Coin Based Universal Mobile Charging using Solar Energy

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Abstract— This paper describes coin based universal mobile charging with solar tracking system. The main intention is to provide mobile charging facility easily in various places such as stations, offices, school, malls, etc. In this project use of solar system is being installed. This can be used where sufficient grid power is not available such as rural areas where people face problems such as load shedding. A user can charge a mobile by inserting a coin into the insertion box. Two pair of LDR sensor will check whether the coin is fair or not. This design is based on ATMEL 89c51RD2 a 40 pin micro controller which is used to display the message on LCD, to select appropriate charger and to control solar tracking system. Solar tracking is done using distinctive LDRs.

Key words: Solar tracking, grid power, LDR, LCD, micro controller

I. INTRODUCTION

Today mobile phones have become a basic need of a human being. Many times it happens that the mobile phone gets discharged while travelling or while in case of emergency and you won't find a source to charge mobile. To overcome with such situations, coin based mobile charging system is use.

In this technique, user can connect a suitable charger to charge his/her mobile phone. For that a coin is to be inserted in coin box. Two pair of LDR sensors is used to detect the uniqueness of coin. A micro controller is used to detect the fairness of coin by differentiating time between two sensors, then and only then the coin gets accepted. For accepting the coin, solenoid is used. A solenoid converts electrical energy to mechanical movement.

After accepting the coin, LCD display the mobile option, by selecting proper charger, it starts charging of mobile phone. Relay circuit is use for switching mobile charging supply from one to another. User can terminate the charging by pressing Cancel button. If replica of coin is inserted, then LCD repeatedly asks for a fair coin to be inserted by displaying the message 'INSERT COIN' and sends the fake coin to the refund box. .

Primarily charging of mobile is done using solar power; simultaneously it will do the tracking. For tracking two LDR sensors are used. If the light intensity on one LDR is less than the other it switches to another LDR. Stepper motor is used with an angle of 90 degree, which rotates the solar panel either in a clockwise or anticlockwise direction. However if the intensity of solar energy is reduced then relay circuitry switch the supply to grid power.

II. PROPOSED SYSTEM

A. Coin Box

Coin box have following sub-parts:

1) Sensor: Two pair of LDR and LED is used to detect the coin. Once the coin is inserted through the insertion slot, resistance of LDR1 gets increased and pulse is send to the micro-controller where it starts the timer. After passing through the second LDR, the resistance of LDR-2 increases. The time taken to reach LDR-2 is calculated to detect the coin. The time difference is preset in controller programming.
2) Solenoid: It is used for accepting the coin in collection box. The basic principle of solenoid is to convert electrical energy into mechanical energy. A 9v battery is connected to solenoid which charges the coil inside it and gives the mechanical movement to a steel plate which accepts coin in collection box. By pressing OK button solenoid gets activated and the coin gets accumulated in the collection box.
3) Rejection box: A mechanical mechanism is being designed with a push button which simultaneously act as a CANCEL button to eject coin. By pressing cancel button charging will get stopped.

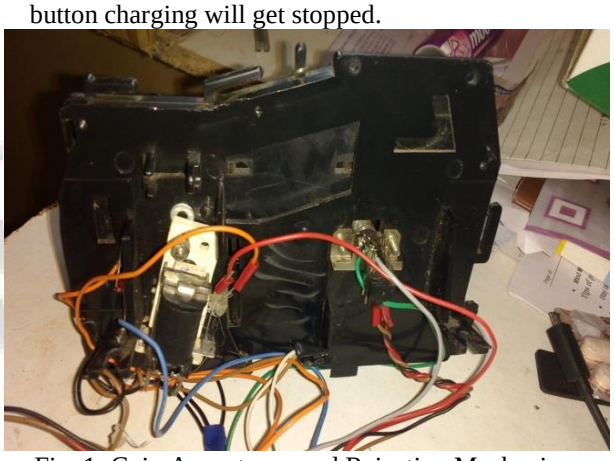

Fig. 1: Coin Acceptance and Rejection Mechanism

B. Relay Circuit

This project comprises of 5 relays. One main relay of 8-pin, 12v to switch solar power to grid power and other four relays of 5-pin, 12v which switch from one to other depending upon which mobile charging pin the user is choosing.ULN2003 driver circuit is used for relays.

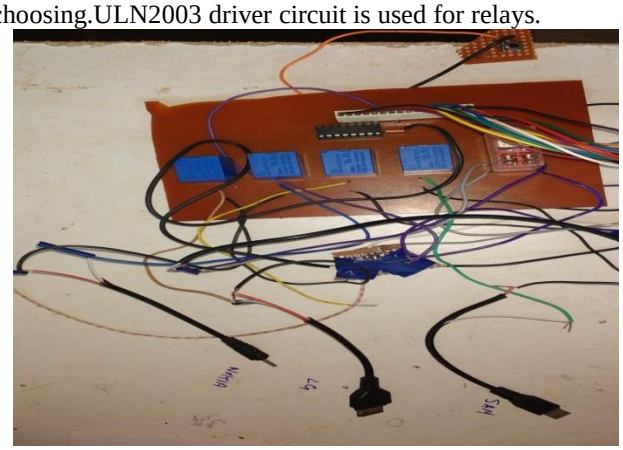

Fig. 2: Relay Circuit

C. Solar system

Solar panel of size 22x19cm and 18v is used to charge the battery. In between solar panel and battery, rectifier circuit of IC LM317 and diode is used, which charge 6v, 1.2A battery. A direct supply of this battery is given to relay circuit to charge mobile phone.

Fig. 3: Solar Charging

D. Tracking System

For rotating solar panel depending on the intensity of sun, two LDR at opposite direction are placed. If intensity of sunlight on LDR-1 is less then it rotates to LDR-2. A stepper motor is used to rotate the solar panel. Stepper motor is interfaced with microcontroller through the driver IC ULN2003.Stepper motor rotate with 90 degree in clockwise and anticlockwise direction.

E. LCD Display

LCD display is used to display a contemporary status of the charging. It displays the instruction that to be followed by user. For example initially it displays a message "INSERT COIN" on the LCD display.

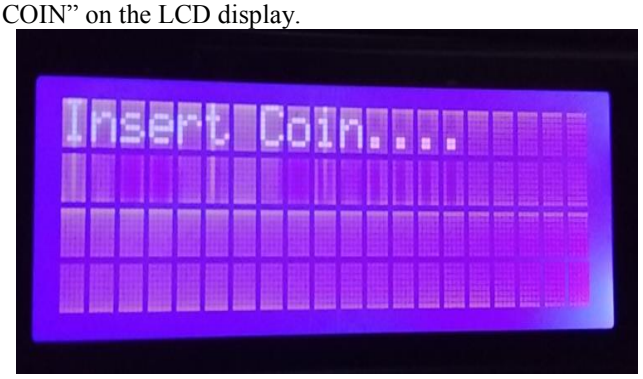

Fig. 4: LCD Display

III. FLOW CHART

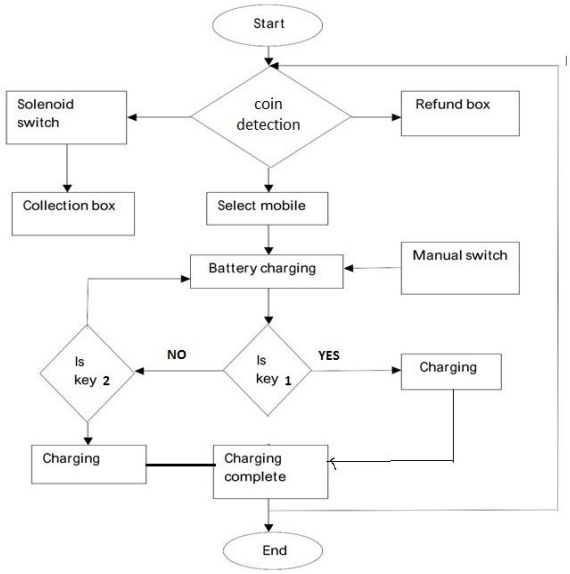

Fig. 5: Actual process flow chart

IV. RESULT

Fig. 6: Project Set-up

V. CONCLUSION

We obtained a goal of charging a mobile phone by solar energy and avoiding external power supply which can be effectively used where power cut-off is regular. Also this project can be installed at various public places to charge the mobile phones when the user battery gets flat at the middle of the conversation.

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