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# Coin Based Mobile Charging System

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**ABSTRACT:** In this generation, mobile phones have become part and parcel of everyone's life, and people are storing many files, data, and banking information on mobile devices. The major problem with mobile phones is that they often run out of battery at any period of time, and we don't always carry chargers and power banks with us. Even if we do carry a charger, there may not always be available sockets, and there is also the threat of cyber-attacks. To address this problem, we have developed a coin-based mobile charging system. This project aims to create a smart mobile charging system that can be used in public places. The system consists of a coin acceptor, an Arduino microcontroller, a power supply section, and an LCD display. When a user inserts a coin, the coin acceptor module recognizes whether the coin is valid or not. If a valid coin is detected, it signals the Arduino to start the mobile charging mechanism, providing a 5V supply to the mobile phone. The Arduino also initiates a reverse countdown timer to display the charging time on the LCD screen. If the user inserts another coin within the remaining charging time, the microcontroller adds the time to the currently remaining charging time and starts the reverse countdown again. This project provides a simple, efficient, and secure way for people to charge their mobile phones in public places.

**KEYWORDS:** Power Source, Coin acceptor, Arduino microcontroller, Relay, Buck Converters, Charging Module

## I. INTRODUCTION

In this 21st century we are able to see that everything is digitalized and we can access the information and share the information from any part of the country and the hacking is also increased. In this digital era, we just require an electronic gadget through which we can access the whole worlds data. Using mobile we can do many things in the present generation and the main problem with mobile is that the battery is drained off easily and we cannot carry a charger or power bank with us at all times. We have seen many problems related to the mobile phones. Firstly, when we are in travelling or in any crowded place if the mobile battery drains off at that situation if we require that scenario to make any transactions or to pass information to someone in that situation, we would be helpless. Secondly, Now-a-days sockets and chargers are provided at public places such as malls, metros, bus stations and suddenly the mobile battery is out of charge. We can charge the mobile with charger but there is risk of security breach and your data can get into wrong hands. To get rid of these problems we have designed a “Coin Based Mobile Charging System”.

In a paper [1], they have built a prototype where people can charge their mobile and they have also used solenoid lock for the protection of phone. In this model when the user inserts the coin it accepts the valid coin and the timer starts for a allocated time and the user places phone in solenoid lock and uses RFID tag to close it. The user cannot enter a new coin until the timer finishes.

In another study [2], author have discussed that the user has to insert a coin or swipe a RFID card then the charging starts. Whereas in paper [3], the researcher has used a keypad where the user has to enter the number of coins to be interested and the timer is updated according to value entered and charging starts.

In paper [4], To charge your phone using this system, all you have to do is plug your phone into one of the adapters and put a coin in. Once you've done that, your phone will receive a small burst of energy to charge it up. It's like giving your phone a little boost to power it up!

In this paper we have discussed about a coin based mobile charging system where people can enter the coins and the certain amount of charge is provided. The paper is structured with Section II covering methodology, followed by Section III presenting results and discussion, and Section IV containing the conclusion.

## II. LITERATURE REVIEW

In [5] One paper introduces an advanced system for automated cellphone charging, leveraging various components to

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streamline the process effectively. Through the use of a programmable coin acceptor, specific Bangladeshi Taka coins are authenticated to unlock the charging station's door, initiating charging seamlessly. Infrared sensors further enhance the system by detecting the presence of cellphones within the designated slot, prompting the connection of the charger port via a relay, ensuring a hassle-free experience.[6] Additionally, security is bolstered through a servo motor managing RFID tag authentication, requiring users to present the tag before accessing their devices, thus prioritizing safety alongside convenience.

Furthermore,[7] the system implements intelligent features to optimize user experience and safety. Upon successful RFID authentication, a countdown timer is initiated, limiting charging to a predefined duration of thirty minutes.[8] This automated cutoff prevents overcharging, conserving energy and safeguarding both the device and its surroundings. With meticulous attention to detail and a user-centric design approach, this system emerges as a promising addition to automated charging solutions, offering a secure, efficient, and user-friendly experience for cellphone users.

**PROPOSED WORK**

Our [9] project seamlessly combines the Arduino microcontroller, a programmable coin acceptor, and a versatile relay module to create an advanced charging system. What sets our system apart is its unique capability to intelligently extend charging sessions based on user interaction.[10] When users add coins during an ongoing charging session, our system intuitively prolongs the duration without interruption, showcasing our commitment to user satisfaction. This enhancement ensures a continuous and seamless charging experience tailored to the user's preferences. By initiating a reverse countdown upon additional coin insertion, users can accurately monitor the extended duration.[11] This user-centric approach transforms our system into a reliable and adaptable solution for public mobile charging, prioritizing convenience and flexibility for users in various settings.[12] Overall, our project not only integrates cutting-edge technology but also prioritizes user convenience, providing a more accommodating and user-friendly solution for mobile charging in public spaces.

## III. METHODOLOGY

The Block diagram for the coin based mobile charging system is shown in Fig 1.

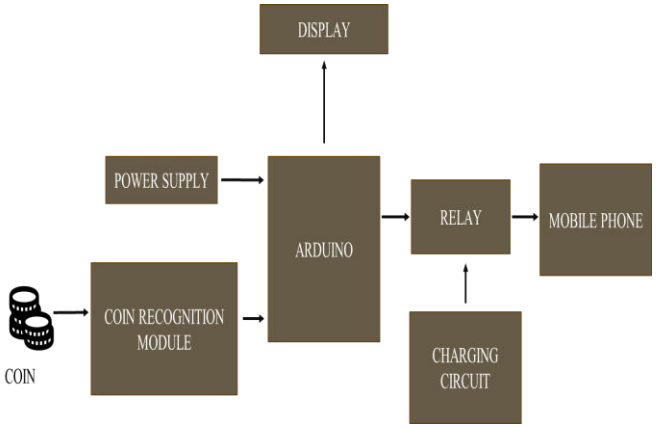


*Fig 1: Block Diagram*

The block diagram represents a pictorial representation of our project. When the user inserts a coin into the coin acceptor, the acceptor checks whether the coin is valid or invalid. If the coin is valid, the acceptor sends pulses to the Arduino, which then powers on the relay. The charging module is connected to the relay, so when the relay is in the ON state, the charging module is also activated. At this point, a reverse countdown is displayed on the OLED screen. If the user inserts another coin, the timer automatically updates based on the value of the inserted coin.

*A Components*

Power Source: To power our model, we used two 12V DC adapters. One was plugged into the coin acceptor and the 5V buck converter, and the other was connected to the 3.7V buck converter. Fig 2 shows DC adapter.

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*Fig 2 DC Adapter*

Coin Acceptor: We have used a CH-926 coin acceptor which is illustrated in Fig 3. The function of the coin acceptor is that it only accepts the valid coins and rejects all invalid coins. We have to program coin acceptor in such way that it can only accept only valid coins.


*Fig 3 Coin Acceptor*

Buck Converter: Buck converter is used to convert a dc-to-dc voltage we have used LM2596 buck converter which is shown in Fig 4.

*Fig 4 Buck Converter*

Arduino Microcontroller: Arduino is heart of the system is shown in Fig 5. It accepts coin from coin acceptor and sends pulses to turn on relay and display a reverse countdown timer on OLED

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*Fig 5 Arduino UNO*

Relay Module: A relay module is an electronic device used to control high-power circuits with low-power signals, typically from a microcontroller or sensor. It consists of a coil, which generates a magnetic field when energized, causing a switch to open or close. Fig 6 shows the relay module.

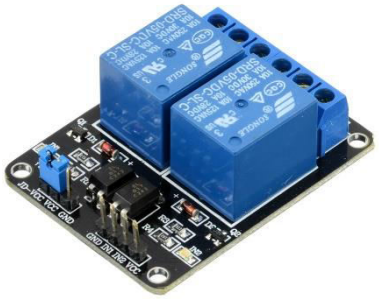

*Fig 6 Relay Module*

Power Bank Module: A power bank module is a portable device equipped with batteries and circuitry to store and deliver electrical energy for charging smartphones, tablets, and other electronic devices on the go. It typically includes features such as USB ports, charging indicators, and protection mechanisms to ensure safe and efficient charging. Power bank module is shown in Fig 7.

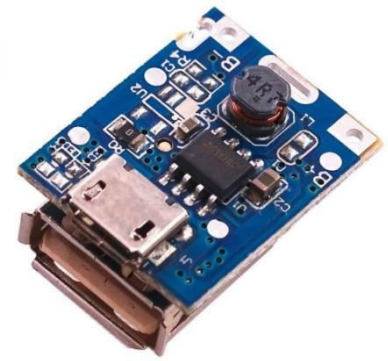

*Fig 7 Power Bank Module*

OLED Display: An OLED display module is a compact screen that uses organic light-emitting diodes to produce

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vibrant colors and high contrast images. It is commonly used in electronics projects and wearable devices for its low power consumption, thin profile, and excellent visibility in various lighting conditions.

The step-by-step process of the project is displayed in the Fig 8.

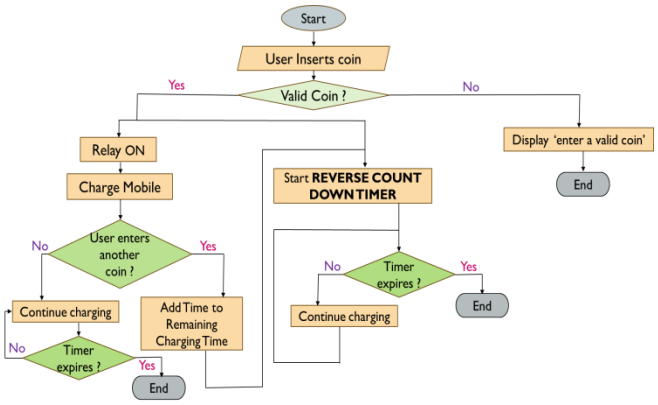


*Fig 8. Flow Chart*

As shown in Fig 8 the user inserts the coin in the coin acceptor and the coin acceptor check it is whether a valid or invalid coin. If the coin is valid then the relay is turned ON and Through relay the power bank module will be in ON state and the charging starts and the reverse countdown is displayed on OLED display. While in the process of charging the user enters a new coin then the timer will be automatically updated.

If the coin is invalid then the coin acceptor rejects the coin and OLED displays “Please enter a valid coin”.

*B. Programming*

To accept only valid coins, we have to program coin acceptor. We have used following steps to program the coin acceptor

1. First, connect the DC12 pin of the Coin Acceptor to the 12V DC supply and ground to ground.
2. Press the plus and minus buttons at a time for 2 seconds then the LED indicators glow and the LED display displays 0.
3. After 0 is displayed press plus and minus buttons at a time 'A' is displayed.
4. Then Press the setup button 'E' will be displayed.
5. Now set the number of coins you want to program in the Coin Acceptor by using the plus and minus signs and then press the setup button 'H1' will be displayed.
6. Put H1 values as the number of samples you want to give as input and press the setup button 'P1' will be displayed.
7. If you want to recognize a 5rupee coin set 'P1' 5 and press setup 'F1' will be displayed.
8. Set the 'F1' value as 10 and again press the setup button 'H2' will be displayed.
9. Repeat the above process until the last coin is programmed and after that power off and on the Coin Acceptor.
10. Press the setup button LED indicators glow and the LED display displays 'A'.
11. After 'A' is displayed press plus and minus buttons at a time 'A1' is displayed.
12. Now enter the coins into the coin slot After completion of the coins 'A2' is displayed.
13. Repeat the process until the last coin is programmed.
14. Now enter a coin into the coin slot then the output will be displayed on the LED display.

## IV. RESULTS AND DISCUSSION

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The Coin-Based Mobile Charging System produced commendable results. The coin acceptor accurately identified coin denominations, and the Arduino adeptly managed coin data and charging times, accommodating multiple coin insertions seamlessly. The addition of an OLED screen improved the user experience by providing real-time charging progress updates. The power system, featuring a buck converter, relay module, and power module, operated efficiently, guaranteeing safe and effective mobile phone charging. The project effectively delivered a precise, user-friendly, and efficient solution for public mobile phone charging. The primary component of the Coin-Based Mobile Charging

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System is the Coin Acceptor, as shown in Fig 9.

*Fig 9. Coin acceptor CH926*

We have programmed the coin acceptor to exclusively accept 1, 2, and 5rupee coins, as demonstrated in Fig 10.

*Fig 10. Inserting Coins*

During the coin validation process, the coin acceptor relies on the pulses provided by the user while training the coins. Notably, the coin acceptor has successfully detected 5 and 2rupee coins, as illustrated in Fig 11 and Fig 12, respectively.


*Fig 11. Validation of 5rupee Coin*

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*Fig 12. Validation of 2rupee Coin*

Upon coin detection by the coin acceptor, an Arduino or a similar microcontroller assesses the coins, and a timer display initiates, as depicted in Fig 13.

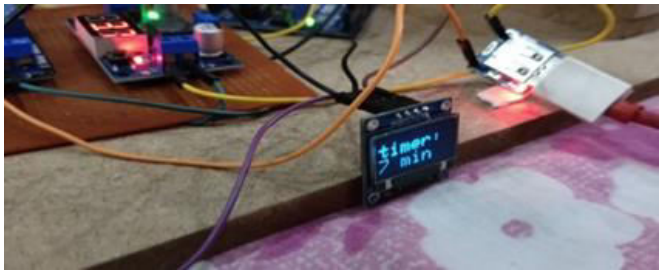


*Fig 13. Timer Display in OLED*

Following this, the mobile charging process is initiated, as indicated in Fig 14.

*Fig 14. Mobile Charging*

You can observe a prototype of the coin acceptor in Fig 15, providing a physical representation of the hardware used in the system. This system offers users a convenient way to pay for mobile charging services using specific coins, with the Coin Acceptor serving as the intermediary for coin validation and a timer display tracking the service duration.

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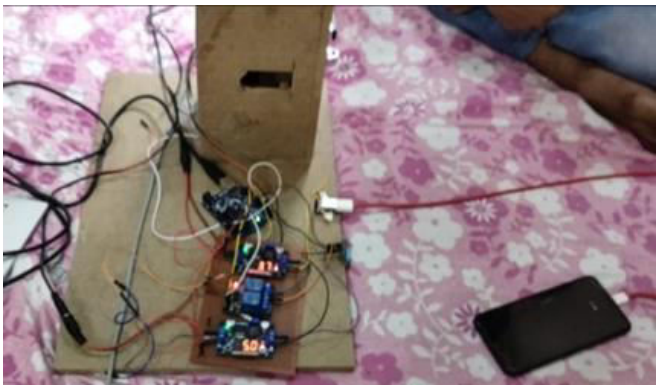

*Fig 15. Coin Based Mobile Charging System*

## V. CONCLUSION

The Coin-Based Mobile Charging System incorporates essential components such as a Coin Acceptor Mechanism, Arduino Microcontroller, Relay Module, OLED Display, Buck Converter, and Step-Up Power Module. These components collaboratively provide a straightforward and effective solution for public mobile device charging.

The system effectively recognizes and validates coins, accurately calculates charging time, and ensures secure device charging. Users can conveniently charge their mobile devices by inserting coins of varying denominations, and a countdown timer is displayed for added user convenience.

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