properties of typical embedded computers when compared with general-purpose counterparts are low power consumption, small size, rugged operating ranges, and low per-unit cost. This comes at the price of limited processing resources, which make them significantly more difficult to program and to interact with. However, by building intelligence mechanisms on top of the hardware, taking advantage of possible existing sensors and the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels as well as provide augmented functions, well beyond

those available. For example, intelligent techniques can be designed to manage power consumption of embedded systems.

Modern embedded systems are often based on microcontrollers (i.e. CPU's with integrated memory or peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more-complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP).

Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

PROGRAM

```
#include <LiquidCrystal.h>
```

```
const int rs = 7, en = 6, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
```

```
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

```
float current;
```

```
int ir;
```

```
void setup()
```

```
{
```

```
    Serial.begin(9600);
```

```
    lcd.begin(16, 2);
```

```
    lcd.setCursor(0, 0);
```

```
    lcd.print(" Wireless Power ");
```

```
    lcd.setCursor(0, 1);
```

```
    lcd.print("Transfer For e-V");
```

```
    delay(2500);
```

```
    pinMode(8, OUTPUT);
```

```
    pinMode(A0, INPUT);
```

```
pinMode(A1, INPUT);

digitalWrite(8, HIGH);

}

void loop()

{

    current = 0;

    for (int i = 0; i < 1000; i++)

    {

        current = current + (.0264 * analogRead(A1) - 13.51) / 1000;

        delay(1);

    }

    ir = digitalRead(A0);

    Serial.print("Current = ");Serial.println(current);

    Serial.print("Ir = ");Serial.println(ir);

    // delay(250);

    if(ir == 0)

    {
```

```
digitalWrite(8,LOW);

lcd.clear();

lcd.setCursor(0,0);

lcd.print("Charging Started");

lcd.setCursor(0,1);

lcd.print("Current ");

lcd.print(current);

lcd.print(" A");

delay(2000);

}

else

{

digitalWrite(8,HIGH);

lcd.clear();

lcd.setCursor(0,0);

lcd.print("No Vehicle Found");

lcd.setCursor(0,1);

lcd.print(" For Charging ");

delay(2000);
```

}

}

CONCLUSIONS

In this system, we are presenting the Wireless Power Transmission. As the electric vehicle in the market is increasing. We can use the wireless charging system to charge our vehicles. This system shows the efficiency and implementation of the charging station in future technology. This paper also covers future technology like payment through RFID tags and self-serviced entry and exit gate to maintain congestion at the station. This will be helpful for those who are doing research in the field of wireless power transmission. And many had came up with the greatest invention like charging mobile wirelessly, and other electronic gadgets too. This could be the future scope for developing the charging station, As electric vehicle are increasing in demand.

FUTURE SCOPE

The transfer power for 150 mm air gap is 3.74 kW and transfer efficiency are gained up to 92.4%. The charging time is around 1 hour and 39 minutes to fully charge its battery from 0 state for a 150mm air gap for an EV with 5.1 kW power may take.

Wireless power transfer technology is a field that has a huge potential of becoming a mainstream technology in the future. The proposed wireless power transfer circuit can be used for EV charging applications. With the necessary research and development in this field, it is possible to create an electric bicycle from a conventional bicycle that is capable of charging wirelessly. In the future, the advanced circuit as used the coil design can be imported from the wireless power transfer circuit that is closer to the real world hardware. With adequate development and innovation in this field, it is certainly possible to create wireless power charging stations capable of charging electric bicycles and electric cars or any heavy EVs from the same power charging station, at a faster charging rate than currently available charging techniques

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SOURCE CODE:

PROJECT PICTURE:

