Mobile Charging by Coin Insertion

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Abstract:
Mobile phones are phenomenal in recent years for communication as well as in day-to-day life. Hence, charging the mobile phones has become the greater task. In this we are trying to design a mobile battery charger on coin insertion. As uses of mobile phones are increasing day by day it need battery life all the time, so in order to use them public charging is needed which would be useful for mobile users. This system will charge the mobile phone for a particular time-period. When the valid coin is recognized, it will start giving power supply to the cell phone through one of the adapters. We will be using a global charging adapter that would be suitable for all mobile phones. The mentioned system can be implemented in public places like railway stations, bus stops, hospitals, malls, etc. to avail the services.

Keywords: Insertion, global charging.

I.INTRODUCTION

In today's digital age, mobile phones have become an essential part of daily life. However, frequent usage often leads to battery depletion at inconvenient times, especially when users are away from home or without access to power. To address this issue, we propose a coin operated mobile charging system — a public utility that allows users to charge their mobile devices by simply inserting coins. This system is designed to be installed in public areas such as railway stations, bus terminals, shopping malls, and educational institutions. By inserting a coin, users can access a timed charging session, making the system not only user-friendly but also a source of revenue. The project combines basic electronics, power regulation, and microcontroller-based automation to provide a low-cost, efficient, and secure solution for mobile charging in public spaces. With the rapid growth of mobile phone usage across the world, maintaining battery life has become a constant concern for users, particularly when they are away from home or traveling. In many public places, people face difficulty finding a reliable source to charge their devices. Power banks and public charging ports are common solutions, but they have limitations such as security risks, overuse, and lack of regulation. To address this problem, we present a coin-operated mobile charging station, an innovative and practical solution designed to provide mobile charging facilities in public areas in exchange for a small fee. The system allows users to charge their phones by inserting a coin, which activates the charging circuit for a pre-determined amount of time. This device can be installed in high-traffic public locations like railway stations, bus stops, shopping malls, parks, colleges, and airports. It not only offers a convenient service to the public but also has commercial potential as a source of passive income for businesses

II. LITERATURE SURVEY

1. Title: Coin-Based Mobile Charger Using Microcontroller:

The system uses a microcontroller (such as Arduino or 8051) to manage inputs from a coin detector and control the charging port. When a user inserts a valid coin, the microcontroller activates the power supply to the USB charging socket for a fixed duration. The system includes components such as an IR-based coin sensor, relay module, voltage regulator, and LCD display for user interaction. After the preset time expires, the charging automatically stops.

2. Title: Embedded Based Coin Operated Mobile Charger:

The system is built around an embedded microcontroller, which serves as the control unit to manage coin validation, charging duration, and power supply control. Upon insertion of a valid coin, the system activates a USB charging port for a specific period using a relay mechanism. It integrates key hardware components such as a coin acceptor, voltage regulator (e.g., 7805), LCD display for user prompts, and buzzer alerts to indicate session start or completion.

3. Title: Mobile charging by Solar Panel:

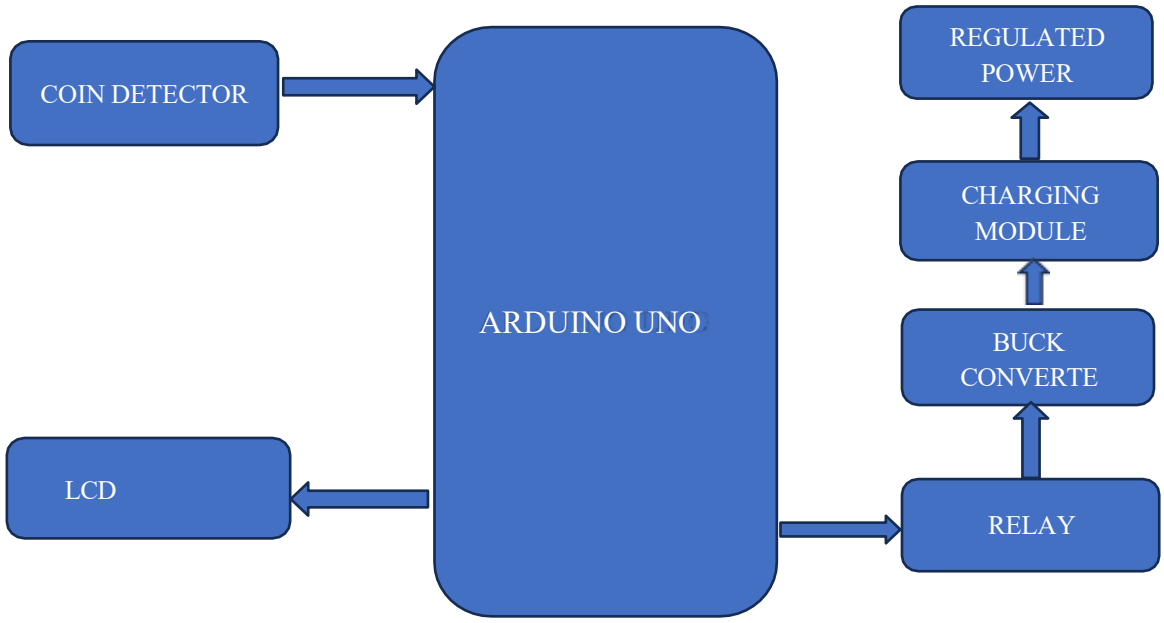
The system harnesses solar energy through photovoltaic (PV) panels, converting it into electrical energy, which is then regulated using voltage controllers to safely charge mobile devices via USB ports. A battery backup is incorporated to store excess energy for use during non-sunny hours, ensuring uninterrupted availability. Key components include a solar panel (typically 6V–12V), charge controller, rechargeable battery, and voltage regulation circuit. The design is cost-effective, portable, and environmentally friendly, making it ideal for deployment in rural or disaster-affected areas. The project demonstrates the practical application of solar technology in day-to-day life and supports the goal of sustainable development through clean energy solutions.

4. Title: Development of Coin Operated Charger for Mobile Devices:

The proposed system employs a microcontroller-based embedded platform that activates a mobile charging port upon insertion of a valid coin. The system includes a coin validation mechanism, a timer circuit, and a USB power module to allow charging for a pre-defined duration. After the allotted time expires, the microcontroller automatically disconnects the power supply to prevent overuse or misuse. The setup is designed with an LCD display for user guidance and a relay-based control circuit for switching.

III. SYSTEM SPECIFICATIONS

With the increasing reliance on mobile devices, the demand for convenient and accessible charging solutions has grown significantly. In many public places such as bus stops, malls, and parks, users often face challenges in finding reliable charging options. To address this, the concept of a coin-operated mobile charging system offers a practical and low-cost solution that enables users to charge their devices on a pay-per-use basis. The proposed method utilizes an Arduino microcontroller to control the charging process, triggered by the insertion of coins detected through an infrared (IR) sensor. When a valid coin is inserted, the system activates a relay to supply power to the mobile device's USB charging port for a preset duration. This time-based charging ensures fair usage and easy management of resources without requiring complex payment infrastructure. This approach leverages simple, readily available components, making it ideal for deployment in areas with limited infrastructure or for small business setups. Additionally, the system can be enhanced with features like an LCD display to provide real-time charging status, making it user friendly and efficient. The proposed method provides a reliable, secure, and cost-effective solution to meet the growing need for accessible mobile charging services.



IV. HARDWARE COMPONENTS

1. ARDUINO UNO:

The most common version of Arduino is the Arduino Uno. This board is what most people are talking about when they refer to an Arduino. The Uno is one of the more popular boards in the Arduino family and a great choice for beginners. There are different revisions of Arduino Uno, below detail is the most recent revision (Rev3 or R3). The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, 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 an AC-to-DC adapter or battery to get started.

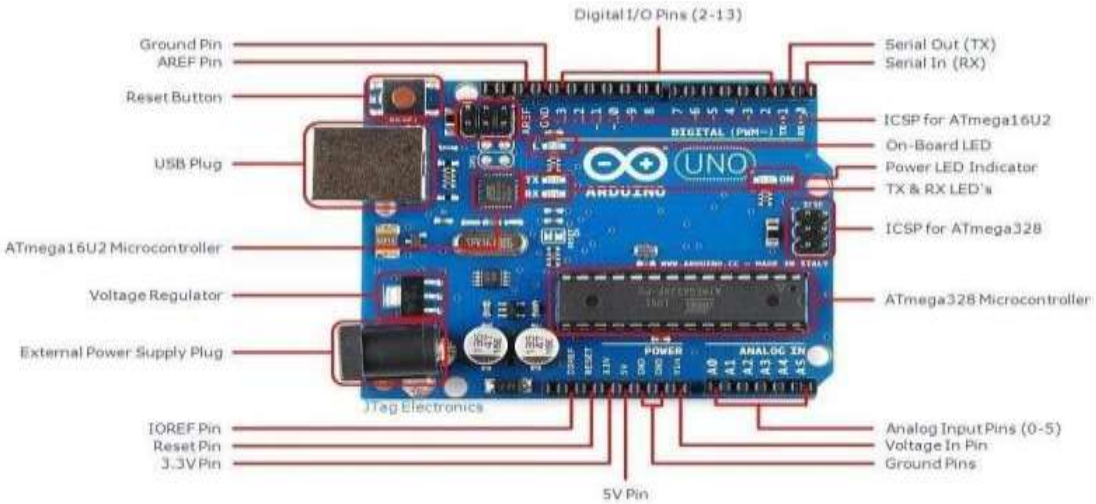


Fig 1. Arduino uno

2. COIN DETECTOR:

A **coin detector** is a device or system that identifies and classifies coins based on their physical and/or electromagnetic properties. Coin detectors are commonly used in vending machines, arcade games, coin sorters, and toll booths

Fig 2. Coin Detector

3. LCD:

We always use devices made up of Liquid Crystal Displays (LCDs) like computers, digital watches and also DVD and CD players. They have become very common and have taken a giant leap in the screen industry by clearly replacing the use of Cathode Ray Tubes (CRT). CRT draws more power than LCD and are also bigger and heavier. All of us have seen an LCD, but no one knows the exact working of it. Let us take a look at the working of an LCD.

Fig 3. LCD

4. Single Channel Relay Module:

The Single Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, NodeMCU, etc. The relay's terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.

The relay is the device that opens or closes the contacts to switch ON/OFF other appliances operating at high voltages. It is also used in safety circuits where it detects the undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area through ON or OFF.

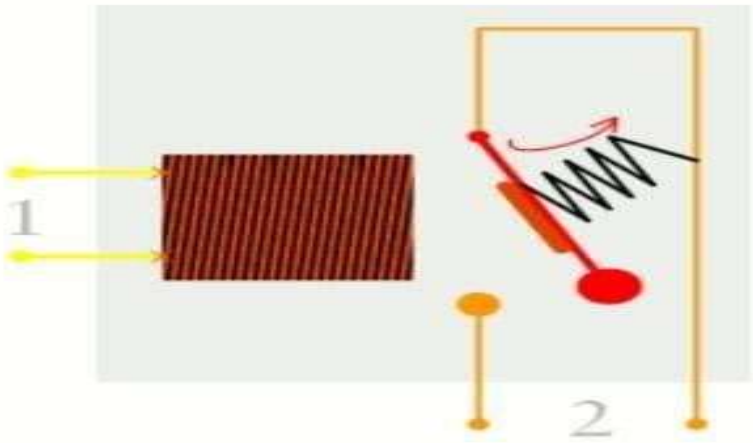


Fig 4. Relay

5. BUCK CONVERTER:

A buck converter steps down the applied DC input voltage level directly. By directly means that buck converter is non-isolated DC converter. Non-isolated converters are ideal for all board level circuits where local conversion is required. Fax machines, scanners, Cellphones, PDAs, computers, copiers are all examples of board level circuits where conversion may require at any level inside the circuit. Hence, a buck converter converts the DC level of input voltage into other required levels.

Buck converter is having a wide range of use in low voltage low power applications. Multiphase version of buck converters can provide high current with low voltage. Therefore, it can be used for low voltage high power applications. This article will discuss both low voltage low power converter and low voltage high power converter.

Fig 5. Buck Converter

6. REGULATED POWER SUPPLY:

A regulated power supply transforms unregulated AC into a stable DC . It guarantees consistent output despite variations in input.

A regulated DC power supply is also known as a linear power supply, it is an embedded circuit and consists of various blocks.

A will step down the voltage from the ac mains to the required voltage level. The turn's ratio of the transformer is so adjusted such as to obtain the required voltage value. The output of the transformer is given as an input to the rectifier circuit. Rectifier is an electronic circuit consisting of diodes which carries out the rectification process.

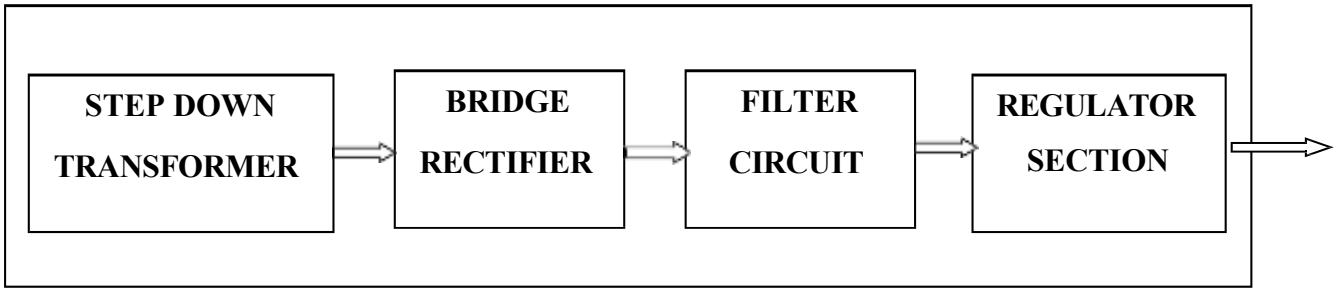
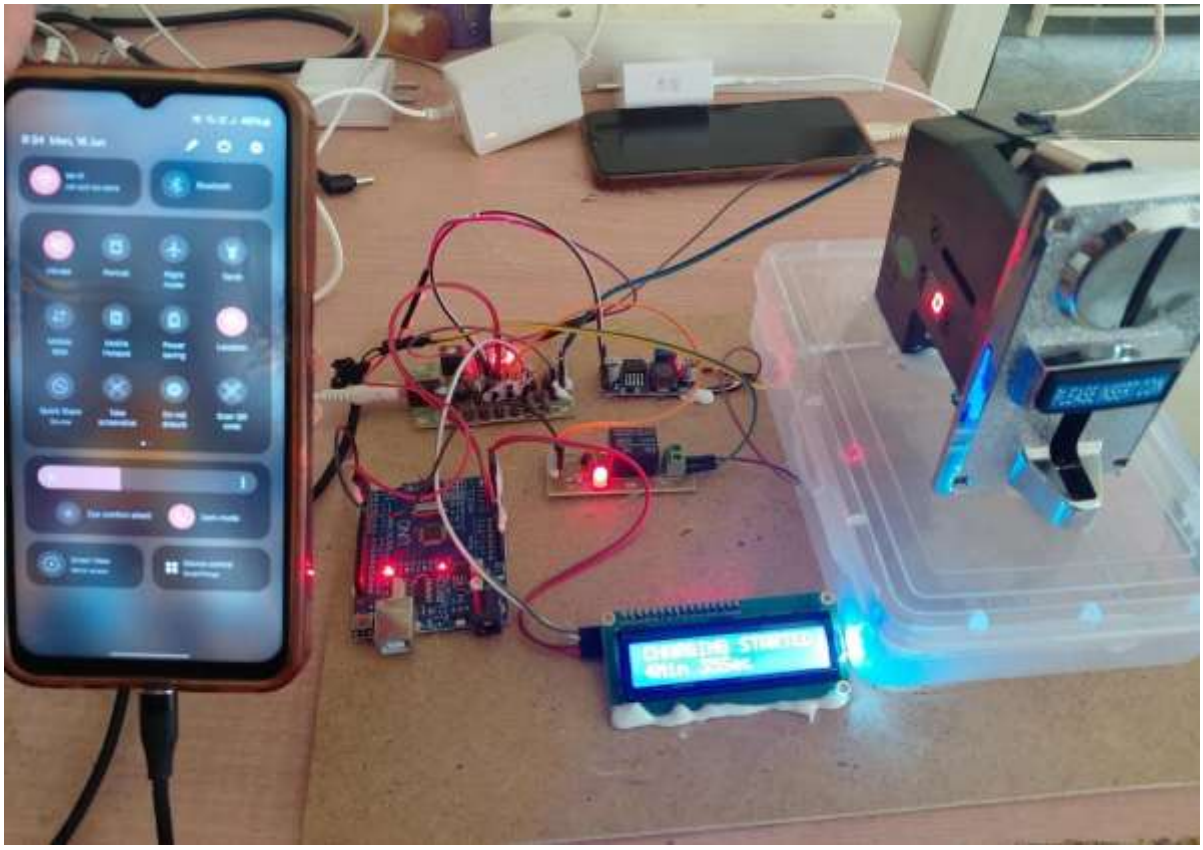


Fig 6. Regulated Power Supply

V. RESULTS



This system will charge the mobile phones for a particular time period. When the valid coin is recognized, it will start giving power supply to the cell phone through one of the adapters.

VII. CONCLUSION

The **mobile charging by coin insertion** system offers a practical and cost-effective solution to provide controlled access to mobile charging facilities, especially in public and semi-urban areas where traditional infrastructure is lacking or unreliable. By integrating a coin detection mechanism with an embedded microcontroller, the system ensures fair usage by enabling charging for a fixed duration based on the coins inserted. This pay-per-use model not only helps in revenue generation but also reduces misuse and energy wastage.

While there are challenges such as coin fraud, limited charging time, and maintenance requirements, these can be addressed through improved sensor technology, robust design, and incorporating alternative payment methods in the future. Overall, this system bridges a critical gap in mobile connectivity by making charging accessible, reliable, and affordable for users on the go, thereby enhancing digital inclusion and convenience in everyday life.

VIII. FUTURE SCOPE

The future scope of mobile charging by coin insertion includes integrating digital payment methods such as mobile wallets and QR codes to enhance convenience and support cashless transactions. Combining this system with solar panels can provide eco-friendly and off-grid charging solutions, especially beneficial in remote areas. The design can be expanded to support multiple devices charging simultaneously with individual timers to serve more users efficiently. Advanced coin validation technologies and improved security measures will reduce fraud and protect the system from vandalism. Incorporating IoT capabilities will allow remote monitoring and maintenance, improving overall management. Additionally, offering customizable charging plans and including battery backups will enhance user experience and service reliability. Lastly, upgrading the user interface with touchscreens or mobile apps can make the system more user-friendly and interactive.

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