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MOBILE CHARGING USING COIN. INSERTION

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Abstract : In response to the growing need for mobile phone charging solutions, we developed a coin-operated charging prototype using an Arduino Mega microcontroller, designed for various public environments like railway stations and commercial complexes, ensuring accessible charging during travel or emergencies.

Keywords **- Coin Insertion Module, Mobile Charging, Charging on Coin Insertion, Arduino Mega Microcontroller, Public Charging.**

I.INTRODUCTION

NOWADAYS, SMARTPHONES HAVE BECOME AN INDISPENSABLE PART OF HUMAN LIFE. POWER SUPPLY IS A CRUCIAL COMPONENT OF ALL ELECTRONIC SYSTEMS. SINCE MOST DAILY ACTIVITIES ARE CONDUCTED THROUGH MOBILE PHONES, CHARGING HAS BECOME A NECESSARY REQUIREMENT FOR THEIR OPERATION. THEREFORE, WE PROPOSE THE DEVELOPMENT OF A SYSTEM THAT PROVIDES CHARGING SERVICES UPON COIN INSERTION. THIS SYSTEM WILL BE ACCESSIBLE IN PUBLIC PLACES AT ANY TIME. TO USE THE SYSTEM, A USER SIMPLY NEEDS TO INSERT A COIN INTO THE COIN ACCEPTOR AND CONNECT THE APPROPRIATE ADAPTER TO THEIR MOBILE PHONE. THE CHARGING DURATION WILL BE BASED ON PRE-DEFINED VALUES SET IN THE MICROCONTROLLER. THIS SYSTEM IS EASY TO INSTALL AND IS BENEFICIAL FOR EVERYONE WHO USES A SMARTPHONE.

The initiative focuses on creating a mobile charging system that operates through coin insertion, offering a practical solution to the common problem of low battery life encountered by individuals while traveling or engaging in daily activities. Given that the majority of people utilize smartphones, which significantly deplete battery power, this system aims to address that challenge effectively

II. LITERATURE PAPER

In 2017, Dhara G. Rangani and Nikunj V. Tahilramani introduced a mobile charging system that utilizes coins, emphasizing the detection of coins. To achieve this, they employed a cantilever-type sensor designed to identify the weight of a 5-rupee coin, which subsequently generates a digital signal for the analog-to-digital converter (ADC). This controller was utilized to ascertain the authenticity of the coin, determining whether it was genuine or counterfeit. Additionally, the system incorporated solar power for charging mobile batteries, with grid power serving as a backup when solar energy was not accessible.

In May 2017, Mr. C V Raja Reddy, Uzoigwe Daniel, Rupesh Rai, and Balaji R proposed a mobile charging system that utilizes coins and incorporates solar tracking technology. Their primary focus was on solar tracking, employing Light Dependent Resistors (LDRs) to adjust based on sunlight intensity. As sunlight intensity increases, the resistance of the LDR decreases. The voltage across each LDR is sent to the Analog-to-Digital Converter (ADC), allowing the controller to analyze the data according to a pre-established algorithm and subsequently rotate the motor in the appropriate direction.

In 2015, Nupur Khera proposed a solution aimed at enhancing the management of battery charging and discharging processes. The solar charge controller is designed to avert overcharging of the battery, thereby extending its lifespan. Additionally, this controller will inhibit the reverse flow of current from the batteries back to the solar panels during nighttime.

A minimal charge can be utilized during the initial phase to mitigate prolonged charging times without compromising the reliability of the batteries. The DPCS technique significantly reduces charging duration, thereby offering an effective alternative for battery charging systems. In this approach, a constant current is applied for a brief period (for instance, a few seconds), followed by a resting phase of several tens of milliseconds to allow ions and chemicals to settle and stabilize. This technique holds potential for future applications in mobile, wireless charging, and power transfer systems.

This study examines the acoustic technique, wherein coin identification relies on the identification of the coin's inherent frequencies. The frequencies associated with these vibrations are influenced by the characteristics of the object, such as its mass, shape, and material composition, and they remain constant as long as these attributes are unchanged, thereby serving as acoustic signatures. Furthermore, this approach allows for the identification of counterfeit or worn coins, as they exhibit distinct properties. The methodology discussed in this paper can also be applied to recognize numerical sequences generated by other sources.
The type and size of the coin wil be indicated on the LCD to facilitate proper coin insertion. Any coin that does not meet the specified criteria will be returned to the refund box.

A sensor located at the coin insertion slot allows the coin to enter the battery charging unit, initiating the charging process for the mobile battery for a predetermined duration as regulated by the microcontroller's software. This sensor operates using infrared technology. The resistance of the sensor diminishes when infrared light is detected. The acceptance or rejection of the coin is determined by its diameter. Upon completion of the charging routine, a message indicating that the charge is complete will be displayed on the LCD.

In 2013, S. B. Sridevi proposed a solution for solar tracking. Given that the sun rises in the east and sets in the west, a system that cannot adjust to the sun's movement will fail to capture the maximum amount of sunlight, resulting in a inefficiency. To address this issue, a solar tracking system has been developed.

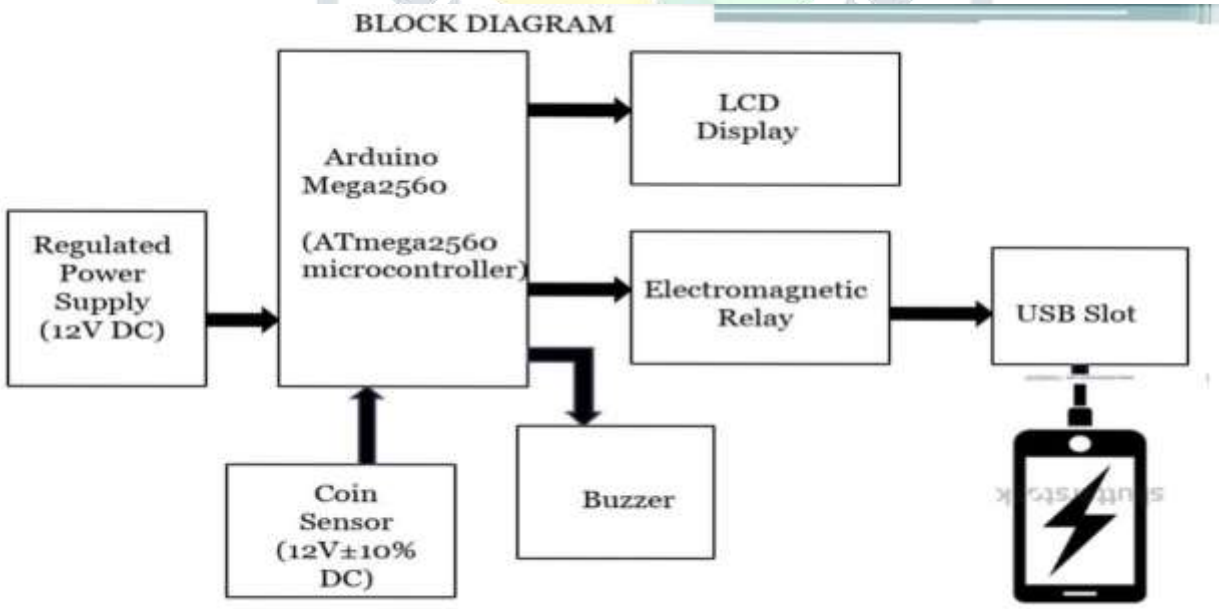
III. PROBLEM IDENTIFICATION

- Individuals who frequently undertake long journeys may find themselves in need of charging facilities at various locations. If they neglect to bring their chargers, it could lead to significant inconveniences.

- In a similar vein, in numerous developing regions where access to grid electricity is intermittently unavailable for several hours on a regular basis, individuals may need electricity to charge their mobile phones in order to maintain their work activities.

IV. METHODOLOGY

BLOCK DIAGRAM



The block diagram of the proposed system consists of six components: Power Supply, Coin Insertion Module, Microcontroller, Keypad, Liquid Crystal Display, and Mobile Charging Adapter. These modules have been procured individually, and a prototype has been developed using them. The specific functions of each component within the overall system will be detailed in the subsequent sections. In summary, the system is designed to charge the user's smartphone upon the insertion of the specified number of coins into the machine.

WORKING

A welcome message is presented to the user upon startup, stating, "Welcome to CS Press '1' to Enter." The user is required to press one, after which the system will display the message "Insert Coin(s)." The user may insert any number of coins, but only INR 5 or 10-rupee coins are accepted. Any other coins inserted will be rejected by the system and returned to the user. Upon pressing one, the LCD will show the "Insert Coin(s)" message along with "Balance= 0." This balance will update continuously as the user adds coins. For instance, if a 5-rupee coin is inserted, the balance will change from 0 to 5, and if a 10-rupee coin is subsequently added, it will update from 5 to 15.
Once the user has inserted the desired amount, they must press two (2) on the keypad to initiate the charging process. The duration of the charging is determined by the amount of money entered: 5 rupees grants a 5-minute charging period, while 10 rupees allows for 10 minutes. After the charging period concludes, the controller must be manually reset in this prototype. If the system is not reset, the next user will need to press one and insert the desired amount for charging, but they will not see the welcome message. The entire system is currently housed in a cardboard box for this prototype, but plans for the final product include a metal casing, which falls within the future scope of this project.

FLOWCHART

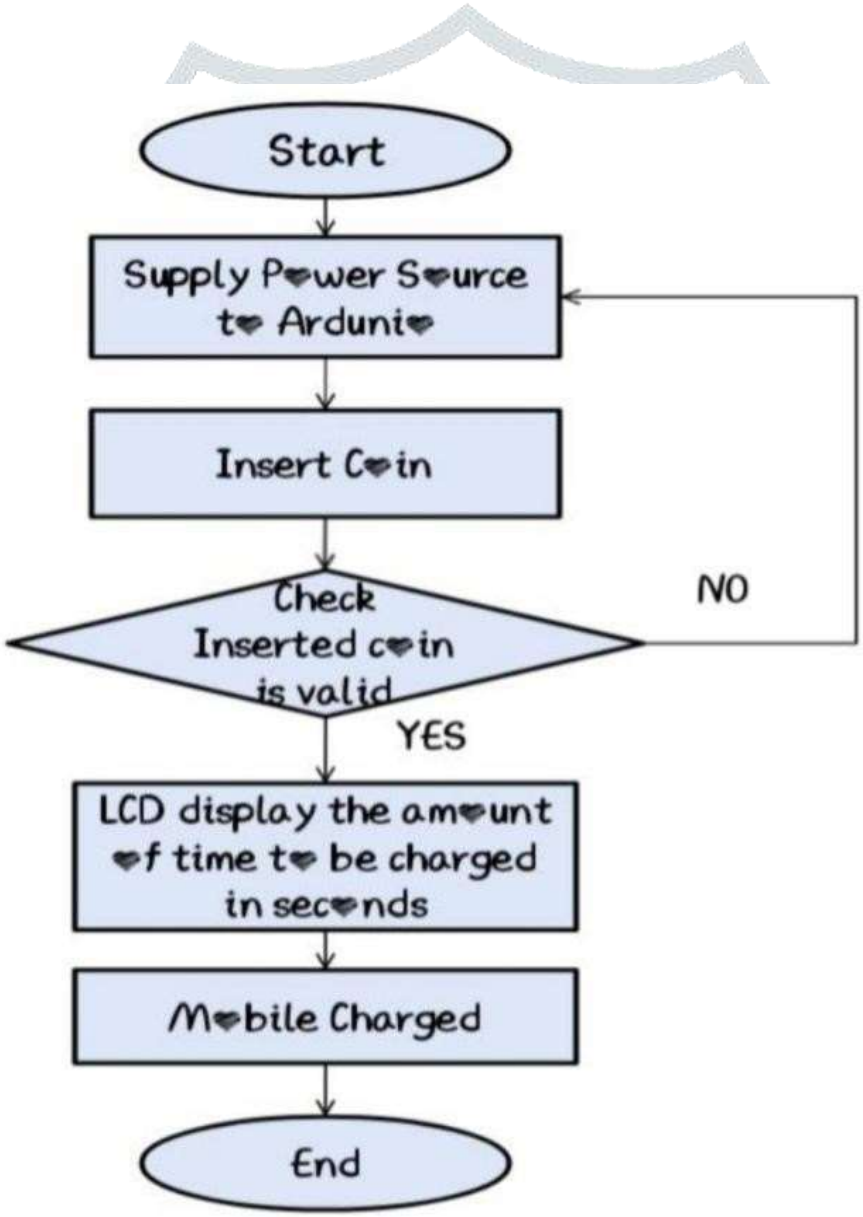


Figure: Flow chart

V. RESULTS

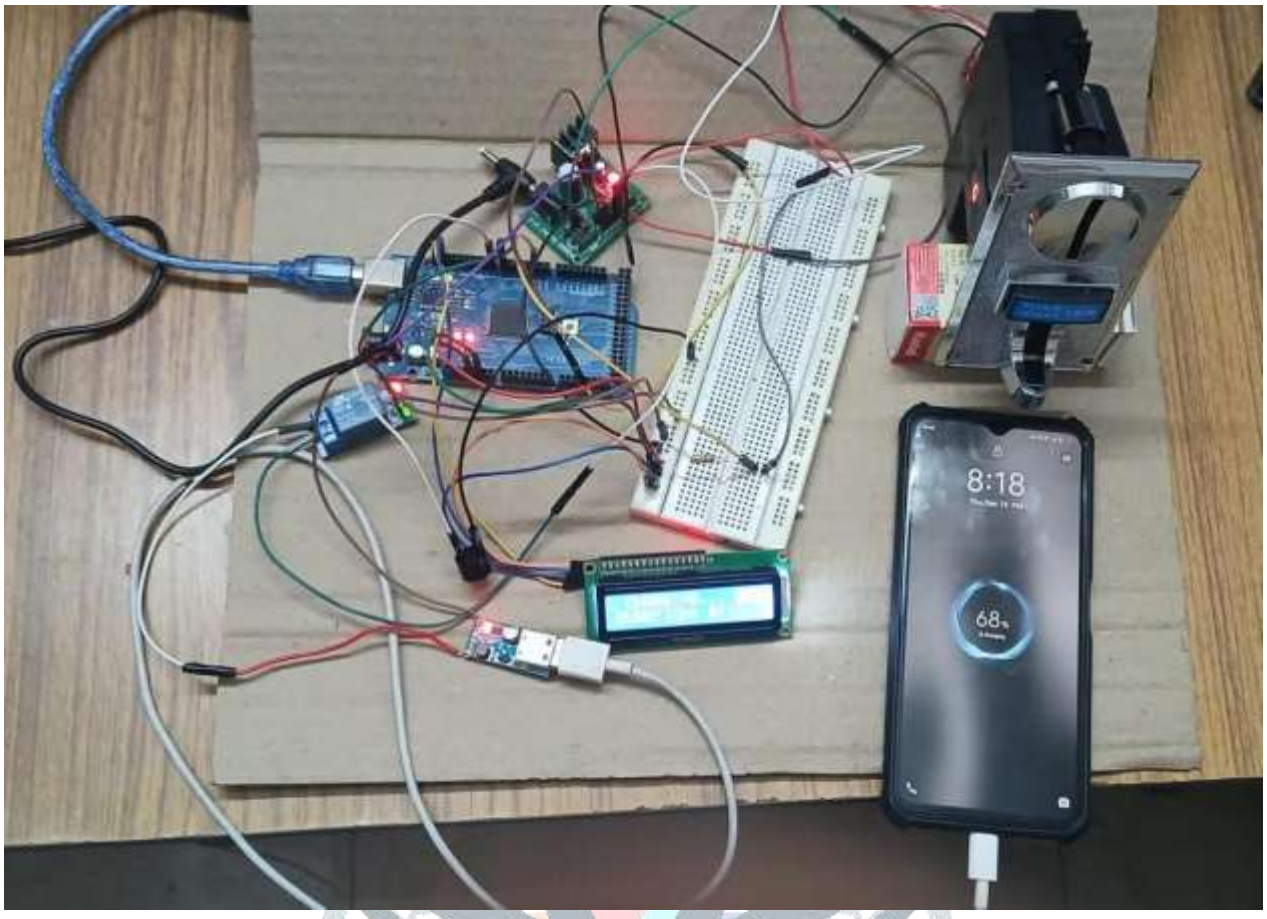


Fig1: Implementation of Mobile Charging Using Coin Insertion

The system under consideration has been designed and developed utilizing Coral Raw and is programmed through the Arduino Mega 2560. It consists of an Arduino Mega Microcontroller, a 16x2 Liquid Crystal Display, an I2C Module, a 4x4 Keypad Matrix, a DC 5V Single Channel Relay, a DC 12V Adapter, and a Coin Insertion Module. For the purpose of this project, all hardware components are housed within a cardboard box to create an aesthetically pleasing prototype. Initially, a welcome message is presented via the microcontroller and displayed on the liquid crystal display. Subsequently, user input is received through the insertion of coins, specifically INR 5 and INR 10 denominations. The coin insertion module detects these coins and continuously updates the microcontroller. Once a coin is accepted, the microcontroller transmits a HIGH signal to the Relay module, which alters its state from Normally Open (NO) to Normally Closed (NC), thereby connecting the mobile charging adapter to the main power line. This process initiates the charging of the mobile phone for designated time intervals.

Fig 2:Displaying to insert coin

Fig 3: Displaying ‘Charging started and time left’

Fig 4:Displaying ‘Charging completed and visit again’

VI. APPLICATONS

- **PUBLIC PLACES.**
- **EDUCATIONAL INSTITUTIONS.**
- **HOSPITALITY INDUSTRIES.**
- **RURAL AREAS.**
- **TEMPORARY OR EMERGENCY SETTINGS.**
- **WORKPLACES**

VII. CONCLUSION

A method for charging mobile batteries of specific brands has been designed and developed as needed. This initiative is particularly advantageous in contemporary society. In today's world, communication is essential, leading to widespread smartphone ownership; however, individuals often do not carry chargers with them at all times. During extended travels, it is common for people to forget their phone chargers. This project aims to assist users by creating a coin-operated charging station. Furthermore, given the prevalent use of the internet and smartphones, such a project is increasingly relevant.

The system utilizes conventional grid power for mobile charging, resulting in a cost-effective solution. A review of existing literature indicates that various individuals have proposed similar projects, but many rely on solar power, which can complicate the system, increase maintenance requirements, create power shortages at night, and ultimately lead to higher costs and reduced long-term feasibility. In contrast, our system employs the main power supply, which can be sourced from renewable energy plants, avoiding the complications associated with solar panels.

This project features a coin-operated mobile charging system designed for installation in public areas such as airports and railway stations, as well as in educational institutions where users may need to charge their devices. The core of this project involves integrating various components, including a coin insertion mechanism, an LCD display, a 4x4 matrix keypad, and a relay, all controlled by an Arduino microcontroller, with programming ensuring seamless operation. Additionally, this system can be utilized in public spaces to display advertisements, generating additional revenue. Upon inserting coins, users will receive a designated charging time based on the amount of money entered into the system. The prototype developed in this project is capable of charging one device at a time.

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