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Coin Based Cell Phone Charger

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Abstract

In this paper, a novel type of coin based cell phone charger has been designed. A new type of charger is designed for public people utilities. This type of charger will be very useful for the public people; many times the battery becomes flat in the middle of the conversation in particularly at inconvenient times when access to a standard charger isn't possible. The main advantage of this charger is, power supply for the charger is determined from solar power and current supply. The coin based cell phone charger is worked according to the coding written in the 89c51 microcontroller IC. When we put a coin, the coin detector detects the coin and the input is given to the controller .The controller reads the program. At the same time the supply is given to the charger for a particular time period. The time period depends on the coding written in the controller. A multi pin charger is connected through the controller. By using the multi pin charger we may also use more than one mobile for charging. MOSFET acts as the switch in the circuit. This circuit can be placed in public places such as Bus stands, Railway stations, Hospitals, etc...

Keywords—*Adapters, Battery Charger, Charging-pulse Cycloconverter, Mobile Phone, Microcontroller, , MOSFET, PV solar panel*

Introduction

In many developing countries the current supply is not available for several hours on daily basis especially in semi urban and rural areas were the cell phones are the essential communication device [1]. In the event of unpredictable current supply and availability of abundant solar power, this paper is designed with coin detecting mechanism, microcontroller, real time clock, driver circuit with MOSFET, charging circuit, inverter, cycloconverter and different phone socket. This coin based charger is similar like a VENDING MACHINE for charging the cell phone, the user has to plug the phone into one of the adapters and insert the coin for the charging at constant current for a definite time period. Coin detecting mechanism is used to detect the coin. When the user inserts the coin, this will detect the coin and send a corresponding signal to the signal conditioning unit in which the incoming signal is converted into square pulse and then given to microcontroller. The microcontroller used is Atmel, which is a type of reprogrammable microcontroller. The microcontroller is already programmed when the user inserts the coin, in the coin detecting mechanism detects the coin, and it generates the pulse to the microcontroller through signal conditioning unit. The microcontroller activates the driver circuit for particular time period as per coin inserted in the machine. Driver circuit consists of transistor, it just acts as switch to turn ON, turn OFF MOSFET. The MOSFET output is directly connected to charging circuit. The different cell phone charging socket is connected in the charging circuit. Such as Nokia, Motorola, Samsung, LG, Sony, Apple, Tab, Etc. By using this paper we can charge the cell phone as per coin inserted in the machine. Solar chargers convert light energy into DC current for a range of voltage that can be used for charging the batteries [3]. In this design of coin based charger a fixed solar panel of size 635x550x38mm, 37WP is used to charge the battery up to 2.0amp in bright sun light.

1.1 BASIC ASSUMPTIONS

The design of coin based cell phone battery charger is based on the following assumptions:

- Maximum solar energy is used for charging lead acid battery (mobile battery).
- The charging current is up to 4.5AH @ 6vDC.
- A single solar panel of size 635x550x38mm, 37WP capable of supplying up to 2.0 amps is used.
- 10 different types of mobile are provided to charge the cell phones.

- Insertion of fixed coin size for charging (example: Rs.5 coin).

1. OPERATION

1.1 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 mechanical slot is attached with electrical triggering in coin insertion slot, if the correct coin is inserted, it sends a pulse to the control unit authorizing the start of charging the mobile battery connected to the device. Then 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 [1].

2.2 Controller

This section acts according to the input signal received from mechanical detection. 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 [1].

2.3 Output and Display

The LCD displays all the information to the user 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". The output has 10 terminals for connecting different types of mobile batteries and 7 of them are internally connected for charging mobile batteries of different make as shown in Table 1[1].

TABLE 1: CHARGING REQUIREMENT OF MOBILE PHONES

SL.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	Black Berry	3.7	1300

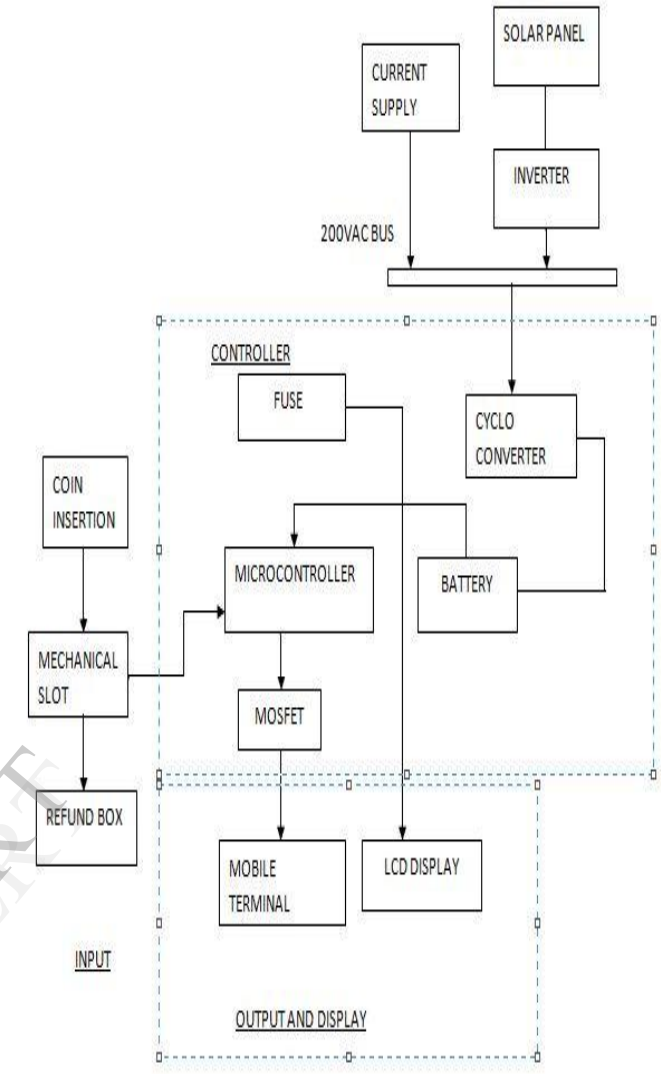

FIG 1: BLOCK DIAGRAM OF COIN BASED CELLPHONE CHARGER

2. POWER SUPPLY

The power supply section is an important one. It should delivery constant output regulated supply for successful working of the coin based cellphone charger. A 12V-0-12V / 1 Amp transformer is used for our purpose; the primary of this transformer is connected to the main supply through an ON/OFF switch and a fuse holder for protecting from overload and short circuit protection. The secondary side is connected to diodes to convert from 12V ac to 12V dc voltage [5]. Here the diodes are formed as two Half-wave rectifier, one is for delivering +12V to +15V for the operation of the relay & a Capacitor of 2200mfd/25V is used for filtering purpose and another side +12V to +15V is fed to the input of the 7805 regulator IC for getting constant output voltages for the operation of Digital IC, & a Capacitor of

1000mfd/25V is used for filtering purpose to get pure dc voltage. All the regulators in the 78 series will deliver a maximum current of 100 ma provided the input-output voltage differential does not exceed 7V [7, 8], otherwise excessive power dissipation will result and the thermal shutdown will operate. This occurs at a dissipation of about 700 mw. A regulator circuit using the 78 is shown in fig1. Together with the layout of a suitable printed circuit board. To obtain the rated output voltages at a current up to 100 ma are given in table 2, together with suitable values for the reservoir capacitor, C1.The capacitance/voltage product of these capacitor are chosen so that any one of them will fit the printed circuit board without difficulty.

V in	V_{out}	Type	I_{max}	C1
35V	5 V	7805	100 mA	1000 mfd/25V

TABLE 2: POWER REQUIREMENTS

3. INVERTER

It consists of astable multi vibrator tuned for 50Hz. This is then converted to a pure sine wave form 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 [2].

FIG 2: INVERTER

3.1 SOLAR PANEL

A solar panel is a packed assembly of photovoltaic cells. The solar panel can be used as to generate and supply electricity in commercial and residential applications. Each panel is rated by its DC output power under standard test conditions, and typically ranges from 100 to 320 watts. A single solar panel can produce only a limited amount of power, most installations contain multiple panels. Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect [3].

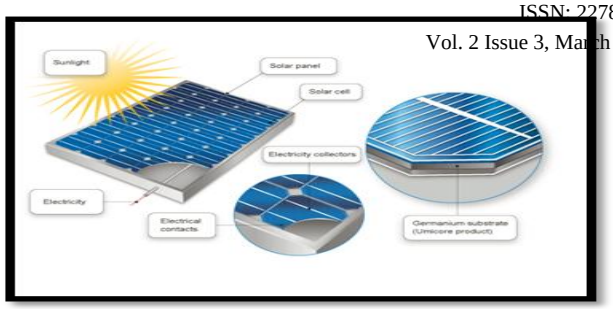

Fig 3: SOLAR PANEL

4. CYCLOCONVERTER

A cycloconverter (CCV) converts a constant voltage, constant frequency AC waveform to another AC waveform of a lower frequency by synthesizing the output waveform from segments of the AC supply without an intermediate DC link. There are two main types of CCVs, circulating current type or blocking mode type, most commercial high power products being of the blocking mode type. The amplitude and frequency of converters' output voltage are both variable [4].

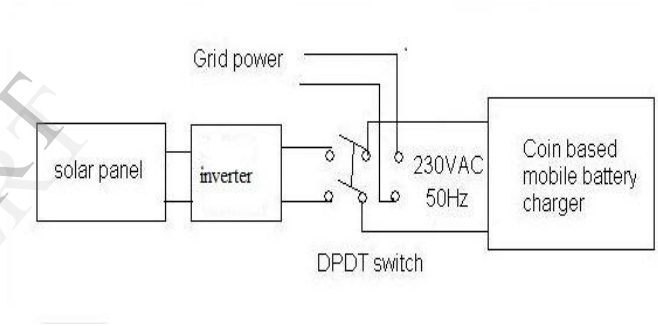

FIG 4:BLOCK DIAGRAM OF POWER SUPPLY

5.1 MOSFET

MOSFET is a transistor used for amplifying or switching electronic signals. Switching devices are the heart of industrial electronic systems [8]. They are used to control ac or dc power. They are used to control the sequence of events in the operation of a system such as an electronic heater, counter, welding circuits, and X-ray equipment, measuring systems, alarm systems and telephony.

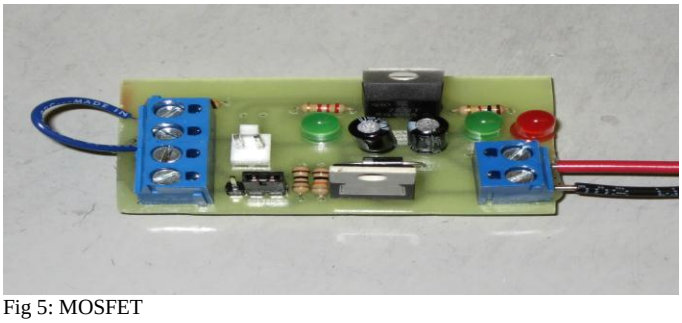

Fig 5: MOSFET

5. RESULT

In this paper a novel method of charging mobile batteries of different manufacturer using solar power has been designed for rural and remote areas where the current supply is not at all available all the time. This paper is very useful in today's life. Because now days the necessity of communication is very important, so every person having cell phone but every time we cannot carry charger with us. When we are going for long travel we may forget to carry cell phone charger. This paper is used to help the people by coin based charger.

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[3]"3rd International Conference on PV Module Recycling". PV CYCLE. Retrieved October 2012

[4]Bose, Bimal K. (2006). *Power Electronics and Motor Drives : Advances and Trends*. Amsterdam: Academic. p. 126.

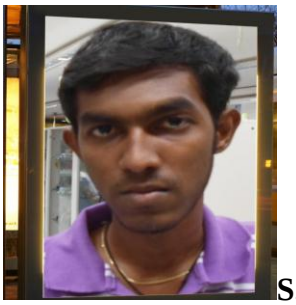
[5]Quoting US patent #4937722, *High efficiency direct coupled switched mode power supply*: *The power supply can also include crowbar circuit protecting it against damage by clamping the output to ground if it exceeds a particular voltage*

[6]http://electronic-components.globalspec.com/LearnMore/Electrical_Electronic_Components/Power_Supplies_Conditioners/Voltage_Multipliers

[7]http://focus.ti.com/lit/an/slyt322/slyt322.pdf

[8]http://liionbms.com/php/wp_passive_active_balancing.php"1960 – Metal Oxide Semiconductor (MOS) Transistor Demonstrated: John Atalla and Dawon Kahng fabricate working transistors and demonstrate the first successful MOS field-effect amplifier (U.S. Patent 3,102,230 filed in 1960, issued in 1963)"

BIOGRAPHIES



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