

# Smart Wireless Battery Charger with Charging Monitor: A Review

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**Abstract** - The project activity introduces a wireless battery charging system with a charging device. The proposed method transmits power without any physical connection between the transmitter and the receiver side. The AVR family microcontroller's (ATMEGA328P) which are used for proposed system constantly measures the charge on the battery and charges the battery accordingly this whole process is automated by microcontroller. The charge of the battery is displayed on the LCD screen (Voltage). As soon as the battery is fully charged, the microcontroller triggers switch off action and the supply are cutted out. An electronic ballast circuit is used in the project to scale down the grid's 230V, 50Hz AC supply to 12V AC (50Hz). An air core transformer's primary coil receives the transformed output. As current flows through primary coil, the magnetic induction process causes an EMF to be induced in the secondary coil. The transformer's secondary coil produces 12V of high frequency. Power is passed from the primary coil to the secondary coil, which are spaced apart by 2-4 cm. By enlarging the coil, the range may be extended. An Avr family microcontroller receives the secondary coil's output. This microcontroller keeps track of the battery's charge in real time, automatically charges the battery until it is fully charged, at which point it stops being charged. This charger may be used to charge and test the charge of batteries for a variety of gadgets and applications, including battery-powered scooters and electrical vehicles.

**Key Words:** WPT (Wireless Power Transfer), Wireless Communication, Wireless Charging System with Charging Monitor, Wireless Energy Transfer.

## 1. INTRODUCTION

Wireless battery charger can be used in many battery-powered products likely smart watches, smartphones, and a host of other small electronic products. Originally the technology focused at small products. Now a days wireless charging technology is used for larger applications which include cars batteries and many other items. Wireless charging usually works on principal of power transmission from one circuit to another via inductive coupling between two circuits. Since no electrical connection directly is implemented it is very easy and does not depend on contacts that may

wear out and become unreliable after many charging cycles.

Wireless battery charging works by transferring electricity between two objects, often coils, using the magnetic induction or magnetic field principle. Power is transmitted without a physical connection being made from a source to a receiver, where it is frequently utilised to recharge a device's battery. With so many portable gadgets like smartphones, smartwatches, media players, and other portable devices, wireless charging is advantageous. However, they are widely used in items like electric toothbrushes when wireless functioning is necessary and transmission could be inefficient or fleeting.

The flat shape of the transformer utilised in this manner makes it easier to access the equipment to be employed. Many wireless battery charging options are used when purchasing small items. The transformer's secondary is linked to the driving circuit, while the main side is connected to the 230V AC mains supply, which serves as the motherinower's typical power source.

Typically, the wireless battery charging mechanism will include two flat coils to accommodate the majority of circumstances and user applications. Usually, the centre of the pad or mat where the charging device is to be positioned is where the power supply is located. There are a few key points associated with wireless transmission-receiver system. Factors such as efficiency, range of coils, frequency waves and the like affect the way wireless charging works. Another aspect of wireless charging that needs to be carefully maintained during design is to check and ensure that wireless power transfer's transmitting circuit and its frequency must not affect or interfere with other electrical appliances and circuitry of outside world in the property, specifically those who receive its power.

Instead of utilising traditional copper wires and current connections, this project measures battery charge and is a wireless power transfer instrument. Additionally, it uses a wireless communication method to fully charge the battery. Nikolas Tesla developed the idea of wireless communication. This power is designed to transport just a tiny quantity, such as to recharge batteries and other devices. We have a wirelessly powered

rechargeable battery for display reasons. This requires an electrical connection to convert AC 230V 50Hz to AC 12V high frequency before being connected to the main air core transformer coil.

A maximum frequency of 12V is produced by the second transformer coil. Additionally, the system gauges battery charge and fully charges it. To do this, we employ a tiny AVR controller from the AVR family, which continuously monitors the battery charge, until the battery is fully charged, at which point the charging process is stopped. Consequently, the energy is transmitted in this manner via the first coil to the second coil after being separated by a distance of about 1 cm. By expanding the coil's size, width may be increased. [fig.1]

The batteries for a number of equipment and applications may be charged with this project, including motorbikes that charge the battery and unconnected vehicles that can only charge to a certain extent.

**Block Diagram**

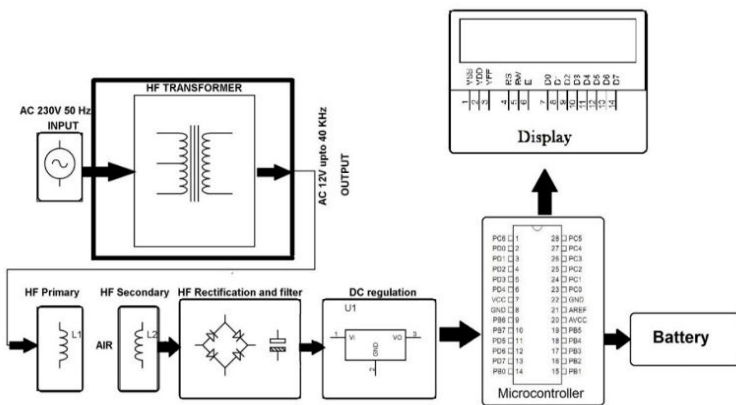


Figure. 1 Block Circuit Diagram

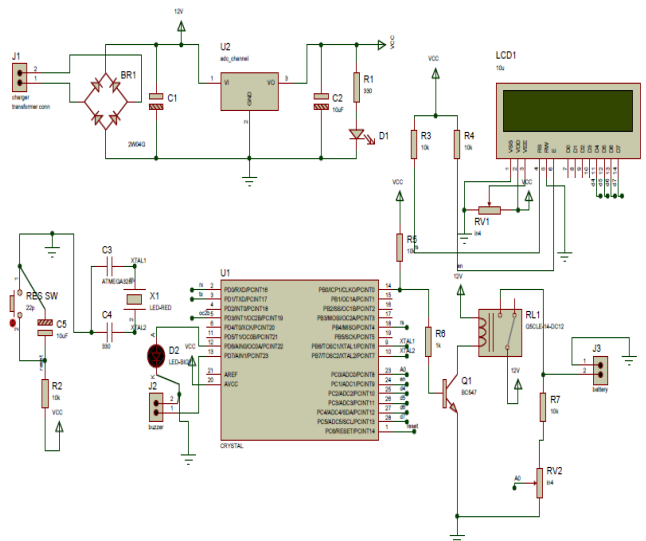


Figure. 2 Schematic Diagram [9]

The output of transformer (Step downed AC) is connected to bridge rectifier where the bridge rectifier is rectifying the output and the frequency is getting doubled as peaks of the negative sides are shifted due to the bridge rectifier and hence we get our output as undirected one. This output is passed through the capacitor C which smooth out the DC output and removes AC component from the system if any present. Further this smoothed output is connected to input pin of Voltage regulator IC (7805) which gives the constant output of 5V despite any change or fluctuations in input side of the circuitry. again, a capacitor is connected at output of voltage regulator IC (7805) to avoid sudden change in output making sure that it will give its rated output which can drive the dependant further circuitry of microcontroller and sensors of circuit.

The bias in Fig.1, Fig.2 is spontaneous which means we cannot say that if any coil finds bias. Therefore, the second coil generates A.C as a result of the current flow in the primary coil throughout both halves of the cycle. The frequency of A.C is 25 KHz due to the quick switching of transistors. This has copper L1 windows that are linked to the second transformer. EMF from L1 sends 25 KHz A.C. to L2 (Transformer System). [Fig.2]

The bridge rectifier, which produces pulse-setting DC and filters the voltage-driven L2 coil through an electrolytic capacitor of around 1000 uF, is made up of four diodes. The capacitor's fully filtered output is sent to IC LM7805, which outputs a constant 5 volts on PIN 3 regardless of the input dc (LM7805's rating ranges from 9 to 14 volts). [Fig.2]

The 5V DC output of LM7805 is also filtered with a small 10uF electrolytic capacitor for avoiding any circuit-

generated noise and sudden change in output that can be used to drive next circuitry. One LED is connected after capacitor of LM7805 which shows the indication of power is on or off for circuitry. And other winding of the transformer is used for battery charging which deals with higher voltages.

The reaction converter's size, density, and end time of the ferrite core flux, as well as the frequency of oscillation, are all heavily influenced by these factors. The current in the response transformer grows after the cycle has started until the spine is full. At this moment, the active transistors' reaction drive is turned off, and after its expiry date, it turns off. The oscillation frequency in this application is around 25 kHz. Dependence on storage time weakens the transistor's RC network, which accelerates the rate of discharge from the base when the transistor is turned off. The network also strives to stop the device's artificial opening by separating the base from the roaming that the base transformer causes when it turns off.

To have storage durations within predetermined ranges, the transistors and FETs must be chosen, tested, and selected. Larger storage time transistors can lead the circuit to wash below the output converter's operational thresholds, resulting in complete filling at the conclusion of each cycle. As a result, the transistors' collector current will surge throughout the cycle, which will eventually lead to overheating and destruction.

## 2. RELATED WORK

In previous chapter we see that the battery charges wireless without using wires (copper cables) and it charges battery up to 100% capacity by using Microcontroller from the AVR family, which continuously monitors battery charging and charges the battery until it is fully charged. could block the battery from charging.

In this chapter focuses on the magnetic field layout of a multiple-coil transmission power transfer system for recharging electric cars with a minimal air gap between the transmission coils and the receiver. For simplicity of use and a superior user experience, this technology has several potential uses, ranging from tiny toothbrushes to powerful electric cars.

There are already various smart wireless battery charger units in the market. The Smart Wireless Battery Charging Project comes with two units, one of which is a wireless power source that is last receiving unit that converts usable energy. This power is used in this project to charge a 12V battery charged by the ATmega328 system and is disconnected as soon as the required power is reached. It all starts at the end of the

transfer. Here, power from the supply of large pipelines is taken and reduced to AC 12V at a frequency of 38 KHz. Because air loss is so low at high frequencies, this high frequency is necessary. The circuit inside the high frequency transformer handles frequency reduction on its own.

Then a second coil out of the transformer transmits this energy in the form of electric waves. The receiver coil when placed within the limits of receiving these energy waves converts back the electromagnetic waves into electrical signals. In this way the receiver board gets powered up to run the micro-controller system as well as for charging the batteries. Battery charge is monitored from time to time to see if the desired voltage has been reached. For the purpose of studying analogy energy, these analogy energies are converted into digital values and returned to the percentage that will be displayed on the LCD screen. When charging is complete, the relay switches on and disconnects the battery supply until the battery voltage drops below the desired voltage. When charging, it indicates its charging and charging percentage and notifies you when charging is complete.

Ahmed A. S. Mohamed and Chr. Joffe [1-3] presented the magnetic field configuration of the Inductive Power Transmission System (IPT) for using a narrow air gap to charge electric cars the transmission coils and the receiver. The placement of a particular vehicle package utilising a new integrated numerical approach and processing of other geometric coils and other twisted structures improve the magnetic design of a multi-coil system.

Razvan asanache and Isaac Nam [4-5] the result is a wireless charger with a few desirable features: eliminates the need for digital communication between the transmitter and receiver, the design is strong against coefficient of integration and load variability, operates most of the time in a highly efficient (cohesive) operating environment. gain frequency), uses synchronized adjustments to improve efficiency, does not require a lower battery charge controller, and provides faster charging performance mode.

The paper present by D. Kurschner [7] a wireless Power Transfer (WPT) uses magnetic resonance, a technology that can free a person from irritating cords. Currently various studies have been done and continue to increase the efficiency of wireless power transmission. This project initiated the introduction of WPT to charge an electric car battery. In this study, the distance between the sender and receiver circuit has been improved, and at the same time the different power level at different distances between the sender and receiver has been assessed.

In order to analyse the wireless charging process, the WPTS (Wireless Power Transfer System) is built. Using the technology that is now in use as the state of the art, preliminary study was done on the fundamentals of wireless power transfer applications. Based on physical and strength criteria, the Resonant Inductive Power Transfer (RIPT) charging system is chosen as the best candidate model.

Pedro Lopes [9] studied RIPT control is recommended as well power (electrical) converter rating and damages the networks. Synonyms for results are available, also made to measure, is the indication. The suggested topology and control are verified by testing. Analysis of the observed waves leads to a conclusion on the overall effectiveness of the inductive resonant charger.

A novel method for electric car wireless charging that uses the battery chargers to demonstrate the theory that has been created. Electric car battery charging with a charger and cable is time-consuming, costly, and unsafe. Vehicles with fuel and petrol-powered vehicles now on the road contribute to air, noise, and greenhouse gas pollution.

Shital R. Khutwad [8] this study describes the inductive coupling method-based wireless battery charging system that has been used for electric vehicles. The driving loop, which uses a MOSFET for switching, is utilised between the transmitter coil and the reception coil. When the vehicle is present or not, you may turn the transmitter coil circuit ON or OFF, correspondingly. The system provides safety, dependability, simple to maintain, and an extended product life while operating at a 67 percent efficiency level. [8]

Wireless transmission, another name for wireless charging, is a technique that enables a power source to transmit magnetic energy to an electrical load in the air without the use of cords. Due to its simplicity of use and improved user experience, this technology draws a wide range of applications, from low-power toothbrushes to more potent electric automobiles. Today, wireless charging is quickly evolving from futuristic concepts to a technology found in many commercial items, particularly smartphones and other smart gadgets.

Xiao Lu [10] studied a new-generation smartphone with integrated wireless charging capabilities started to be released in 2014 by a number of top smartphone makers. According to IMS Research, the market for wireless charging will be worth \$4.5 billion in 2016. According to Pike Research, the market for mobile phone devices is expected to quadruple to \$ 15 billion by 2020.

A rigorous process of regional level analysis and design of all systems, developed to for the first time, based on the introduction of a two-hole parallel circuit, to define a wireless power connector where the transmitter and receiver are in the middle of a nearby field or in an equally distant region. This method allows one to accurately calculate the value of a qualifying system, i.e. the efficiency of the power transfer.

A. Costanzo et al [11] the detailed examination of specific dual configuration guidelines is followed by the adoption of software tools based on a mix of complete wave analysis and indirect harmonic balancing methods. A few real-world examples based on this design method are provided to show the testing and predicted behaviour of anomalous devices for both close-by and far-off power transmission.

J. Garnica [12] Since the early 20th century till the present, wireless power has been a hot issue. This study explores radiant energy utilising microwaves and follows the development of wireless energy transmission from Nikola Tesla. This study discusses the distinctions between near-field approaches and remote regions, explains why the near-field approach is more appropriate for consumer electronics, and investigates close-by energy transfer using magnetic field. Examples of wireless power systems for short- and medium-term use are investigated.

Power is suggested to be sent one way to a greater operational area utilising the unique concept of wireless power transmission via inductive coupling. This idea makes use of a zigzag group that was specifically created on the transmission side to create a moving magnetic field. This field's reception coefficient is affected by magnetic fluctuations, which feeds power to the coil.

J. Gao [13] the prototype system offers one or more power receivers that are 4.0 mm thick and 11.5 mm broad an effective working area of 180 by 220 mm. Each receiver gets a static power of around 330 mW at 3.1 + 0.4 V dc, which is electrically driven throughout the working system. This idea may be applied to enable offline microrobots.

Since its introduction by Nikola Tesla in 1900, the concept of wireless power beams, lasers and mutual magnetic induction. Far-field systems such as lasers, focused microwaves and large aperture RF links are well suited for traversing large (>100 m) distances but exhibit relatively low (<10%) overall system efficiencies due to beam diffraction limits, atmospheric absorption and multiple conversion losses. Near-field devices using direct or resonant magnetic induction offer higher



efficiencies but only at low power levels and close distances.

G. E. Leyh and M. D. Kennan [14] this paper explores the potential of using coupled electric fields between two tuned resonant transformers as a means for transmitting considerable power (>500 W) over laboratory-scale distances (5 to 20 m) with reasonable efficiency. The paper presents design concepts, circuit simulations and test results.

### 3. METHODOLOGY

In previous chapter we observe that wireless power transmission and reception has attracted interest since the early 20th century till the present day. Since Nikola Tesla first proposed the idea of wireless power transfer in 1900, it has evolved in a variety of ways.

In this chapter we do (1) a continuous test which is an electrical circuit test to determine the current flow (that is actually a complete circuit). (2) the power of the test performed to check whether the electrical power in the various terminals complies with the requirement or not. Mobile phone and cordless appliance charging are no longer necessary with the use of cables. By merely positioning the appliance close to a wireless power transmitter or an authorised charging station, a wireless charger allows the battery inside any battery-powered equipment to be charged. As a consequence, the appliance enclosure can be completely sealed. In addition to the inherent convenience it provides, wireless charging may also significantly increase dependability because the side-mounted charging port on an appliance is susceptible to mechanical damage and can even be accidentally plugged in with the incorrect adaptor. Wireless charging is based on the well-known Faraday's law of induced voltage, which is frequently applied in motors and transformers.

The contactless Inductive Power Transfer (IPT) allows electrical energy to be transferred to both stationary and mobile consumers without the use of physical connections, wires, or slip-rings. A new systematic and modular design technique must be used in order to reduce the increased development effort of modern contactless inductive power supply. These methodologies, which are specifically integrated into a simulation software tool, incorporate novel techniques to improve the transfer efficiency and placement flexibility of the consumer device.

The coil and ferrite geometry can be optimised to increase positioning tolerance. In this way, the effects of modifying physical and geometrical factors on magnetic coupling and therefore on electrical transmission are

examined. A novel IPT system for home appliances with an output power range of 1 kW is given as a consequence of the design technique, with an overall efficiency of more than 90% and a high positioning tolerance.

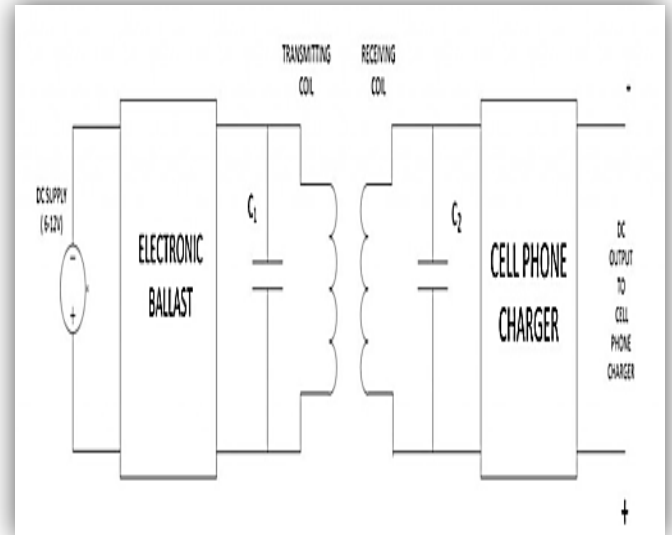


Figure. 3 Transistor Switching Action

In above Fig.3 It depicts the input of a 6–12 V direct current source delivered by a battery or eliminator to the electronic ballast. Inside an electronic ballast, a technique called inversion converts DC signals into AC signals. They are seldom encountered. The electronic ballast's transistor switching action high-frequency AC signals from low-frequency AC signals are produced. The transmitting coil uses AC impulses with a high frequency received from an electronic ballast's input. Receiving Coil produces an EMF as a result of *Magnetic Induction and Resonance*. The Cell Phone Charger Circuit receives its input from the Receiving Coil's output. Therefore, wireless power transfer enables cell phone charging.



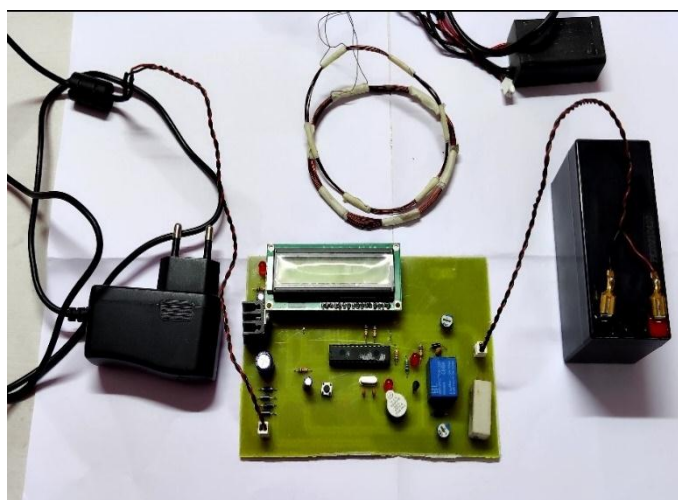


Figure.5 Working circuit

The 16K bytes of system storage on the ATmega328 are located on the chip. Flash is configured as 8K 16 because AVR instructions are all 16 or 32 bits wide. The Flash Program memory area is divided into two sections, Boot Loader Phase and Phase, for the security of the software. ATmega328 application.

The location of the presently used command is stored in this programme counter register on a computer's CPU. The system for each, counter raises the value it has stored by 1. command that is downloaded. The application calculator directs users to the next message in order once each command has been downloaded. The system calculator often resets to 0 when the machine restarts or resets. A programme on a computer is a predetermined set of operations that the machine carries out. A computer processor's software is called an instruction. An address in a computer refers to a unique spot in storage or memory. One of the few data archives used by the CPU is the register. The most crucial component of microcontrollers is the system counter.

They are the fastest AVR microcontroller that uses multiple commands in a single operating cycle. PICs are about 4 times or slower than AVR, using smaller amount of power and can work with a variety of energy-saving methods. Let's make a comparison between the three most widely used microcontroller families.

AVR is an 8-bit small controller owned by the RISC (Reduced Instruction Set Computer) family. In the RISC architecture a bunch are not only few in number but also easy to use and quick to execute. Another category of classification is CISC (Complex Instruction Set Computers). To view the between differences CISC and RISC. We will investigate more on this as we learn more

about the features of the AVR microcontroller in the section that follows.

The microcontroller has the ability of receiving and transmitting data that is eight bits wide. Eight-bit I/O registers are readily available. The family of AVR controllers has a register-based structure, which implies that each operation's datatypes and outcomes are kept in separate registers. An easy example of conducting an OR operation between two input registers and saving the result in an output register is shown in the previously mentioned figure 5, which.

- There are three types of AVR controls:
  1. TinyAVR - Small in size and memory, only appropriate for application basics
  2. MegaAVR - The majority of them are ideal for medium and sophisticated applications, contain a lot of internal peripherals, and have good memory capacity (up to 256 KB).
  3. XmegaAVR - Used to promote sophisticated apps that demand fast processing and a lot of system memory.

AVR microcontrollers have 32 x 8-bit standard operational registers and are built on an advanced RISC architectural design. During one cycle of the clock, the AVR is able to input into two registers for general objectives and place it in the ALU to perform the requested function, and then return the result to the incomprehensible register.

ALU is able to perform calculations and entries between the register or from the register are performed logically in terms of consistency. Only one register tasks such as taking a complement can also be performed at ALU. We note that the AVR does not have an accumulator-like register as in the 8051 family of microcontrollers; tasks can be performed between any registers and can be saved in any of them.

AVR follows the Harvard Architecture format where the processor is loaded with different memory and System bases and Data information. Here while the command is being performed fully, the following command is pre-downloaded from the system memory.

Since AVR is capable of performing one cycle, it indicates that AVR can process a million commands if a frequency of 1MHz is utilised. The controller's processing speed will increase with increasing operation frequency. We have to improve energy efficiency at processing speeds and we need to choose the right frequency for operating.



- There are two flavours of the Atmega16 microcontroller:
  1. Atmega16:-- Operating frequency range is between 0 and 16 MHz
  2. Atmega16L:-- Operating frequency range is between 0 and 8 MHz

### 3.2 SOFTWARE DESCRIPTION

Arduino is an open source software and software company, project, and community of users who design and produce small single-board controls and small control kits to build digital gadget. Different types of microprocessors and controllers are used in Arduino board designs. boards that may be attached to various expansion boards (also known as "shields") or veneer boards (making prototyping possible) and different circuits. These boards are equipped with digital anchor sets and output/ input (O/ I) symbols.

Programs can also be loaded onto boards with a network of ports, certain variations also including Universal Serial Bus (USB). The computer programming languages C and C++, as well as a common API commonly referred to as the Arduino language, which is supported by the language of Processing and utilised with an altered rendition of the Processor IDE, can be applied to manage minor controls.

The project of Arduino started in 2005 as a student device at the Italian Institute of Interaction Design Ivrea, it seeks to present novices and everyday users with a cheap and simple route to construct devices that function according to their requirements utilising actuators and sensors. Recreational robots, motion, and temperature detectors are typical examples of such gadgets for beginners.

The project's objective was to provide easy, affordable tools for non-engineers to use while producing digital projects. The Wiring platform featured an ATmega128 microcontroller on a printed circuit board (PCB), a Processing-based IDE, and library features for quick microcontroller programming.

IDE (Integrated Development Environment) is a software program that given complete resources for computer programmers to develop software. The IDE usually made up of at least single source code editor, a dynamic tool builder and corrector. A relocation control system or other tools that help with the creation of Graphical User Interface (GUI) may occasionally be incorporated, blurring the line between IDE and other components of the larger software development environment. For object-based software development,

many contemporary IDEs additionally include a class browser, object browser, and section diagram.

Arduino IDE is a multi-platform implementation written in Java programming language. It comes from the IDE of language processing and editing. It includes a code editor with features such as cut and paste text, replacing and searching text, auto-loading, splint matching, and highlighting syntax and provides easy one-click ways to merged and upload programs to the Arduino board. It also contains a message box, a text repair, a toolbar with buttons for general functions and a menu of work menus.

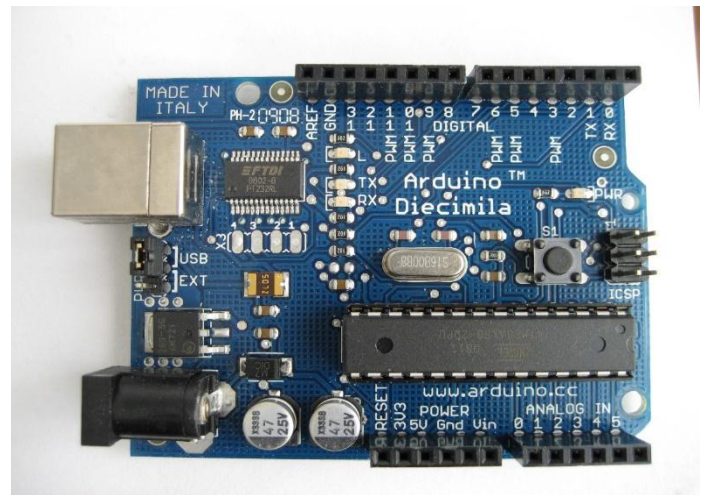


Figure. 6 Arduino Circuit

The Arduino IDE has specific code guidelines to support the C and C++ languages. Software from the Wiring project, which offers several installation and output operations, is included in the Arduino IDE. User-coded programming only needs two fundamental operations, the main programme stub is connected to the main programme loop and the initial drawing () in a cyclic executive program via the GNU tool-chain, embedded with IDE. distribution. Arduino IDE uses the program *avrdude* to convert usable code into a text file in hexadecimal text that is downloaded to the Arduino board via an uploader program on the firmware of the board.

The Arduino project offers an Integrated Development Environment in addition to typical compiler tool-chains (IDE). As a tool for students, the Arduino project began in 2005 to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.



## ▪ IDE 2.0

The Arduino Pro IDE was made public. Next, in March 2021, IDE 2.0 was given as the new name for the beta test. Despite advancements including a more professional programming environment, autocompletion support, and Git integration, the system continues to use the Arduino CLI (Command Line Interface). The frontend of the programme is built using the Eclipse Theia Open Source IDE. The following are the primary features of the latest release:

- Modern, well equipped working environment,
- Pro Mode, Classic Mode and Dual Mode,
- New Board Manager,
- New Library Manager,
- Board List,
- Basic Auto-Completion,
- Serial Monitor

## ▪ Sketch

In the Arduino IDE, a sketch is a written programme. The useable computer stores sketch the extension as text files "extension. ino." Pre-1.0 versions of the Arduino Software (IDE) stored sketches with the "extension. pde" format. Only two functions are present in an Arduino C/C++ programme:

- `setup()`: This function is never used more than once when a sketch starts following a power-on or reset. Using it, the sketch's variables, input and output pin modes, and other necessary libraries are changed. It is connected to the primary goal().
- `loop()`: The function `loop()` is continually executed in the main programme after the `setup()` method quits (ends). Until the board is turned off or reset, it is in control. It is comparable to the `while(1)` function.

## 3.3 CONTINUITY TEST

In electronics, a continuous test checks an electrical circuit to see if it is flowing current (that it is actually a complete circuit). Continuity testing is performed by setting a small voltage (series cable with LED or a component that produces sound like a speaker) throughout the selected path. The circuit is "open" if damaged components, broken conductors, or excessive resistance are obstructing the passage of electrons.

Numerous current metres and specialised continuous testers—cheap, straightforward devices often equipped with a simple light to monitor the current flow—are

tools that may be used to conduct continuous tests. There won't be many inconsistencies between "right" conclusions, and only between "right" conclusions, therefore checking the string of strings' continuity to identify the two non-single ends is a significant application.

As soon as the hardware soldering and setup are finished, this test is performed. This examination aims to find any open power lines in the circuit following a blackout. In many cases, the power supply in the circuit is lost due to improper adhesion, improper and improper handling of the PCB, improper use of coupling iron, partial failure and the presence of interruptions in the circuit diagram. We use several meters to perform this test. We store several meters in buzzer mode and connect the ground terminal several meters down. We connect both terminals to a path that needs to be tested. If there is a connection you can hear a beep sound.

- High frequency transformer and wirelessly transforming power -We are using coli which is high frequency transformer and wirelessly transforming power to the circuit through second coil attached to the circuit.
- LED screen monitoring - When we supply power the circuit indicator starts glowing which indicate that power supply through coil to coil and the LED screen monitor show us charging status.
- The fully charged battery - As soon as the battery charged 100% the LED screen shows the status. The battery Fully charged and the circuit automatically switch off the supply.

## 3.4 POWER ON TEST

This test is done to determine whether, the voltage of power at the different points complies with the necessary power or not. We take several meters and kept them in voltage mode. Remember that these tests are done without ICs. When employing a transformer, we must first verify that the transformer's output produces the necessary 12 V AC voltage (depending on the transformer kept in the circuit). When the battery is in operation, we use a multi-meter to determine if it is completely charged or not based on the battery's specified voltage.

Then we apply this voltage to the power supply circuit. Note that we do this test without ICs because if there is too much electrical power, this could lead to damage to ICs. If the circuit contains an electrical controller it checks the input to the power controller (such as 7805, 7809, 7815, 7915 etc.) that is, does it get the 12V input

and output required depending on the controller used in the circuit.

This output from the power controller is supplied with the power supply pin of certain ICs. Therefore, we check the voltage level on those pins to see if we are getting the required electrical power. Similarly, we check other terminals for the required voltage. In this way we can ensure that the voltage across all terminals complies with the requirement.



Figure.7 ATmega328 IC

- Arduino Planning Project - Integrated Development Centre (IDE), It was created using the Java programming language and is a cross-platform application. It is built using the Language Processing IDE and Strings. It is intended to acquaint artists and other newcomers who are not familiar with software development with programmes.
- Sketch - The Arduino IDE program is called a "sketch". It provides a code editor with tools like syntax highlighting, bracelet matching, and auto-zoom, as well as a straightforward one-click mechanism for integrating and uploading programmers to the Arduino board.
- Programming language - When editing code, the Arduino IDE supports C and C++ utilizing certain rules. The wiring undertaking, which is an application library that comes using the Arduino IDE and provides a variety of standard installation and techniques for output.
- Compiling and Linking - The standard Arduino C / C++ diagram combines two functions that are integrated and linked to the main stub of a program () in a functional cyclic executive system, connecting to and using the GNU toolchain, included with the Arduino IDE distribution. Uses the software to convert the usable code into a text file in hexadecimal format, which is then uploaded to

the Arduino board using the uploader programmer built into the firmware of the board.

- Coding – The IDE code editor is called an Integrated Development site. IDE is an application for software used to formatting your code, testing syntax, and using and testing your code. Some IDEs can work in multiple programmed language, while others are more specific only in one language.

### 3.4 ADVANTAGES And DISADVANTAGE

- **Wireless Power Transmission Using Inductive coupling** delivers various benefits over other choices, including the following:
  - **Simple Design** -- Both in principle and in practise, the design is not difficult to implement. The built-in circuits are simple to put together and use a small number of components.
  - **Lower Frequency Operation** -- The technology operates in the kilohertz frequency band. Additionally, there is virtually little radiation danger in the LF-band.
  - **Low Cost** -- The entire system is built with distinct, easily accessible elements. The design didn't require any specialty or specially ordered parts. As a result, we were able to drastically cut the system's overall cost.
  - **Practical for Short Distance** -- As long as the coupling coefficient is optimised, the system is particularly useful at close range. The design also provides the flexibility to reduce the receiver size significantly for practical applications.
  - **Wireless Power Transmission using Inductive coupling** - There are various drawbacks to this approach that should be highlighted.
  - **High Power Loss** - The flux leakage is quite high because of its major air designs. Low efficiency and excessive power loss are the effects of this. When used in conjunction with a logical system, weight loss might be slowed down by improving productivity.

## 4. RESULT

1. If without the battery we start power supply to the circuit, then the LED screen show charging status is, "Battery charging 0% charged". Shown by arrow in below circuit (That battery is not connected) as shown Fig.8.

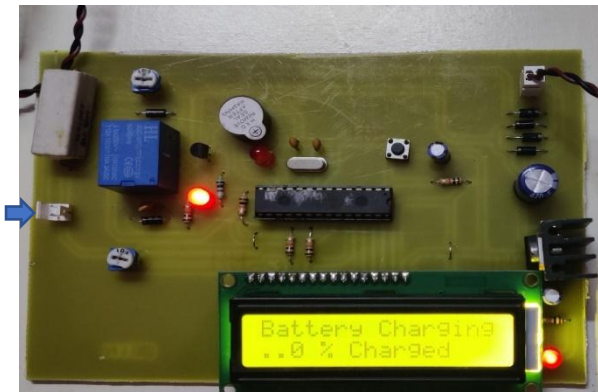


Figure.8 Without battery 0%

- When we start battery charging the LED screen show charging status, "Battery charging" with percentage. As shown in below LED screen Fig.9.



Figure.9 Battery charged 87%

- As the battery reaches 100% capacity the LED screen show the "Battery charging 100% Charged" and stop charging the battery. As shown in Fig.10.



Figure. 10 Fully Charged 100%

When we start supply to the circuit from mains supply it start charging battery as shown in above figures. The system Operates on 12V and wirelessly charging 13.2V to 17V battery. While system works

it uses maximum 1A current. Its rate of charging is 6W to 12W. Voltage across battery is 12.6V and maximum 14.4V depending on the distance between the coils.

## CONCLUSIONS

This project introduces a wireless battery charging circuit using a new method. The proposed method measures any wireless connection using a simple circuit to detect the flow of a transmitter coil, such as a DC value. This method does not require a high sample frequency to detect the voltage and power of the transmission coil. The proposed wireless battery charging circuit is used to charge the battery pack to control power outages and voltage. The model circuit for charging a 12-V battery pack is tested under a variety of load resistance conditions and coil steering conditions. The system Operates on 12V and wirelessly charges 13.2V to 17V battery. While system works it uses maximum 1A current. Its rate of charging is 6W to 12W. Voltage across battery is 12.6V and maximum 14.4V depending on the distance between the coils. Subsequently all test and simulation results showed that the proposed method is well-suited to control wireless battery charging efficiently.

When we are use ATmega328 controller integrated circuit with programming in circuit. The address (position) of the presently used command is stored in the programme counter registers of a computer processor. The system counter increments its stored value by 1 with each command that is downloaded. The software calculator indicates the following message in the sequence after each command has been downloaded. The system calculator often resets to 0 after a computer restart or reset. A programme on a computer is a predetermined set of operations that the machine carries out. A computer processor's software is called an instruction. An address is a unique place in memory or storage within a computer. One of the little archives used by the processor is the register. The system counter is the most important feature for microcontrollers.

When you go to the atmega328 system think of pin no. as the color setting on the previous PIN (as the control pin is a digital input or output pin). Use the appropriate PIN to find the correct interface for the appropriate input of the analogy input should be set to the output of the analogy pin must be set to the pins and the same digital input and output.

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