RFID COIN BASED MOBILE CHARGER USING SOLAR ENERGY

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Abstract: In this world now a days, mobile phones play a vital role in the communication, navigation and gaming fields. This paper describes about the mobile charging based on the RFID system. This type of charging system is very useful for the public people whose mobile needs charging for emergency communication. The main advantage of this project is that the supply for the charging is get from the solar panel which is a form of renewable energy resources. The RFID coin based mobile charging is worked according to the code written in the Arduino ATmega328p. This type of charging system may be employed in public places such as railway station, Bus stand and in rural areas which consisting of small hotels and small shops.

Index Terms - Arduino UNO, Relays, Battery, LCD, Mobile charger, Solar PV panel.

I. INTRODUCTION

In the today society, the mobile phones are not only become a very important means of communication all around the world but also an integral part of everyone's life and hence require frequent charging of battery is required owning to longer duration usage, but there are certain people who tend to forget their mobile phone charger. This is where the RFID coin based mobile charger comes for the rescue in public places with the near field communication of RFID coins. In the availability of abundant solar power, this method is designed with RFID coin detecting mechanism. Arduino Uno, relays, LCD, solar panel, sealed lead acid battery and different phone charging circuit.

II. LITERATURE SURVEY

S. BHANU PRATHAP *et al*., 2013, paper titled "Coin based cell phone charger", describes about the charging of the cell phone using Indian coins. In this method the cell phone gets charging only for the particular insertion of the coin. A mechanical slot is provided with electrical triggering in the slot of coin insertion. The size and type of the coin is displayed at the LCD display for the user reference. If correct coin is inserted, it sends the pulse to the control unit and starts the charging of cell phone. Here 89c51 microcontroller IC is used.

VAIBHAV GUPTA *et al*., 2014, paper titled "Prompt Indian Coin Recognition with Rotation Invariance using Image Subtraction Technique", presented a method of recognition of the Indian coins of different denomination based on the image subtraction. In this process, it checks the radius, coarse and fine of the coin on the input image and then the radius of the test image is compared with the database. The subtraction between input image and data base image is done. The identification of the coin is obtained by plotting the resultant value we get a lower limit value which if less than a standard threshold.

KALYANI U.CHAFLE *et al*., 2015, paper titled "Coin Based Mobile Charger on Solar Energy", described about the charging of the mobile phone using solar energy. The solar tracking system is used to extract the solar energy from the supply. To control the mechanical movement of the solar panel, stepped motor is used. LDR is used for the solar optimization. Here the coin detector detects the coin and gives the input to the microcontroller. In this circuit MOSFET is used as a switch.

GANJAN CHHBRA *et al*., 2015, paper titled "automatic gadget charger using coin detection", reported that by using technology of image processing, lets the coin holder move in front of the camera, it send the real time captured image to the MATLAB for calculating the value of the coin then it sent the command to the microcontroller to charge the mobile phone for limited period.

RAHUL PATIL *et al*., 2017, paper titled "Coin operated cell phone power charger", Coin operated cell phone power charger", reported that the mobile is charging using solar energy and power supply alternatively. The coin detection mechanism includes a IR sensor attached to the coin insertion slot. When

coin inserted in the slot, it disturbs the Infra Red lights falls on the IR sensor. The resistance of the sensor decreases and which gives the pulse to the control unit to start the charging.

G. PRIYANKA *et al*., 2018, paper titled "Coin Based Mobile Charger", describes the charging of the mobile phone is done by main power supply. The coin detection mechanism used here is IR sensor technology. A electromagnetic relay is used as a switch.

III. BLOCK DIAGRAM

The basic block diagram of the RFID coin based mobile charger using solar energy is shown in the below figure.
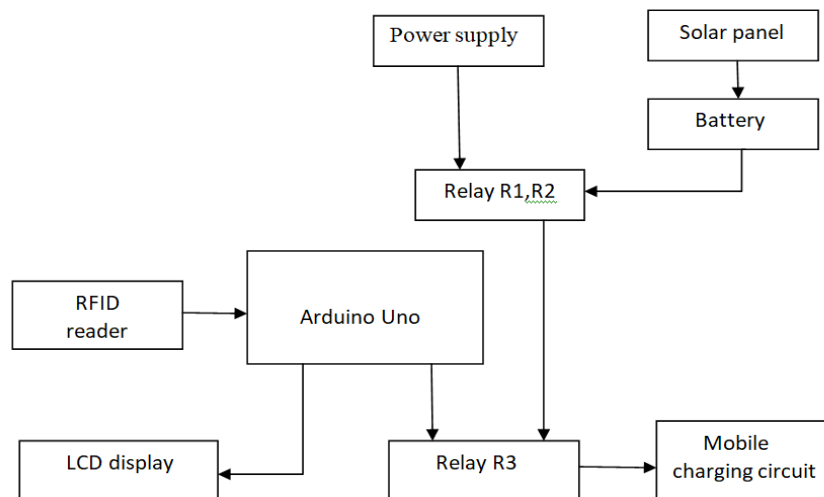

Fig 1. Block diagram

IV. WORKING PRINCIPLE

The mobile get charges when RFID coins get inserted. The mobile should be connected to the USB terminal: where there are 3 mobile terminals are given out. The RFID coin is inserted to the RFID reader 522, which is working on radio frequency or radio waves. This will automatically identify the objects; here it is automatically identify the RFID coin in which each coin has its own value. The Arduino Uno is a microcontroller board based on the microchip ATmega328. It can be powered by a USB cable or by an external 9V battery, though it accepts voltages between 9 and 20 volts. The Arduino Uno ATmega328 comes pre-programmed with a boot loader that allows uploading new code to it without the use of an external hardware programmer. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The Arduino software (IDE) includes a serial monitor which allows simple textual data to be sent and from the board.

A Electromagnetic relay R2 is operating based on the duration of mobile charging according to the value of corresponding RFID coins. Initially a 16X2 LCD displays "Insert Coin", then after the insertion of the coin the mobile get charging and the LCD displays "Charging". The LCD display will also shows countdown duration of the remaining timing of the charging. After charging LCD displays "Charging done".

The power supply for the charging is taken from a battery which is charged by the solar panel. The mobile is charging from the solar energy. In the case of inaccessibility of solar energy, alternatively the mobile get charged from power supply which is taken from the main power supply. One more Electromagnetic relay R1 switches between power obtained from the battery and power from the main power supply.
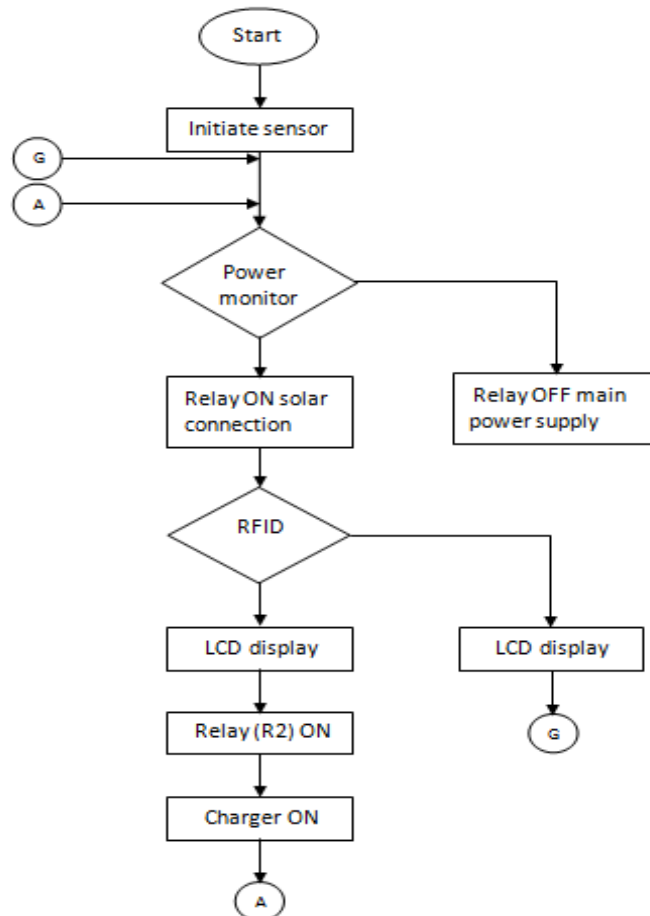
V. FLOW CHART

Fig 2. Flow chart of charging mechanism

VI. HARDWARE REQUIREMENTS

RFID SYSTEM: Radio frequency identification is a technology which works on the principle of radio frequency or Radio waves. In this project the RFID system involves RFID reader and RFID coins. In this technology RFID reader is used to automatically identifying the RFID coins within the specified range of distance. The coin which is used in this technology is attest with the RFID tag. The RFID reader and RFID tag used in this system is RC522 respectively. The operating frequency range of this system is 13.56MHz. Let us discuss the working of the RFID system. Basically the RFID reader consisting of radio frequency module which is used to generate radio frequency of the range of 13.56MHz and an antenna which is used to transmit and receive the radio frequency signal. On the other hand the RFID tag based coin consist of transponder and antenna which is used to respond to the radio frequency send by the reader and sent the corresponding feedback signal to the reader. The RFID reader continuously transmit the radio frequency and at the same time when RFID tag comes near with the reader , the RFID tag respond to the radio frequency and send back the feedback signal to the reader. This signal is process through the Arduino Uno which is interface with the RFID reader.

ARDUINO UNO: The Arduino Uno used in this project is ATmega328. The Arduino Uno is a microcontroller board based on the ATmega328. It consists of 14 digital I/O pins (out of which 6 pins are for pulse width modulation outputs, 6 analog inputs, 16MHz ceramic resonator, USB connection, power jack, ICSP header and reset button. The power to the Uno is through the USB connection or through external power supply. The external power supply may be through the battery. The operating voltage will be 5V. the DC Current per I/O pin and DC Current for 3.3V pin will be 40mA and 50mA respectively.

MEMORY: Flash memory: 32KB
         SRAM (Static Random Access Memory): 2KB

EEPROM (Electrically Erasable Program Read Only Memory): 1KB

RELAY: The relay used in this project is Electromagnetic relay. Electromagnetic relay is the one which works on the principle of electromagnetic action.

BATTERY: The battery employed in this project is 12V sealed lead-acid battery. This battery not only used to store the power which is generated from the solar panel but also to charge the mobile whenever it will be required for the charging.

SOLAR PANEL: 12V rating of solar panel is used in this project. This solar panel converts solar energy into electrical energy and it will charge the battery. Photovoltaic effect is involved in the process of converting solar energy into electrical energy.

VII. FUTURE SCOPE

- ✓ Intelligent battery charging.
- ✓ Output constant rate of charging current.
- ✓ To make sure we have plenty of energy in the future it is up to all of us to use it efficiently.
- ✓ We must all conserve energy and use it efficiently.
- ✓ It is also up to those who will create the new energy technologies of the futures.

VIII. CONCLUSION

The RFID coin based mobile charger is very useful to public for using coin to charge for all mobile phone in any public places just like charging if normally owing to the fact that it relayed the electricity through the coin based mobile charger needed to bring the mobile phone back to life.
A method of charging mobile batteries of different manufacturers 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 places.

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