National Conference on 'Advances in Engineering, Technology and Applied Sciences' - NCAETAS-2019
© 2019 IJSRSET | Volume 5 | Issue 6 | Print ISSN : 2395-1990 | Online ISSN : 2394-4099

Coin Based Universal Mobile Battery Charger

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ABSTRACT

The coin-based mobile battery charger developed in this paper is providing a unique service to the rural public where grid power is not available for partial/full daytime and source of revenue for site providers. The coin-based mobile battery charger 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 a essential means of communication. While the urban population buy the pre owned mobile phones that require charging frequently. Many times battery becomes flat in the middle of conversation particularly at inconvenient times when access to a standard charger isn't possible. The coin based mobile battery charger is designed to solve this problem. A microcontroller is programmed for all the controlling application. The source for charging is obtained from direct power grid and solar energy in case of non availability of grid power.

Keywords : Solar panel, mobile battery, microcontroller, LCD Display, Mobile Phone

I. INTRODUCTION

The growth of mobile phone market is phenomenal in recent years and the need for charging the mobile battery is required anytime and anywhere. In many developing countries the grid power is not available for few hours to several hours on daily basis especially in semi urban and rural population use more sophisticated mobiles with good power batteries lasting for few days, the rural population buy the pre owned mobile phones that require charging frequently even two or three times a day. In the event of unpredictable grid power and availability of abundant solar power a coin based mobile battery charger is designed and developed in this paper.

This device is like a vending machine for mobile for mobile battery charging at kiosks and the user has to plug the phone into one of the adaptor and insert a coin for charging at a constant current for a definite duration. 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 chargers convert the battery. They are generally portable but can also be firmly mounted. In this design of coin based mobile battery charger fixed solar panel of size 635*550*38mm, 37WP is used to charge the battery up to maximum 2.0 amps in bright sun light. In this paper, the design and developed of a coin based mobile battery charger 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 motivation for this research came from the published papers.

II. BLOCK DIAGRAM

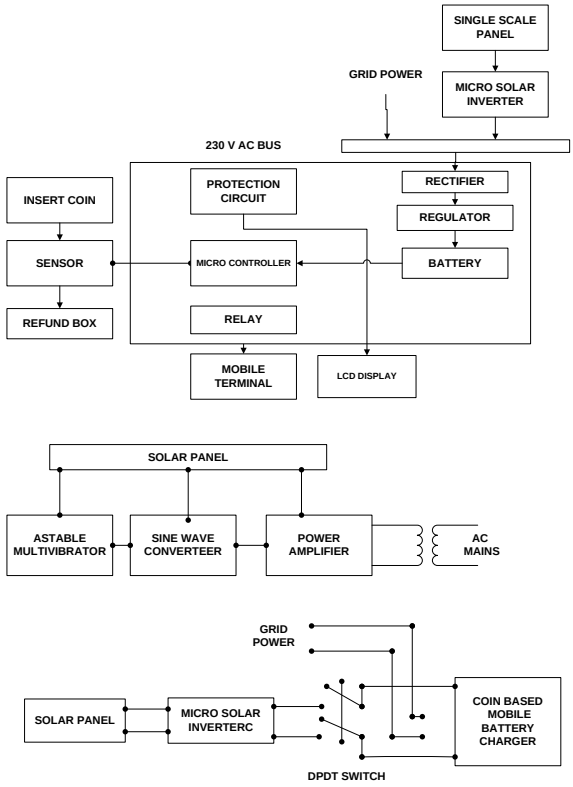

Figure 1. Block diagram

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 zero resistance in presence of light and a very large resistance in absence of light. When the coin obstructs 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.

2.1 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. When the routine completes, it indicates charge complete message through LCD display. 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 Figure.

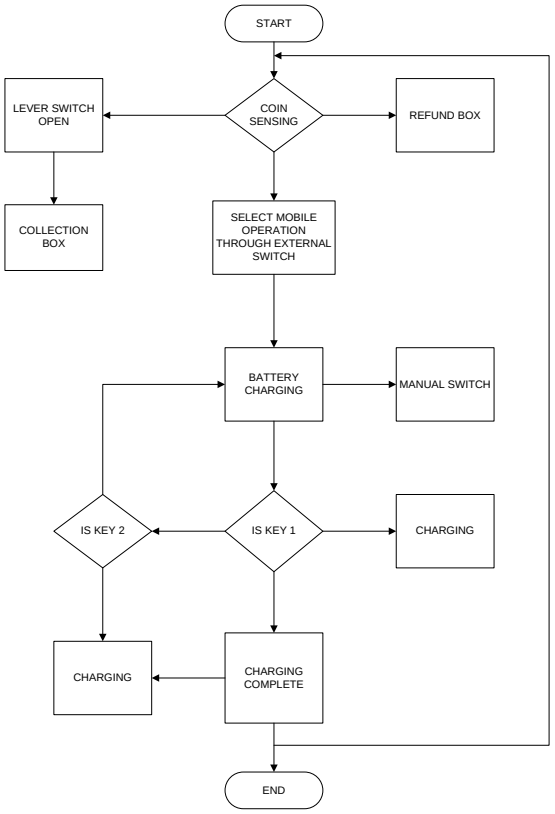

Figure 3. flowchart

2.2 LCD 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 “Charging” and at the end of charging cycle it displays “Charge completed”. For charging

continuously the coin has to be inserted when the display shows “Charge Completed”.

2.3 POWER SUPPLY

The input to the circuit is applied from the regulated power supply. The AC input i.e. 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained 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.

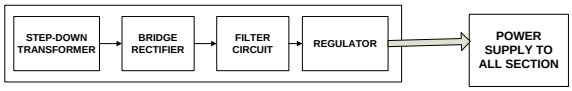

Figure 3. Power supply Module

2.4 TRANSFORMER

Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the AC input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

2.5 RELAY

A relay is a switch. This is an electromagnet switch in which it is operate as a mechanically and also other operating principles are also used, such as Solid-state relays. It can be used to control a circuit by a separate low-power signal, or must be controlled by one signal.

2.6 RECTIFIER

The output from the transformer is fed to the rectifier. It converts AC into pulsating DC. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

2.7 MICROCONTROLLER AT89S52

The **AT89S52** is a low voltage, high performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable flash memory. The AT89S52 provides the following standard features: 8K bytes of flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointer, three 16-bit timer/counter, a six-vector two level interrupt architecture, a full duplex serial port, on chip oscillator, and clock circuitry, fast programming time.

2.8 SOLAR PANEL

A solar panel is a collection of solar cells. Solar panel is a packaged interconnected assembly of solar cells, known as photovoltaic cells. Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect.

2.9 RECHARGABLE BATTERY

A rechargeable battery or storage battery is a group of one or more electrochemical cells. They are known as secondary cells because their electrochemical reaction is electrically reversible.

2.10 IR SENSOR

An infrared sensor is an electronic instrument which is used to sense certain characteristic of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

III. APPLICATION

- ✓ Public places
- ✓ Trains
- ✓ Function halls

IV. ADVANTAGES

- ✓ Low power consumption
- ✓ Less expensive
- ✓ Reduced man power
- ✓ Simple and hand efficient

- ✓ More useful save Energy from Sun

V. FUTURE SCOPE

This project is very useful to people who are all using mobile phone without charging condition in public places.

VI. CONCLUSION

In this paper, a novel method of charging mobile batteries of different manufactures 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 the convenience of mobile users.

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