Coin Based Mobile Battery Charger and Recharger

Sagar Zambre, Santosh Yadav, Anjali Tiwari, Ausaf Shaikh
Department of Elecronics Engineering, KCCEMSR
Thane, India
sagar.y.zambre@gmail.com

*Abstract:-***The coin-based mobile battery charger and recharger developed in this paper is providing a unique service to the rural public where grid power is not available for partial/full daytime and a source of revenue for site providers. The coin-based mobile battery charger and recharger can be quickly and easily installed outside any business premises. The mobile phone market is a vast industry, and has spread into rural areas as an essential means of communication. While the urban population use more sophisticated mobiles with good power batteries lasting for several days, the rural population buy the pre-owned mobile phones that require charging frequently. Many times battery becomes flat and balance get deduce to zero in the middle of conversation particularly at inconvenient times when access to a standard charger and balance top-up isn't possible. The coin-based mobile battery charger and charger are designed to solve this problem. The user has to plug the mobile phone into one of the adapters and insert a coin; the phone will then be given a micro-pulse for charging and mobile number for recharging. It does not bring a mobile from 'dead' to fully charged state. The charging capacity of the mobile is designed with the help of pre-defined values. It is, of course, possible to continue charging the mobile by inserting more coins. This compact and lightweight product is designed to cater for the growing number of rural mobile users worldwide. A suitable microcontroller is programmed for all the controlling applications. The source for charging is obtained from direct power grid and solar energy in case of non-availability of grid power.**

Keywords: - Mobile Phone, Battery Charger, GSM Adapters, Charging-pulse, Microcontroller, P.V.solar panel

I. INTRODUCTION

The growth of mobile phone market is phenomenal in recent years and the need for charging the mobile battery and recharging is required anytime and anywhere. In many developing countries the grid power is not available for few hours to several hours and no shop for balance top up on daily basis especially in semi urban and rural areas where the mobile phones are the essential communication device. While the urban population use more sophisticated mobiles with good power batteries lasting for few days, but there is no shop for balance top-up. The rural population buy the pre-owned mobile phones that require charging frequently even two or three times a day and recharging per week. In the event of unpredictable grid power, less shop for recharging and availability of abundant solar power. A coin based universal mobile battery charger and recharger is designed and developed in this paper. This device is like a vending machine for mobile battery charging and recharging at kiosks and the user has to plug the phone into one of the adapters and insert a coin for charging at a constant current for a definite duration and dial the phone number available on keypad as an input for recharging. The solar power application to battery charging has been studied in the past. Solar chargers convert light energy into DC current for a range of voltage that can be used for charging the battery. They are generally portable but can also be firmly mounted. In this design of coin based mobile charger and recharger a fixed solar panel of size 635x550x38mm , 37WP is used to charge the battery up to maximum 2 .0 amp in bright sun light. In this paper, the design and development of a coin based universal mobile battery charger and recharger based on main power and solar power is discussed and this is primarily for rural areas where the mobiles are basic needs for communication and the main power is not available all the time. The charger offers a unique revenue opportunity for a vast range of businesses - from airports to pubs, from universities to health clubs; virtually any location where there is a high footfall, creating a large number of users. The mobile phone market is a billion pound industry, and the launch of new generation mobile phones with cameras and video, means the battery life of today's mobile phone is becoming noticeably shorter. One of the most annoying things that can happen to a mobile phone user is a flat battery, particularly at inconvenient times when access is .The charger operates like a vending machine; all a user has to do is plug the mobile phone into one of the ten adapters and insert a coin, the phone will then be given a micro-pulse fast charge in just 10 minutes! Note: The charger is designed to provide an emergency top-up - extending talk time for a few hours. It does not bring a mobile from 'dead' to fully charged (full bars) in just 10 minute, it is of course, possible to continue charging the mobile by inserting more. This compact and lightweight product is designed to cater for the growing number of mobile phone users worldwide. The charger can charge up to 10 different mobile phones simultaneously. It will extend low mobile phone talk time, provide battery charging and recharging in where there is no shop in express way or while traveling long distance then this top-up method will be handy in that condition where smart card is used for recharging the mobile which is simple just you have to dial the number

And then message is deliver to dialed mobile number and balance is credited to mobile number immediately

II. BASIC ASSUMPTIONS

The design of coin based universal mobile battery charger is based on the following assumptions:

Maximum solar energy is used for charging the lead acid battery inside the mobile battery charger to keep it charged fully all the time

The charging current is up to 4.5AH @ 6vDC and this takes care of the mobiles manufactured by Nokia, Sony-Ericson, Blackberry, HTC and others of first and second generation mobiles.

A single solar panel of size 635x550x38 mm, 37WP capable of supplying up to 2.0 amp is used.

Provision to charge maximum 10 different types of mobile

III. INPUT STAGE

The mobile battery charger starts charging a mobile connected to it when a coin is inserted at the coin insertion slot 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, if inserted in the slot will be returned to refund box. A sensor attached to the coin insertion slot accepts the coin into the battery charging unit and start charging the mobile battery for a specific period controlled by the software of the microcontroller. The sensor is an IR sensor. The resistance of the sensor decreases when IR (infrared) light falls on it.

A good sensor will have near zero resistance in presence of light and a very large resistance in absence of light. When the coin obstruct the IR light falling on a sensor, it sends a pulse to the control unit authorizing the start of charging the mobile battery connected to the device. Two IR sensors are used for positive authentication of the charging process.

IV. 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. This invokes microcontroller along with LCD interface displays the selection of mobile option if particular mobile is selected for charging the corresponding routine is activated and charge the mobile for a particular duration of time . Similarly the same procedure is followed for charging more than four different mobiles simultaneously .The simple routine is indicated through flowchart as shown in the Fig 2.

3.3 Output and Display

The LCD displays all the information to the customer as and when required. When the mobile battery is connected, it displays" Insert Coin". While charging it displays

V. BLOCK DESIGN

The basic block diagram of the mobile battery charger

Fig. 1 Basic Block Diagram of a Universal Mobile Battery Charger

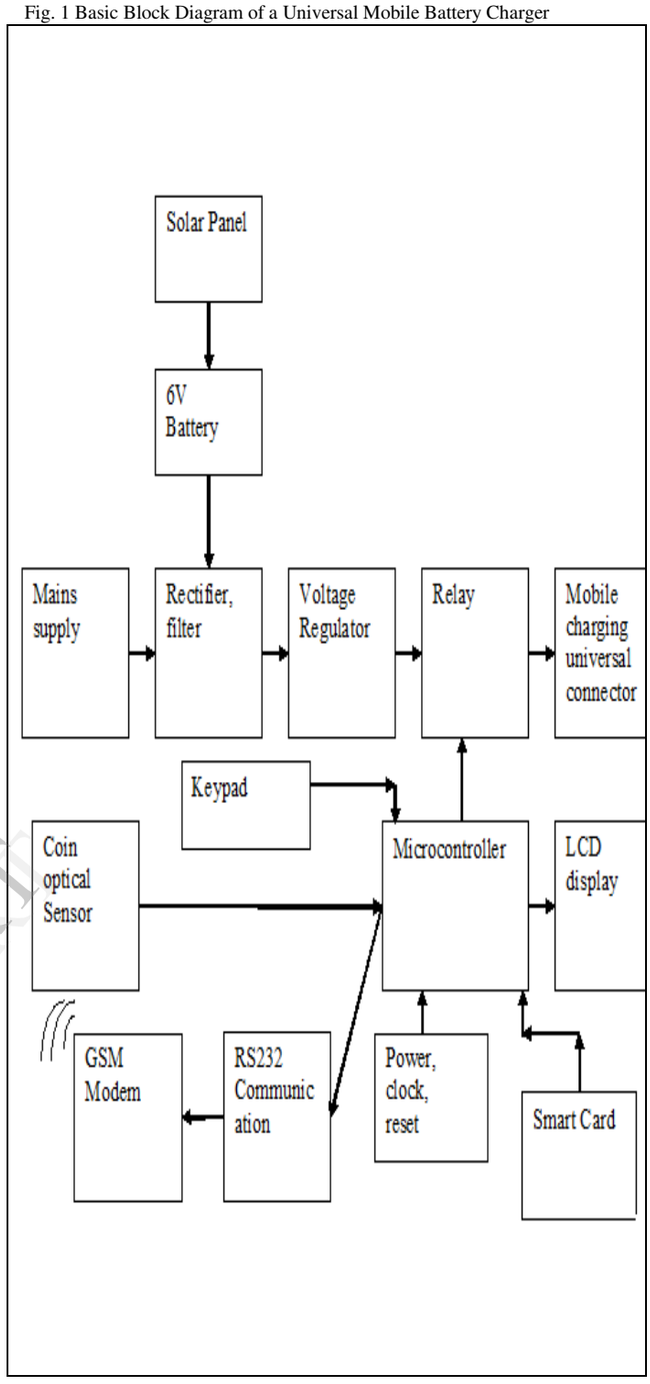
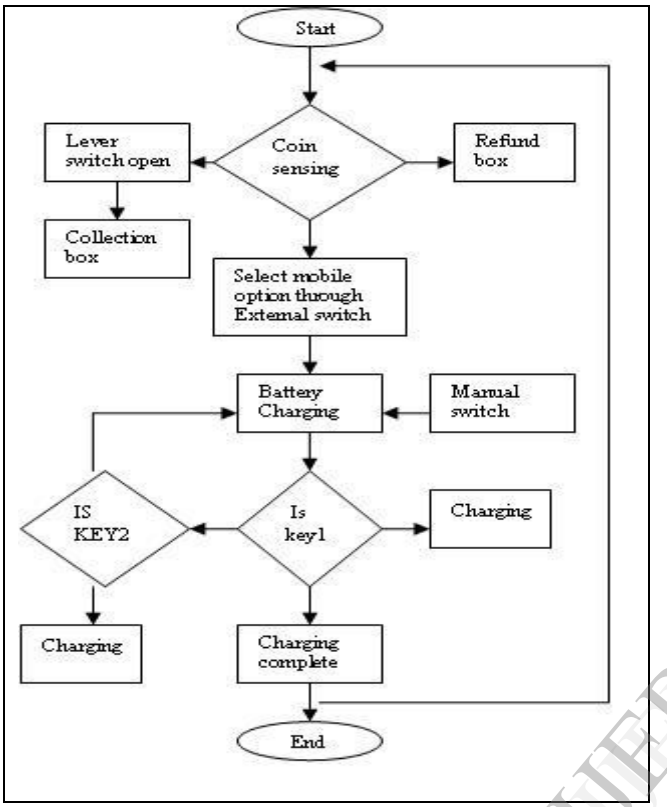


Fig.2 Flow Chart for the Coin Based Universal Mobile Battery Charger



VI. POWER

The salient feature of the universal mobile battery charger is that it draws power from the solar energy during the day time for charging the internal battery of the controller. Only if additional power is required, then the grid power is used. A solar micro inverter has been designed for supplying 230v, 50Hz so that both grid power and the solar power are connected in parallel with a switch to changeover from one to the other.

VII. MICRO SOLAR INVERTER

The solar panel required for the application is given in Fig. 3. And the micro solar inverter designed and developed is shown in Fig. 4.

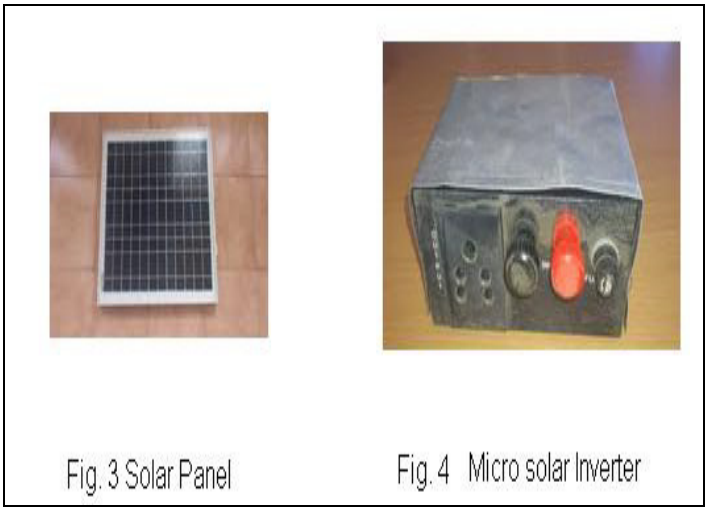


Fig. 3 Solar Panel Fig. 4 Micro solar Inverter

The architecture of a micro solar inverter is given in Fig.5. It consists of and a stable multi-vibrator tuned for 50Hz. This is then converted to a pure sine wave using a converter. This is further power amplified and connected to a step up transformer load. The secondary of the transformer gives 230V AC, 50Hz.

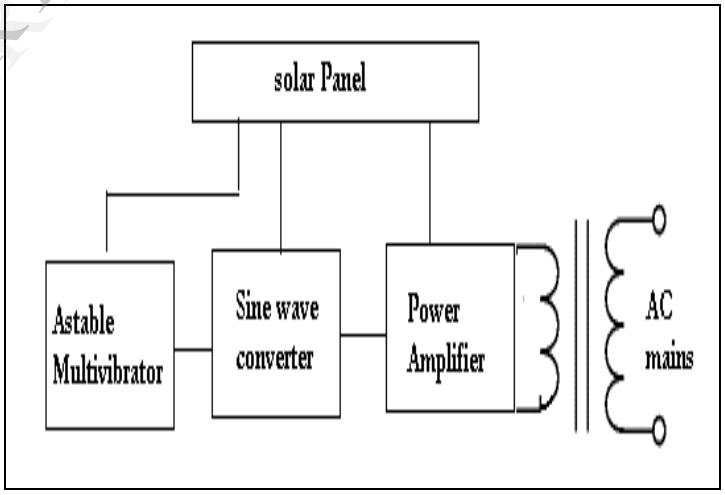


Fig. 5 Architecture of a Micro Solar Inverter

The laboratory model is designed for a 36 cell solar panel of size 635x550x38mm with power output 37wp, 17.1 V_{amp}. The I-V characteristics of the solar panel is shown in Fig.6. The characteristics are taken for dark, moderate solar irradiance and high intensity solar irradiance.

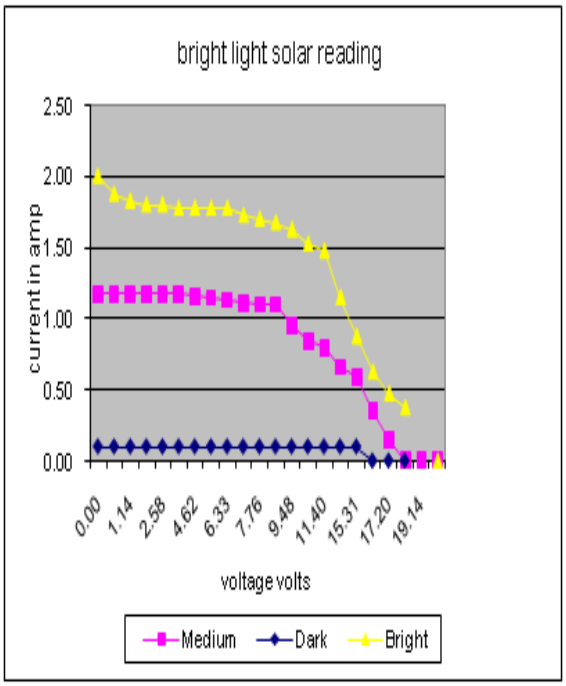


Fig. 6 I-V characteristics of a solar panel

The micro solar inverter is mounted behind the solar panel, compact in size and the DC voltage from the solar panel is used as bias for the electronic circuit as shown Fig.5. The interconnection of solar power to the mobile battery charger is shown in Fig. 7.

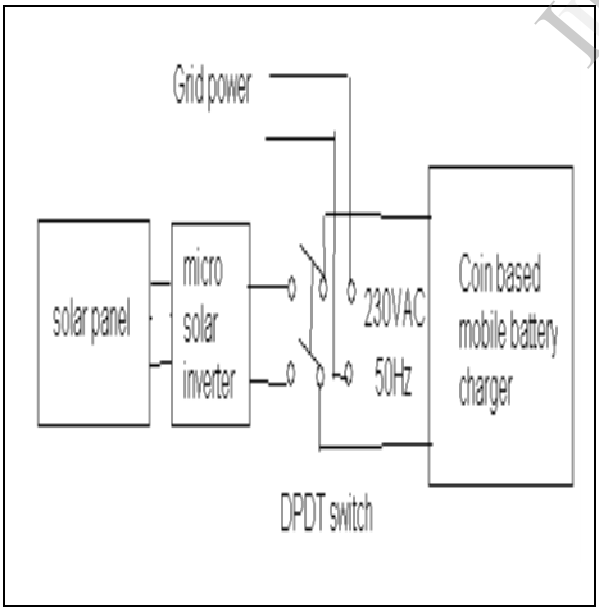


Fig.7 Interconnection of power supply to Mobile Battery Charger

FUTURE SCOPE

We can replace coin by currency or by smart card and can be implemented in express highway conveniently

VIII. CONCLUSION

In this paper, a novel 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 all the time. The mobile communication has become a necessity even in rural areas and this device is useful for charging mobile batteries as these mobile battery chargers can be installed in kiosks at various places for the convenience of mobile users.

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