RFID and Coin based Mobile Charger using Solar Panel

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Abstract -*The mobile market being a vast industry has spread into rural areas, public places and railways etc. as a vital means of communication. While the town city people use more complex mobiles with good power batteries lasting for several days, the countryside people buy the mobile phones that need charging instantly. Frequently battery becomes dead during the middle of conversation particularly at difficult times when access to a typical charger isn't possible. Therefore RFID (Radio Frequency Identification) and coin-based mobile battery chargers are made to unravel this huge problem. The user should plug the mobile into one of the adapters and insert a coin or swipe an RFID card then phone will then run as a capacity for charging. The capacity of mobile charging is developed with the assistance of fixed values. It is, of course, possible to continue charging the mobile by inserting more coins or RFID card. The RFID and coin-based mobile charger designed in this paper providesa novel service to the agricultural area where grid power isn't available for partial/full daytime. The RFID and coin-based mobile device could be quickly and simply installed outside any business purpose. An acceptable microcontroller is programmed for all the controlling applications. The source for mobile charging is obtained from solar panel.*

*Keywords***: *RFID, microcontroller, charger, Solar panel.*

1. INTRODUCTION

The growth of cellphone market is phenomenal in recent years and therefore the need for charging the mobile battery is required anytime and anywhere. In many developing countries the grid power isn't available for few hours to many hours on day to day especially in village and countryside areas where the mobile phones are the essential communication device. While the inner-city population use more worldly-wise mobile phones with good power batteries lasting for few days, the countryside population buy the pre-owned mobile phones that need charging frequently even two or 3 times every day.

Most of the period telephone battery becomes low or dead at inopportune times when standard charger isn't accessible. As we all know that, in most of the building nations the electrical power supply isn't accessible for several hours. Nowadays mobile phones are the vital communication gadget. The RFID and coin-based mobile device can solve this problem. In cases where there's unpredictable electrical power supply and solar power is obtainable, this secured transportable charger is incredibly useful. For charging the phone, the user must insert the coin or swipe the card and connect thephone to one of the charger pins for charging battery for a selected period of time.

The solar energy application to battery charging has been studied before. Solar chargers convert light energy into DC current for a spread of voltage which will be used for charging the battery. They're generally portable but may also be firmly mounted. Here in our proposed design of RFID card and coin based mobile charger a 5W, 12V solar panel is used to charge a battery to a max of two amp in bright sun light. The outline and development of a RFID card and coin based universal mobile device supported solar energy is implemented and it's primarily designed for both rural and city areas where the mobiles are the essential needs for communication where in the main power isn't available all the time.

1.1 Objectives

In the section 1.1 the purpose of the project is described. The main purpose of this project is to reactivate an occasional or dead battery once your phone's battery has been drained somewhere publicly. RFID and Coin based mobile charger are very useful to public because of its technical machinery that recharges the mobile and brings it back to life once it dies in public places.

- Inserting the coin or the card using charger for your mobile in public places.
- Source for charging is solar energy supply.
- Different kind of mobiles will be charged.
- To implement the straightforward and hand efficient mobile charger which helps the user, to charge their phone during urgent needs.
- To scale back the wastage of power which regularly arises due to negligence of the user.

2. LITERATURE SURVEY

Coin Based Universal Mobile Battery Charger: A fixed solar panel of size 635x550x38mm, 37WP is used to charge the mobile phones up to maximum 2.0 ampere [1]. The target of this project is embedding the coin employing charge for your mobile phone in broad daylight places. This venture is extremely valuable to individuals who are largely utilizing cell phone without charging condition in broad daytime places. In this undertaking, who are for the most part utilizing cell phones in outside of home are office without charging condition. The coin based cell phone charger is exceptionally of great worth to that individual for employing coin to charge the mobile phone. The IR (infrared) transmitter is utilized to transmit IR motion in the transmitter side. The IR recipient is utilized to get the IR motion in the beneficiary side. Between the IR transmitter and receiver, insert a coin to change the extremity of heartbeat in System Control unit (SCU) input. The 555 IC is go about as a clock to produces high heartbeat for specific day and age. Driver circuit is utilized to give the adequate information voltage of hand-off [1].

Sun Tracking by Peak Power Positioning for Photovoltaic Concentrator Arrays: It experimentally investigated the working of Coin based mobile charger with solar tracking system by peak power positioning [2]. In this experiment the op-amps can operate the ON/OFF and directional functions of the structured five motors. These motors rotate in two axes. The tracker's sun sensor is mounted. From the output of this device it will check the outputs are all equal, then the collector structure is nearly perpendicular to the sun and tracking error is reduced [2].

A microcontroller-based solar panel tracking system: The renewable energy is the main source of one of the renewable energy sources is solar energy. This energy generated more energy because the solar panel is to maintain a perpendicular to the sun's rays [3]. By using IoT, the mobile phone is being charged. In this framework, it keeps the track of the solar energy as well as battery power when the coin is inserted in the coin box. Once the coin is identified, it sends signal to the Raspberry pi and it activates the relay and the LCD display shows the countdown timer. The Raspberry pi can cooperate with the outside world. The relay generates the voltage and fed as input to mobile phones [3].

Coin based mobile charger on solar energy: To give control supply routinely, here they have utilized sun oriented board. This sunlight based board assimilated the light from the sun then this will create the light vitality and this sun powered charger change over light vitality into DC current for a scope of voltage that can be utilized for charging the 12V rechargeable battery daylight to successfully assemble sun based vitality [4].

3. BLOCK DIAGRAM

The block diagram shown in the figure1 has the following three stages,

- Input stage
- Controller stage
- Output stage

3.1 Input Stage

In the input stage the user has to insert a coin in a coin acceptor box or swipe a card into the RFID Reader. If the swiped card/coin is valid, the message is displayed in the LCD and the signal is sent to the Arduino. If the card is not valid, the access is denied. When the card is accepted, the Arduino and relay is activated and the battery starts getting charged by the relay. The keypad is used to enter the password, amount, charging time etc. The mobile phone begins to charge, when a coin is inserted at the coin insertion groove at the input stage. The nature of coin and the volume will be displayed in the LCD for the user, so as to make sure correct coin insertion. Any other coin, if inserted in the slot will be recurred to refund box. A mechanical slot is connected with electrical triggering in coin insertion slot, if the correct coin is inserted it sends a pulse to the control unit entitling the start of charging the mobile connected to the device. Then the coin insertion groove accepts the coin into the charging unit and starts to charge the mobile phone for a defined period controlled by the software of the Arduino microcontroller. The RFID cards eliminate the problems of coins, most of the time user can't carry the coin in such cases these cards will help the users. These cards work similar to that of ATM cards, user needs to swipe the card at the charging station then the system will ask the user to

enter the password. After entering the password, system will display the different options in the LCD Display. Depending upon the option display, user needs to select any one of the option by pressing the respective key from the keypad after that system will deduct the money from the card. By using these cards automatically security will increase. In the sec 3.1 figure 2 and 3 shows the input setup.
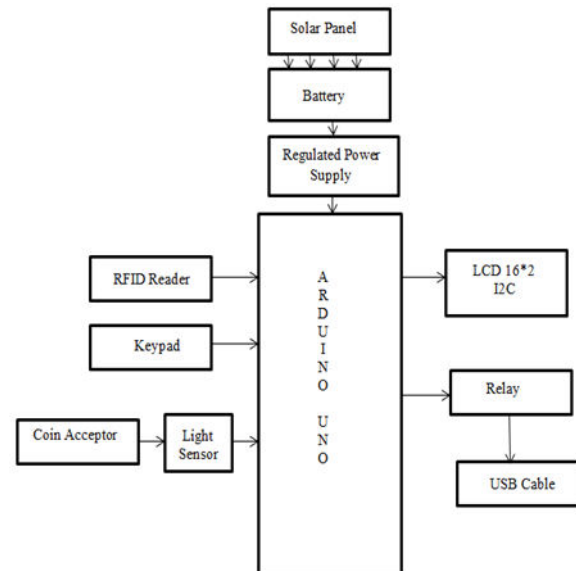

Figure 1: Block Diagram
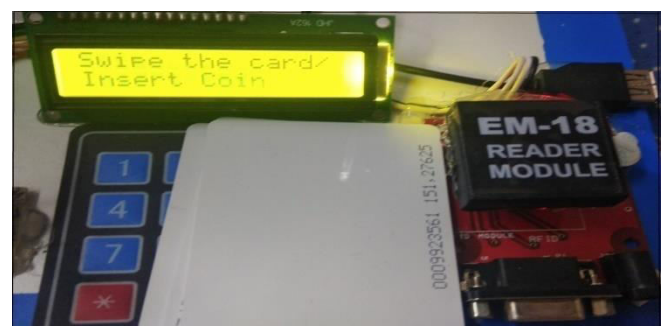

Figure 2: Setup for Coin Recognition

Figure 3: Setup for RFID card

3.2 Controller

The system performs according to the input signal from the module. If the card is accepted, it sends signal to arduino along with LCD interface. Once the arduino receives the signal from the coin acceptor/RFID reader it sends the signal to the relay. The relay

generates the voltage of 5V, which in turn charges the mobile phone through the USB terminal. Microcontroller works only when the command is received from RFID/coin box. In the section 3.2 the controller used is Arduino Uno R3.

To provide power supply regularly, we use 5W Solar Panel, DC PowerSupply and 12V Battery. Solar Panel provides DC power supply which is given to charge the rechargeable battery of 12V and from the battery we are giving to the regulated power supply board where in the obtained voltage is given to a voltage regulator to obtain a pure constant DC voltage.

3.3   Output Stage

The LCD displays the required information to the user as and when required. When the mobile is connected, it displays "Insert Coin/Swipe the card". When charging it displays "Charging" and at the end of charging period it displays "Charging completed". For charging frequently the coin has to be inserted when the display shows "Charging Completed". The supply from the relay is given to the mobile charger pin. The charger will be ON only when the coin is inserted or RFID card is swapped. The user has to enter the required amount for charging. Depending upon the amount the mobile phone will charge for a specified amount of time. When this time period reaches to 0, automatically power supply will be cut by the relay indicating charging completed. If the user enters an amount exceeding that of the card, the LCD displays "Insufficient funds".

4. ALGORITHM

- Step 1: Start
- Step 2: Insert coin/Swipe the card
- Step 3: Collect the coin or else refund the coin if rejected
- Step 4: Send command to the Arduino and the relay
- Step 5: Shows the various options in LCD
- Step 6: Select the required options
- Step 7: Mobile charging counter starts
- Step 8: Charging Time completed
- Step 9: Stop charging

5. RESULTS

When user uses RFID card, initially system gives the information to the user about the balance present in RFID card. System asks user to enter the password. When the user enters wrong password lcd display displays message as "access denied". When the user enters correct password system gives the information to the user that the entered password is correct and also system asks the user to enter the amount for mobile charging. The charging time depending on the entered amount will be displayed.

In the figure 4 the user 1 card details is displayed in LCD when he swipes the card.

Figure 4: Display of user -1 card details

In the figure 5 the amount to be entered by the user-1 for charging is displayed.

Figure 5: Display of the amount to be entered

In the figure 6 the timerfor the charging process is shown.

Figure 6: Display of the timer for charging

In the figure 7 the charging status and the remaining balance left in the card after charging.is displayed.

Figure 7: Display of charging status and the remaining balance

In the figure 8 the user entering the wrong password which denies the access to the system is shown.
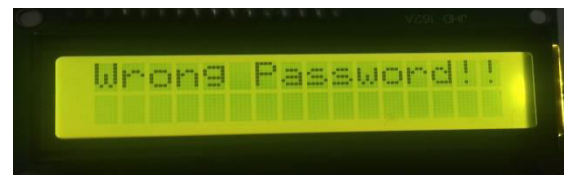
Figure 8: Display of User entering the wrong password

6. CONCLUSION

In this proposed system, an attempt has been made to implement RFID and coin based secured cell phone charger. The mobile phones have become a vital requirement in urban as well as rural areas. Present scenario, almost everybody have mobile phones. But onecannot carry mobile charger with them all the time. This charger can be installed at different places for the convenience of mobile phone users. Along with that security of mobile can also be assured.

7. SCOPE FOR FUTURE WORK

To make sure we've got abundant energy in the future, it's up to us to use energy wisely. We must all sustain energy and use it precisely. It's also up to people who will create the new energy technologies of the long run. This idea can be often used for several purposes instead for charging the mobile. It can be used for purchasing foods within the restaurant, snacks within the stores, by inserting the specified amount of cash to that specific product. By this idea, queue can be often reduced at the tickets buying places in the trains, and buses in the fast-moving city. This project can also be installed in hilly areas, where alternate energy like wind power can be implemented to charge and store power within the battery. This project can be often employed in railway stations, shops, rural areas and other public places. In future it can be also employed in electric vehicles as charging stations. Charging slot can be often increased for more no of user. Laptop and camera can be charged using this system and is also used as theft proof coin based and RFID based charging system.

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