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Mini Project Report

on

"COIN BASED MOBILE CHARGING USING ARDUINO"

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Department of Electronics and Communication Engineering

CERTIFICATE

This is to certify that the mini project work entitled **"Coin Based Mobile Charging Using Arduino"** carried out by **Bhumika P (1DT19EC010), G H Anjali Priya(1DT19EC024), Isha V(1DT19EC027), Jyoti Kumari (1DT19EC030),** a bonafide student of **DAYANANDA SAGAR ACADEMY OF TECHNOLOGY AND MANAGEMENT** in **Bachelor of Engineering in Electronics and Communication Engineering** of the **Visvesvaraya Technological University, Belagavi** during the year 2021-2022. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

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Yours Sincerely

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Abstract

The coin based mobile charging system charges the mobile phones when the coin is inserted. This system is used by shop owners, rural people and can be implemented in the public places like railway stations, bus stand to provide mobile charging facility. So, the coin acceptor recognizes valid coins and then signals the Arduino for further action. If a valid coin is found, it signals the arduino and then arduino starts the mobile charging mechanism providing a 5V supply through a power supply section to the mobile phone. The arduino starts a reverse countdown timer to display the charging time for that mobile phone. Further the user adds another coin, the arduino adds to the currently remaining time and once again decrements the countdown. This system can be used for smart mobile charging at public places. This coin based mobile charging system will supply the enough amount of charge to the mobile phone and is available on demand in public places.

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Chapter 1

INTRODUCTION

The usage of mobile phones is increasing in many folds. Hence, charging the mobile phones has become a greater task these days. Battery power is the main concern when buying new mobile phones. Power supply is an integral parts a vital role in every electronic system and hence their design constitutes a major part in every application. The main purpose of mobile charger is to reduce the wastage of electrical power which often arises due to negligence of the use.

Once the coin is inserted, the coin acceptor detects whether the coin is valid or not. For each unit of price, the power is available only for a limited period. The arduino can calculate the time based on the number of coins inserted. The objective of this project is inserting the coin using charge for your mobile phone in public places. This project is very useful to people who are all using mobile phone without charging condition in public places. In this project, who are all using mobile phones in outside of home or office without charging condition.

The coin based mobile phone charger is very useful to that person for using coin to 0charge for that mobile. The IR (infrared) transmitter is used to transmit IR signal in the transmitter side. The IR receiver is used to receive the IR signal in the receiver side.The objective of this project is inserting the coin using charge for your mobile phone in public spaces this project is very useful to people who are all using mobile phones without charging condition in public places in this project who are all using mobile phones and outside of home or office without top charging condition

The coin based mobile charger is very useful to a person for using coin to charge the mobile. A sensor system is used to detect the presence of coin it may be or type different type [IR sensor, LDR etc….] The coin is inserted between the transmitted and received signal.When signal comes from sensor unit the controller activity the charger unit for a predefined time, after that it will reset to normal case the driver circuit is used to provide the sufficient input voltage of relay. The relay will on to activate the 230V charger, we will use charger to charge our mobile phone.

The major action in the system is controlled by transmitter section, This section consists of IR transmitter and IR receiver. Here we need to generate IR frequency continuously so that by using a small tiny microcontroller frequency is produced and is connected IR sensor continuously receives the signal from the transmitter. Whenever the light path is in between IR transmitted and IR receiver cuts by an obstacle receiver signal or gives a low to high pulse. By to the IR led to generate IR light rays of 38 KHz frequency.

Connecting the receiver output to the microcontroller interrupt pin, it gives interrupt to microcontroller immediately the system gives the buzzer and sends this message to display on LCD display to the microcontroller.

1.1.Problem Definition

In today's world, mobile phones are considered as the important part of life. People tend to use its huge features, which consumes charging. Peoples who use to make every long journey may require charging anywhere and if they forget to bring chargers then that would create a problem. Similarly, in many developing areas where grid power is not available for few hours to several hours on regular basis, people may require electricity to charge their mobile phones to continue with their works. So in order to overcome all these problems Mobile Charging Based on Coin Insertion is designed . It would provide reliable charging services with less cost. This system is very helpful and easy to developed.

1.2.Motivation

In this age of technology, where we constantly use our cell phones day in and day out, the need to charge our phones on the go requires us to carry our phone chargers with us at all times. Evidently, this is an added burden or a first world problem. Not to forget the futility of carrying chargers in a country like India where there is a lack of proper charging ports in public spaces.

This project aims to eliminate this problem by developing a prototype which will provide an easy access to phone charging facilities to the users. Also, this model can be implemented in rural areas without access to regular electricity with reduced charging rates.

1.3.Objectives

The main purpose of mobile charger is to reduce the wastage of electrical power which often arises due to negligence of the user. Once the coin is inserted, the coin acceptor detects whether the coin is valid or not. For each unit of price, the power is available only for a limited period provided.

The main aim of this mini project is are:

➢ If your mobile runs out of battery, you just need to get it charged

➢ To reduce the wastage of electrical power which often arises due to negligence of the user.

➢ It would provide reliable charging services with less cost.

Chapter 2

LITERATURE REVIEW

The main aim of this research is to provide charger through insertion of coin and battery. The system works according to coding written in Arduino UNO. The system uses the maximum coins for charging mobile battery. The Arduino activates the driver for particular time as per coin inserted and it consists of transistors that act as a switch to turn ON and OFF[1].

The IR (infrared) transmitter and IR receiver is used to transmit and receive the IR signal in the receiver side. Between the IR transmitter and receiver, a coin is to be inserted to change the polarity of pulse in input. The relay will ON to activate the 230v charger, we will use charger to charge for our mobile phone. When the coin is detected it sends a pulse to the 555 timer which turn ON the relay (Electromechanical switch) will start providing charging to the socket to charge the mobile phone[2].

This research is providing unique service to the rural public where the grid power is not available Partial/full daytime. The salient feature of this paper is that it draws power from grid 4 power. In case of non-availability of grid power, User simply has to plug the mobile phone into one of the adapter and inset the coin; the phone will then be given a micro-pulse for charging. The charging capacity of mobile will be pre-defined values. The LCD displays showing the actual time left. AC voltage is converted in to DC voltage by using rectifier. Then fixed DC voltage is regulated by using voltage regulator[3].

During the timing period a relay output is latched and finishing timing in progress. It is of course possible to continue charging by inserting more coins. In the event of unpredictable current supply, this project is
designed with coin detecting mechanism, Arduino, and real time clock, driver circuit, charging circuit, inverter, cycle converter, security system circuit and different phone socket[4].

This Coin based charger is similar like a VENDING MACHINE for charging the cell phone. A sensor attached to the coin insertion slot accepts the coin into the battery charging unit and start charging the mobile battery for a specific period controlled by the software of the microcontroller. The sensor is an IR sensor[5]

In 2017, Dhara G. Rangani, Nikunj V. Tahilramani [6] presented mobile charging using a coin in which their main focus was coin detection, for which they have used a cantilever type sensor for coin detection. The cantilever-type sensor detects the weight of the 5-rupee coin and gives a digital signal to ADC. They were using this controller to check whether the coin is original or duplicate. They have also used solar power for charging the mobile batteries and used greed power when solar power is not available.

This paper focuses on the acoustic method, in which coin recognition is based on the detection of the coin's natural frequencies. The frequencies of these vibrations depend on the object's properties like mass, shape and material type, and remain the same as long as these properties do not change, thus being used as acoustic fingerprints. Also, this method permits the recognition of fake or deteriorated coins because they have different properties. The principle applied in this paper can be used for the recognition of numerical sequences produced by others.[7]

The type of coin and the size will be displayed at the LCD to ensure correct coin insertion. Any other coin, if inserted in the slot, will be returned to the refund box. A sensor attached to the coin insertion slot accepts the coin into the battery charging unit and starts charging the mobile battery for a specific period controlled by the microcontroller's software. The sensor is an I.R. sensor. The resistance of the sensor decreases when I.R. (infrared) light falls on it. Coin is whether accepted or rejected is based on the diameter of the coin. When the routine completes, it indicates the complete charge message through the LCD. [8]

Once the coin is detected, it sends signal to the Arduino and it trigger the relay and the LCD display show the countdown time. The arduino can collaborate with the outside world. The relay generates the voltage and fed as input to mobile phones. There are various technologies evolved for charging the mobile phones in our world [9].

In urban area there are many resources available for charging but in rural areas most of the time charging facilities are unavailable, electricity is absent. Sometimes battery becomes low in middle conversation and we need urgent requirement of charging. That time this coin operated mobile charger is used. In this proposed system the mobile will charge when mobile is connected to charging slot. But initially we need to insert coin. According to coin it will charge for some percentage. The coins are used in this system according to Indian currency1Rs,2Rs,5Rs,10Rs. Attaching the number of mobile have charge same speed of the charging. And this system charges the mobile continue when inserting the more number of coin.[10]

Chapter 3

COIN BASED MOBILE CHARGER

The system uses a coin acceptor machine which will detect for a valid coin. The coin acceptor is connected to Arduino board and it then connected to the LCD display. If a valid coin found it signals the Arduino and the Arduino will send signal to LDC to display the amount of time to be charged. The relay will control the power supply to charger, after completion of time duration it will stop supplying power. The LCD screen will show how much time left for the charging if the user wants to increase the duration of charging he needs to add another coin then the system adds the time in currently remaining time.

3.1. Designed based architecture :

The system architecture is described in the figure 3.1.1. A sequence of modules are used in the architecture namely Arduino UNO board (based on Atmega 328p), LCD 16x2 display,power source for arduino, battery and USB Port. The Arduino can "talk", (transmit or receive data data) via a serial channel, so any other device with serial capabilities can communicate with an Arduino.

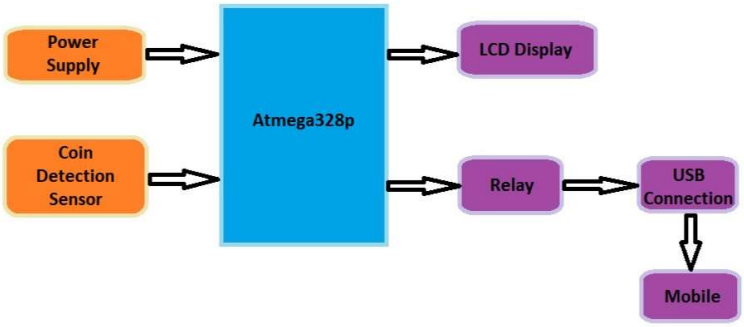


Figure 3.1.1 System architecture

This section describes the modules for the proposed system, include:

- Input stage-To accepts the valid coin.
- Controller-To control the voltage using relay.
- Power-To supply the power based on the requirements.
- Output and display-To display the output information.

Input Stage: The user inserts a coin to the coin insertion slot. The sensor is attached to the coin insertion slot and the coin is validated based on the diameter of the coin inserted. Initially the LCD display a message as “Please insert coin”. If the inserted coin is valid, the message is displayed in the LCD and signal is sent to the arduino. When the coin is accepted, the arduino and relay is activated and the battery starts getting charged by the software of relay.

Controller: The system performs according to the input signal from the circuit. Based on the diameter of the coin, the coin is either accepted or rejected. If the coin is accepted, it sends signal to arduino along with LCD interface. Once the arduino receives the signal from the coin insertion slot, it sends signal to the relay. The relay generates the voltage of 5v, which in turn charges the mobile phone through the mobile USB terminal.

Output and Display: The LCD connected displays the messages as and when required. Initially, when the mobile charger is connected the LCD displays as, “Please insert coin”. When the mobile phone is charging, it displays “Charging” and the duration of charging based on the coin inserted.

Power: This coin based mobile charger draws power from the arduino through relay. The voltage is regulated based on the type of the mobile phone connected for charging.

Chapter 4

HARDWARE AND SOFTWARE REQUIREMENT

In this project, we have used a list of Hardware and Software components which are the building blocks of this project "COIN BASED MOBILE CHARGER". Electronic components are at the core of electronics technology. There is a huge variety of different components that are available with a variety of different functions. Hardware Components are used for interfacing and Software tools are used to compile the code and dump it on the Arduino Uno board.

4.1 Hardware Components Required

- Arduino UNO
- IR Sensor
- Relay
- LCD
- Charging Connectors

4.2. Software required:

Arduio Compiler

Proteus designing

4.1. Arduino uno board

Arduino is a single card Micro controller designed to make the application more appreciable, that is interactive objects and the surrounding environment. The UNO board of Arduino is a micro controller based on ATmega328. It has 14 digital input and output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power connector and a reset button. Contains all the necessary support controller required. It is presented by ATmega16U2 (Atmega8U2 up to R2 version) programmed as USB serial converter.

Figure 4.2 : Arduino Uno Board

The ATmega48PA/88PA/168PA/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48PA/88PA/168PA/328P achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed The ATmega48PA/88PA/168PA/328P provides the following features: 4K/8K bytes of In-System Programmable Flash with Read-While-Write capabilities, 256/512/512/1K bytes EEPROM, 512/1K/1K/2K bytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external .

Also a serial programmable USART, a byte- oriented 2-wire Serial Interface, an SPI serial port, a 6- channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a programmable Watchdog Timer with internal Oscillator, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, USART, 2-wire Serial Interface, SPI port, and interrupt system to continue functioning.

The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions.

In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle.

FEATURE	SPECIFICATION
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Table 4.1 : Arduino Uno Specifications

4.2. IR sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Anything that emits heat (anything that has a temperature greater than five degrees Kelvin) emits infrared radiation.

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light-emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection system.

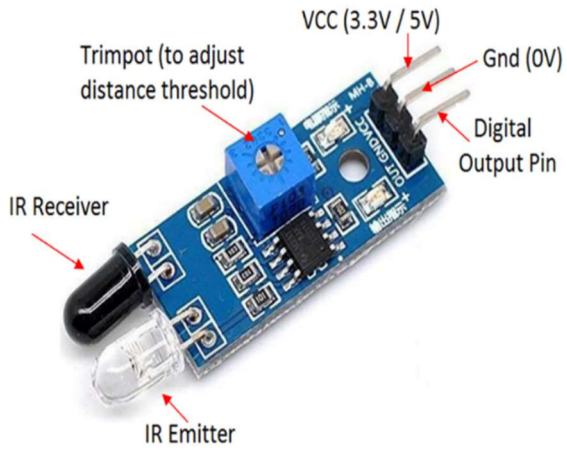


Figure 4.1.1. I R sensor

Features:

- Easy to assemble and use.
- On-board detection indication
- The effective distance range from 2cm to 80cm.
- A preset knob for adjusting the distance range
- If there is an obstacle, the indicator lights up on the circuit board.

4.3. Relay

A relay is an electrical main voltage switch. This means that it can be turned on or off, letting the current flow or not. Controlling a relay with Arduino is as simple as controlling an output like a motor. There are many types of modules, such as single channels, double channels, four channels and eight channels.

It can be used to control a circuit by a separate low-power signal, or must be controlled by one signal. The relays were used in many fields. One of the fields used as an amplifier: they repeated the signal coming in from one circuit and retransmitted it on another circuit. It can be used extensively in telephone exchanges and early computers to perform logical operations. When an electric current is passed through the coil in which the coil is placed inside the relay and it generates a magnetic field. The relays are manufactured to operate quickly. It reduces the noise in low voltage application.

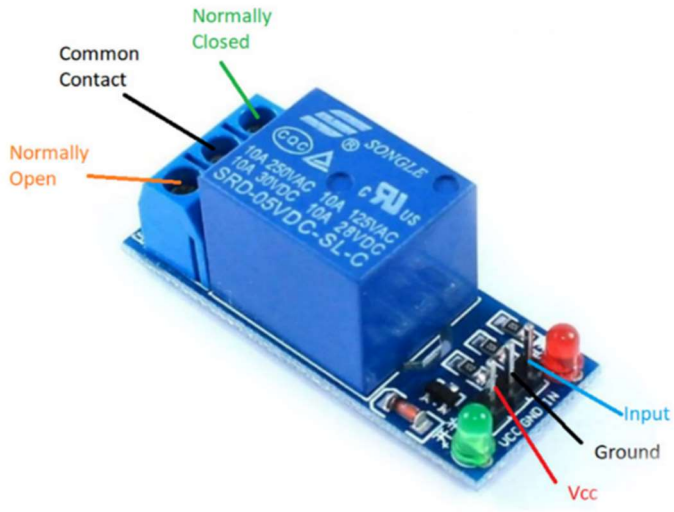


Figure 4.1.2 Relay

4.4. 16*2 Standard LCD

An LCD (liquid crystal display) screen is an electronic display module and has a wide range of applications. A 16 × 2 LCD screen is a very basic module and is very commonly used in various devices and circuits.

A 16 × 2 LCD screen means that it can display 16 characters per line and there are 2 of those lines. On this LCD screen, each character is displayed in a 5 × 7 pixel matrix. The 16 x 2 alphanumeric dot-matrix smart display is capable of displaying 224 different characters and symbols. This LCD display has two registers, namely Command and Data. The command register stores various commands given to the screen.

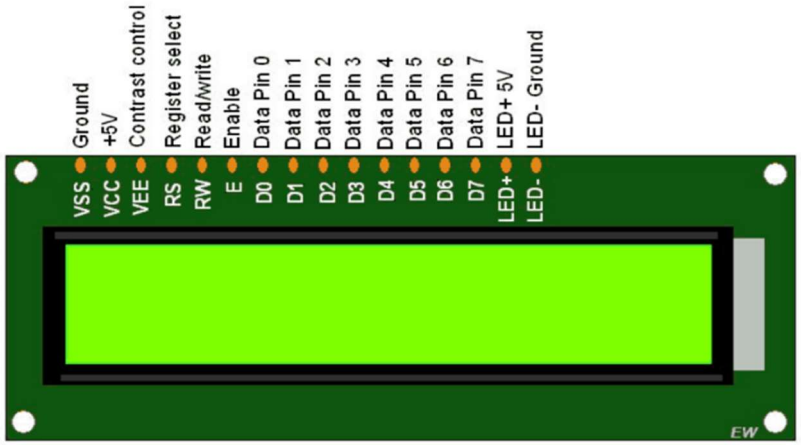


Figure 4.1.3.16*2 Standard LCD

The data log stores the data to be displayed. The screen control process involves placing the data that makes up the image of what you want to display in the data registers and then placing the instructions in the instruction register. In your Arduino project, the liquid crystal library simplifies this so you don't need to know the low-level instructions. The display contrast can be adjusted by adjusting the potentiometer that will be connected through the VEE pin.

4.5. Jumper Wires

Jumper Wires Jumper wires are simple cables having connector pins on both ends that may be used to connect two points without the use of solder. Jumper wires are commonly used with breadboards and other prototyping tools to allow for quick circuit changes .

Figure 4.1.4 Types of jumper wires

4.6. Mobile Charging Adapter

This unit is the most important one. It charges the users Smartphone. It draws power from the mainline (230V AC) and converts it to 5V DC. It has an inbuilt transformer, rectifier and filter. A relay is used to switch ON the charging when coins are inserted and switches OFF when the allotted time for charging has passed.

The purpose of using an adapter with cable is that the user may not always have a data cable with himself, and so we have included it in our machine. We have inculcated a type C charger pin considering it is the most common one nowadays. Different types of pins can also be provided in different machines on user demand.

Figure 4.1.5 Adapter

4.7 Arduino compiler

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software from the wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub *main()* into an executable cyclic executive program with the IDE distribution. The Arduino IDE employs the program *avrdude* to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

4.8 Proteus designing

The **Proteus Design Suite** is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as a training or teaching tool.

Chapter 5

Proposed Methodology

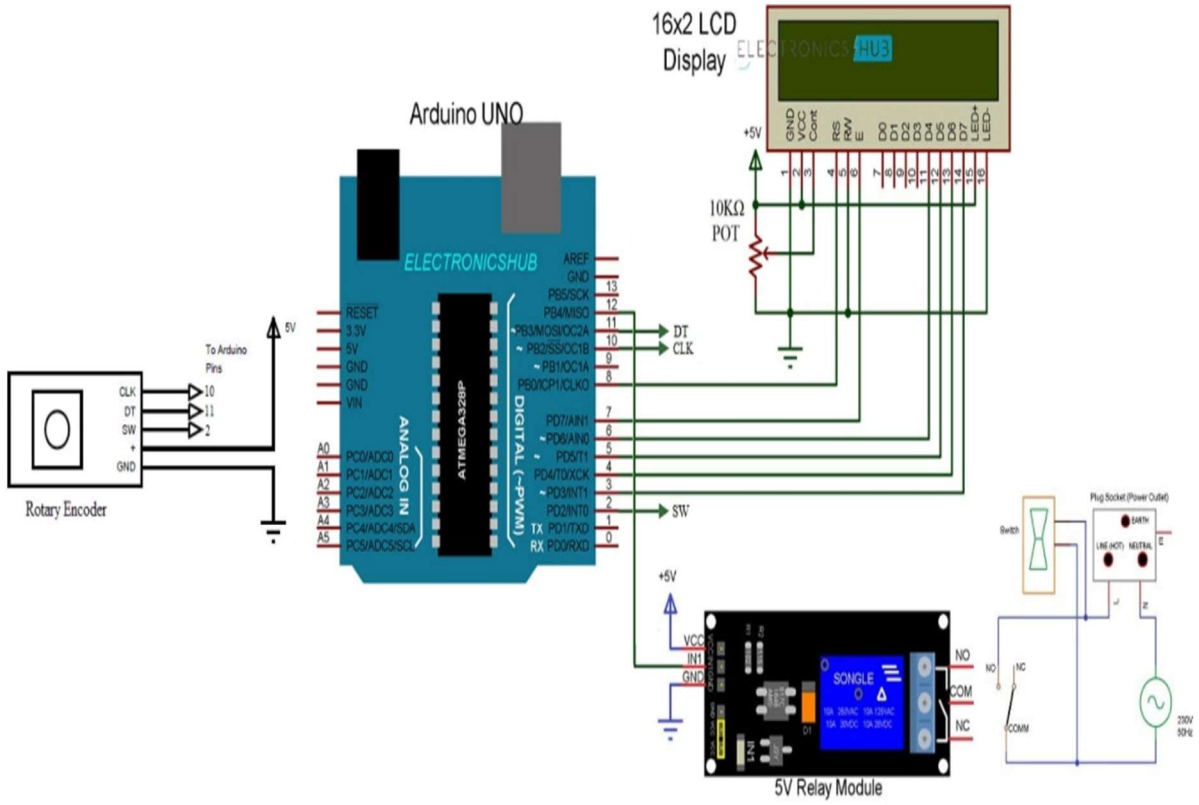


Figure 5.1: circuit diagram of the coin based mobile charging using Arduino

Chapter -6

Results and Discussion

In this system, we have implemented the simple and hand efficient mobile charger which helps the user, charge their phones during urgent needs. This system is very helpful to the users who are all using mobile phone without charging conditions in public places. This system simple to use and is less expensive.

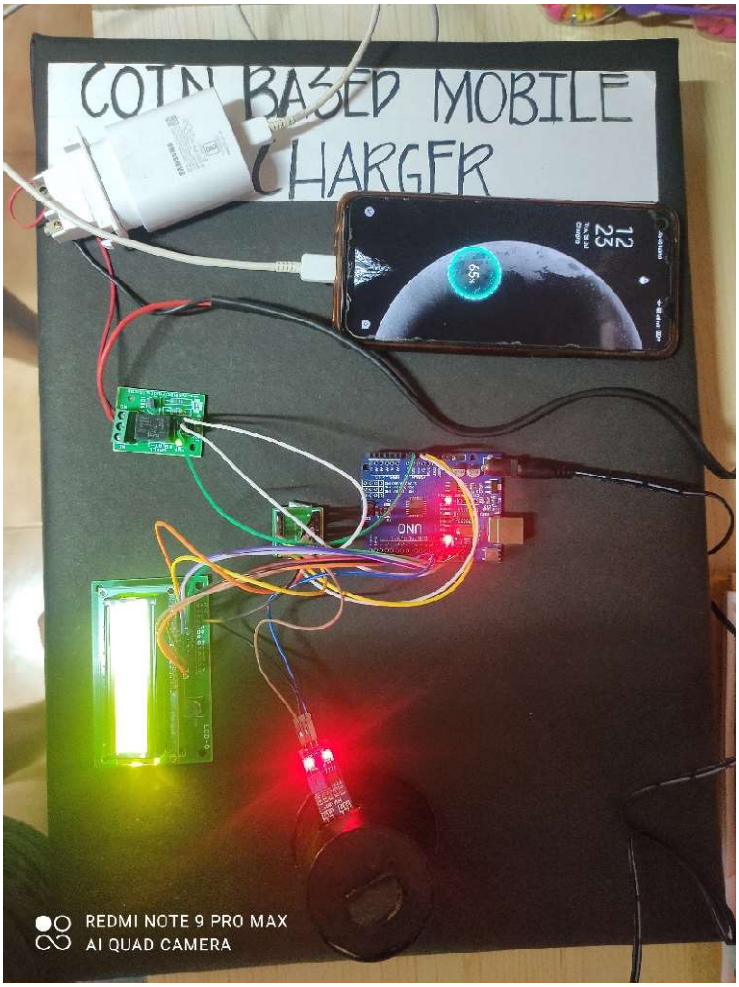


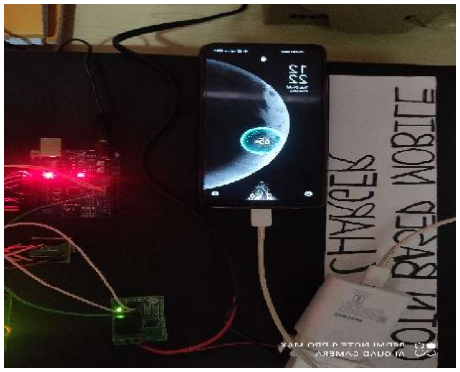
Fig 6.1 Coin Based Mobile Charger Prototype

Step by Step Procedure of the Working Model

6.1.1 Insertion of the Coin.

6.1.2 The Coin is Inserted.

6.1.3 Mobile Charging Starts for 1 min



6.1.4 The Phone is Charging

The LCD display the message “INSERT COIN”, Once the coin is inserted the IR sensor shown in the picture senses the coin and the message “MOBILE CHARGING.” and the time period of the charging in seconds is displayed on the LCD and the Mobile gets charged.

6.1 ANALYSIS

BATTERY(mAh)	CHARGINGTIME(min)	PERCENTAGE CHARGED(%)
5000	1.09	1
7000	1.28	1
3700	1.02	1

6.2. Application

- Useful for public for using the coin to charge their phone at any place.
- It can be used for different types of mobile phone.
- It is used for emergency charging purposes.
- It can be installed in rural places and public places like railway stations, bus stops.
- It can be installed in colleges and offices for pay charging facility

6.3 SOCIAL RELAVENCE

This project is useful in the following areas :

- Railway Stations: This type of project is very used in railway stations for public purpose.
- Shops: Coin based mobile charger can be used in shops to earn money.
- Rural areas : This project can be installed in rural areas where the power grid not available many a times.

6.4 ADVANTAGES

- Low cost to design the circuit
- Easy to implement the circuit
- Low power consumption.
- Simple and hand efficient.
- Reduced man power.
- It is useful while travelling and when we don't have charger with us in travel.
- Easy to operate.
- Good performance.

- Smart irrigation is an essential element for the economy of the regions, for the quality of life and valorisation of products.
- Smart irrigation plays a key role in addressing food security challenges, both in India and in the rest of the world. The increase in food production directly influences the expansion of irrigated areas and the availability of water, both in space and time.
- In addition, another important issue to be addressed is climate change, since it will directly affect the ratio of future agricultural production, impacting global food security and forcing us to produce more food with fewer resources, or in a more efficient manner.
- The effects of climate change on irrigation will grow exponentially since the decrease in rainfall will cause a reduction in the availability of water resources.

Chapter-7

Conclusion and Future Scope

In our work, we have generated the results of a create-and-design research aimed at providing a Coin Based Mobile Charger using Arduino, Coin Sensor and relay. This plays a vital role in charging the mobile phones. The sensor has been fabricated for particular type of coin. Once it was fabricated for accepting many types of coins, then it will be very useful and can be implemented in many areas.

A novel method of charging mobile batteries of different manufactures using solar power has been designed and developed for rural and remote areas where the grid power is not available at any time at any place.

The project can be used in the following areas:-

- Railway station: This type of project is used in railway station for public palace.
- Shop: coin based project charger can be installed at any shop to earn money.
- Rural areas: This project can be installed in rural areas where the power grid is not available at any time.
- Public Place: This project is very useful when mobile phone battery dies in public places.

APPENDIX

Algorithm: Charge_Mobile(coin)

Input: Coin.

Output: Charging the mobile phone.

Process: Display a message as “Please insert coin” // LCD will display a message

If (valid coin) // coin sensor //validates whether the coin is valid or not

{

Based on the coin value the timer will be decremented in seconds. LCD display the message as “Charging” LCD display the time period for charging the mobile phone.

}

Else

{

No operation takes place

}

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