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Universal Coin based Mobile Charger

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Abstract: This paper is based on universal coin based mobile charger in which multiple mobiles can be charged using coin, with the help of solar energy as well as ac main power supply. Usually the solar panel gets four to five hours of bright sunlight in a day. If the weather is cloudy or rainy, it affects the charging process and the battery does not attain full charge. When the output is about 12V, the battery charges using the solar power, when the output drop below 12V the battery charges through ac main supply. This type of charger will be very useful for the people in public places. Coin based mobile charger can be placed in trains, stations, hospitals, exhibition halls, serviced offices, training centers, hotels, etc.

Keywords:LCD Display, battery charger, solar panel, coin detector sensor, microcontroller, mobile phones.
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I.   INTRODUCTION

In this project we aim to design a mobile charger that charges the phone upon coin insertion. The coin detector detects the coin by using coin detector sensor or opto-coupler type of mechanism as in the conventional coin box phone. As soon as it detects the coin it send a pulse to the microcontroller. The microcontroller turns ON the relay (electro-mechanical switch) to provide 230V,50Hz signal to the charging socket and the user can charge his/her mobile phone from the socket. The LCD (16*2) is used to display the time duration for which the user can charge his/her mobile phone. The programming of 89 V51RD2 is done in C language using Keil compiler. The PCB designing is done using EAGLE (Easily Applicable Graphical Layout Editor) software. Solar charges convert light energy into dc current for a range of voltage that can be used for charging the batteries.

II.   BASIC ASSUMPTION

The basic assumption of coin based mobile charger is as follows.Maximum solar energy is used for charging lead acid battery (mobile battery).

a. AC supply given to the charger is 230V, 50Hz.
b. The charging current is up to 4.5amp at 6V dc.
c. A single solar panel of size 635*550*38mm, 37WP capable of supplying up to 2amp is used.
d. 10 different types of mobile are provided to charge the cell phone.
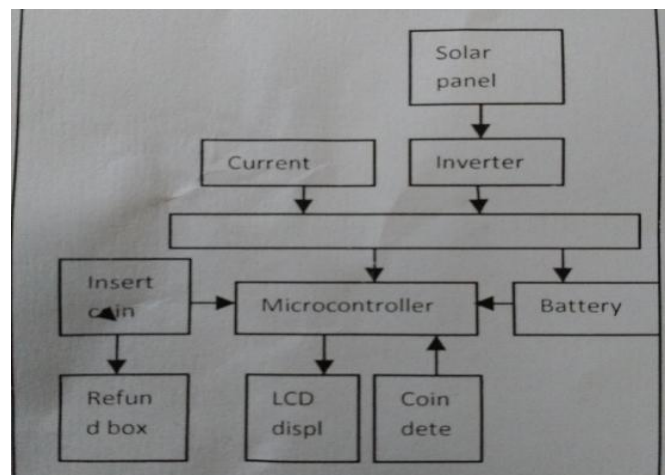
III.   BLOCK DIAGRAM

Figure 1.Block Diagram

1.1.   Block description

1.1.1. Input stage

The mobile battery charger starts charging a mobile connected to it, when a coin is inserted at the coin insertion slots at the input stage the type of coin and the size will be displayed at the LCD display for the user so as to ensure correct coin insertion. Any other coin is inserted in the slot will be returned to refund box. A mechanical slot is attached to electrical triggering coin insertion slot. If a correct coin is inserted it sends a pulse to the control unit authorizing the start of charging mobile battery connected to the device, then the coin insertion slot accepted coin into the battery charging unit and starts charging for specific period of time.

1.1.2. Controller

This section acts according to the input signal from the sensor circuit coin accepted or rejected is based on the diameter of the coin. It indicates charge complete message through LCD display.
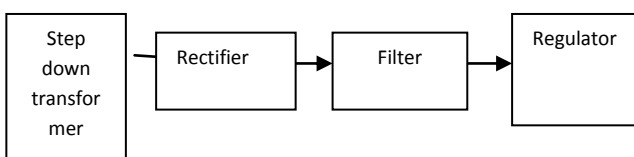
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1.1.3.   Output and display

The LCD display all the information to the customer as and when required. Then the mobile battery is connected, it display "insert coin"while charging it display charging and at the end of charging cycle it display "charge completed". For charging continuously the coin has to be inserted when the display shows charge completed the output has 6-7 terminals for connecting different types of mobile.

Table 1:Model with its charging voltage

Sr. No	Mobile Type	Max. Charging Voltage(V)	Max. charging current (mAh)
1	Samsung	5.7	3400
2	Sony Ericson	4.8	900
3	Nokia	4.8	1500
4	LG	5.5	2100
5	Panasonic	3.7	1200
6	HTC	5.5	1800
7	Blackberry	3.7	1300

1.1.4.   Power supply

The input to the circuit is applied from the regulator power supply the ac input i.e. 230V from the main power supply is step down by the transformer to 12V and is fed to a rectifier. The output obtain from the rectifier is a pulsating dc voltage. So in order to get a pure dc voltage, the output voltage from the rectifier is fed to a filter to remove any ac components present even after rectification. Now this voltage is given to a voltage regulator to obtain a pure constant dc voltage.

Step down transformer → Rectifier → Filter → Regulator
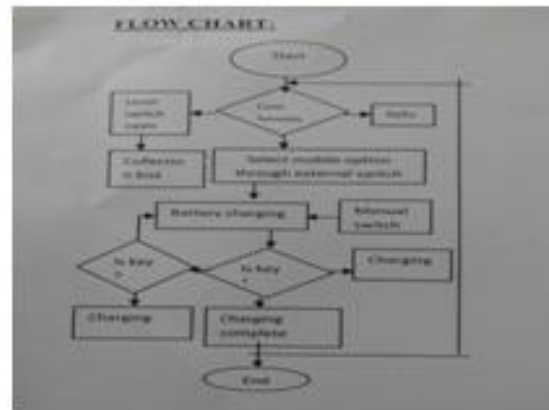
IV.   FlowChart

Figure 2. Flowchart of the system

V.   ALGORITHM FOR COIN BASED MOBILE CHARGER

1.   Start
2.   Enter the coin.
3.   Once enter the coin, it shows coin is correct.If coin is not exact then on LCD
     Display "Please insert the exact coin.
4.   If coin is exact then charge your mobile phone.
5.   End

VI.   FUTURE SCOPE

1.   Recently there was a news from app mobile company, they have found technology to charge mobile four times faster than conventional charging method.
2.   They provide high current to the mobile battery which is up to 4 amperes.
3.   If we used such high current to charge conventional battery of mobile, so it will get start heating and has chances of damage of mobile and battery. So they have provide protection from such heating problem.
4.   So if all the mobile companies started using this technology then the customer of our coin paid mobile charging system does not have to wait for long time to charge his mobile.
5.   Hence instead of 10 minutes of charging time the battery got charged his mobile.

VII.   ADVANTAGES

1.   Effectively receive maximum energy from sun towards earth rotation.
2.   It is more useful to save energy from sun and intelligent tracking solar energy.
3.   It is simple and hand efficient.
4.   Less expensive.
5.   Reduced man power.
6.   It consumes low power.

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VIII.   APPLICATIONS

- Solar system.
- Power management systems.
- Industrial applications.
- This is very useful for public to charge their mobiles using coins.

IX.   EXPERIMENTAL RESULT

The hardware of this coin based universal mobile charger is shown in below figure. This one is the complete coin based universal mobile battery charger which is depend on solar energy as well as ac mains hence it is very useful in today's life. This system effectively receives maximum energy from sun towards earth rotation. Only one drawback is that it will not be used in all night times but it is overcome by AC power supply. But some percent of battery will charge so that for some time this charging system can use.
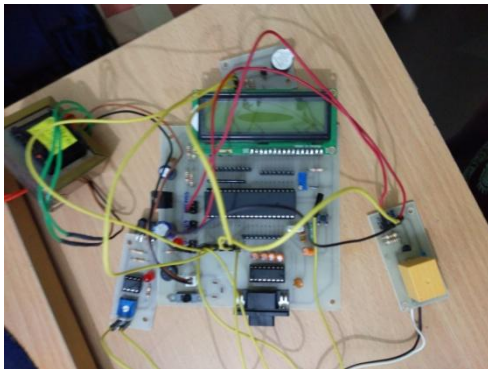

Figure 3. Circuit connection

X.   CONCLUSION

In this project, a novel method of charging mobile batteries using solar power as well as AC power supply with relay switching has been designed and developed for rural and remote areas where the grid power is not available all the time. The mobile communication has become necessity for people staying in rural areas and remote areas. This device is useful for charging mobile batteries as these mobile battery chargers be installed at various public places for the convenience of mobile users for charging purpose.

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