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## Coin Based Universal Mobile Charger using Solar Energy

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**Abstract:** Now a day's mobile phones are playing an important position in the present conversation world as well as daily lifestyles. Without it, one feels incomplete and insecure because most of the work is achieved with the help of it. Cell phone is the most usual gadget in cities, towns and also in villages. The fundamental backlog of clever smart phone is battery; the clever cell phone battery consumption is excessive due to numerous functions in it. The coin-based generic cell charger system advanced on this project is used to provide service for rural public in which grid energy isn't always to be had for partial/full daytime and oftentimes battery turns into lifeless at within the middle of communication particularly at inconvenient instances whilst access to a preferred charger isn't feasible. The coin based mobile charger is designed to resolve this trouble, may be quickly and easily installed outdoor any enterprise premises. That is designed based totally on Arduino UNO R3, is used to govern LCD show, coin insertion module and charging unit. The LCD show will show the real time left. LED indication on the front panel indicates on which machine is working either sun/battery or GRID strength.

**Keywords:** LCD Show, Solar Panel, ARDUINO, Coin Insertion Module, Mobile Phone.

### I. INTRODUCTION

In this paper, we design and developed a coin based universal mobile battery charger based on grid and solar power are discussed and this is primarily need for rural areas where the mobiles are major need for communication and the grid power is not available all the time. A PN junction diode is used for the unidirectional flow of charge current. The solar panel output depends on the intensity of the solar light. For regulating this voltage, LM317T is used. LM317T is an adjustable voltage regulator. In this work we additionally build a ARDUINO based micro controller solar charger. The coin-primarily based cell battery charger advanced on this work providing a unique service to the rural public in which grid energy is not to be had in partial/full sunlight hours. The coin-based mobile battery charger using solar energy may be fast and effortlessly established outdoor any enterprise premises. The cell phone [1] marketplace is a significant enterprise, and has unfolded into rural areas as an important way of verbal exchange. at the same time as the city population use greater sophisticated mobiles with excellent electricity batteries lasting for several days, the rural population buy the pre owned cellular phones that require charging often [2]. Many times battery [3] will become flat inside the middle of verbal exchange specifically at inconvenient instances while get entry to a widespread charger isn't always viable. The coin-based mobile battery chargers are designed to solve this problem. The user has to plug the cellular telephone into one of the adapters and insert a coin; the smart phone will then receive a micro-pulse for

charging. It does not convey a mobile from 'useless' to completely charged state. The charging capacity of the mobile is designed with the help of pre described values. Its miles, of direction, possible to keep charging the mobile through inserting more coins. This compact and lightweight product is designed to cater for the growing range of rural mobile customers. An appropriate microcontroller is programmed for all of the controlling packages. The supply for charging is obtained from direct energy from sun [4] in case of non availability of solar, grid power is used

### II. BASIC ASSUMPTIONS

The design of coin based custom cellular battery charger is primarily based on the subsequent assumptions:

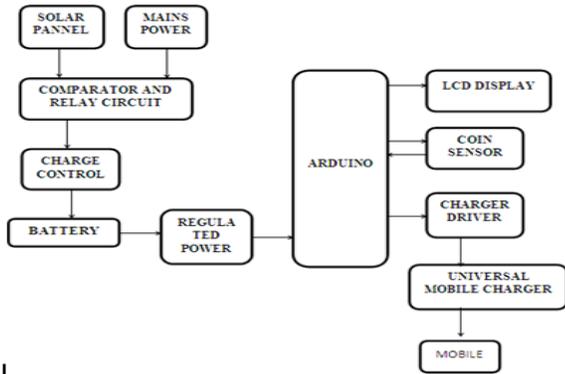
- Maximum sun energy is used for charging the lead acid battery within the cellular battery charger to maintain it charged absolutely all of the time
- The charging cutting-edge is as much as four.5AH @ 6vDC and this looks after the mobiles synthetic with the aid of Nokia, Sony-ericsson, Blackberry, HTC and others of first and second technology mobiles.
- A solar panel of length 635x550x38 mm, 37WP capable of providing up to 2.0 amps is used.
- Provision to feed maximum 10 distinct types of mobiles is furnished.
- Insertion of a set coin length for charging.

### III. PROPOSED SYSTEM ARCHITECTURE

When the solar panel output is above 12 V, the 12 V 7 Ah battery charges using solar power and the total designed

system works on the solar power, when the output of solar panel is below 12 V, the battery charges using AC main supply. A comparator and relay circuit is used to switch between the solar and grid power. Universal mobile charging unit is used in this design to care of all types of mobiles. Whenever the solar panel output is low, the comparator circuit switches to the ac mains supply, if the ac mains supply is not available, the designed system works on the battery. The coin acceptor module accepts only one type of coin to which it is tuned, whenever the sensor senses the desired coin, it make 30 MS pulse to the Arduino UNO R3 interrupt pin, controller reads the pulse and operates the charger driver, the charger driver controls the universal charging unit to charge the mobile. All the operations in this is project is shown in the LCD display and with LED indication

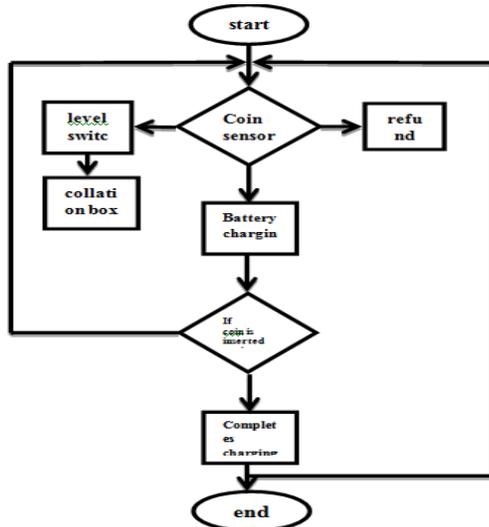
**Design:**



**Fig1. Block diagram.**

**A. Algorithm for Coin Based Mobile Charger**

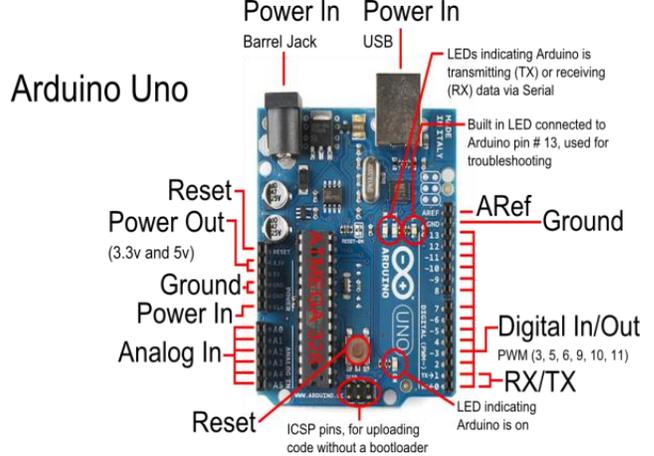
1. Start
2. Enter the coin.
3. Once enter the coin is correct then its start charging. the charging time shown on LCD display or else if, coin is not exact then it will refunded through refund box and display's Display "Please insert the coin.
4. If coin is inserted again the charging time increases within the defined time period
5. End



**Fig2. Flowchart.**

**IV. SYSTEM OVERVIEW HARDWARE WORKING**

**PRINCIPLE OF ARDUINO**



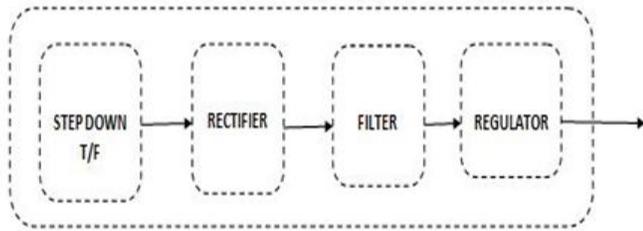
**Fig3. Arduino microcontroller.**

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Duemilanove board features an Atmel ATmega328 microcontroller operating at 5 V with 2 Kb of RAM, 32 Kb of flash memory for storing programs and 1 Kb of EEPROM for storing Parameters. The clock speed is 16 MHz, which translates to about executing about 300,000 lines of C source code per second. The board has 14 digital I/O pins and 6 analog input pins. There is a USB connector for talking to the host computer and a DC power jack for connecting an external 6-20 V power source, for example a 11.1 V battery, when running a program while not connected to the host computer. Headers are provided for interfacing to the I/O pins using 22 g solid wire or header connectors. The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions. An important feature of the Arduino is that we can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program

**A. Power Supply**

The input to the circuit is carried out from the regulated strength deliver [6]. The AC input i.e., 230V from the mains deliver is step down by using the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating DC voltage. So so as to get a natural DC voltage, the output voltage from the rectifier is fed to a clear out to take away any AC additives gift even after rectification. Now, this voltage is given to a voltage regulator to gain a pure regular DC voltage.

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**Fig4. Power Supply circuit.**

### B. Solar Panel

A sun panel works with the aid of permitting photons, or particles of mild, to knock electrons unfastened from atoms, producing a drift of power. sun panels without a doubt comprise many, smaller devices known as photovoltaic cells. (Photovoltaic truly method they convert sunlight into power.) Many cells connected together make up a solar panel. every photovoltaic cell is largely a sandwich made up of two slices of semi-carrying out cloth, commonly silicon — the same stuff used in microelectronics. To works, photovoltaic cells want to establish an electric powered area. just like a magnetic subject, which takes place due to contrary poles, an electric powered field takes place whilst opposite costs are separated. To get this Discipline, manufacturers "dope" silicon with other materials, giving each slice of the sandwich a superb or bad electrical charge. Mainly, they seed phosphorous into the top layer of silicon, which adds greater electrons, with a negative rate, to that layer. In the meantime, the lowest layer gets a dose of boron, which leads to fewer electrons, or a positive price. This all provides up to an electric powered area on the junction among the silicon layers. Then, whilst a photon of sunlight knocks an electron loose, the electrical area will push that electron out of the silicon junction. Multiple other components of the cellular turn these electrons into usable energy. Metal conductive plates on the sides of the cellular acquire the electrons and transfer them to wires. At that factor, the electrons can flow like another source of strength. There are other types of sun power generation including solar thermal and concentrated sun electricity (CSP) that perform in a distinctive style than photovoltaic solar panels, however all harness the strength of sunlight to both create power or to warmness water or air.

### C. Driver Unit

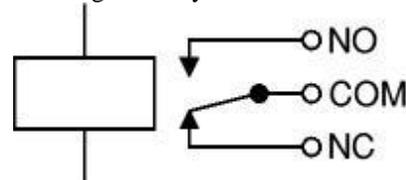
A relay is an electrically operated switch. Current flowing via the coil of the relay creates a magnetic discipline which draws a lever and adjustments the switch contacts. The coil current can be on or off so relays have switch positions and they are double throw (changeover) switches. Relays allow one circuit to interchange a second circuit which can be absolutely cut loose the first. as an instance a low voltage battery circuit can use a relay to exchange a 230V AC mains circuit. There is no electric connection within the relay among the two circuits; the link is magnetic and mechanical. Relays are quite simple devices. There are 4 principal elements in every relay. They're

- Electromagnet
- Armature that may be attracted by using the electromagnet

- Spring
- Set of electrical contacts

### D. Working

While a current flows via the coil, the ensuing magnetic field attracts an armature that is routinely linked to a moving contact. The movement either makes or breaks a reference to a hard and fast contact. While the modern to the coil is switched off, the armature is again through a force approximately 1/2 as strong as the magnetic pressure to its comfortable function. Commonly this is a spring, but gravity is also used commonly in commercial motor starters. Maximum relays are manufactured to function fast. In low voltage software, that is to lessen noise. In a high voltage or high present day application, that is to lessen arcing. Fig 3 suggests circuit image of relay.



**Fig5. Circuit symbol of a relay.**

The relay's transfer connections are generally categorized COM, NC and NO:

COM = common, usually connect to this, it's far the transferring a part of the transfer.

NC = commonly Closed, COM is attached to this while the relay coil is off.

NO = generally Open, COM is connected to this when the relay coil is on.

### E. LCD Module (2x16 Individual)

Dot matrix liquid crystal display a module is used for show the parameters and fault condition.16 characters 2 lines show is used. It has controller which interface statistic's and liquid crystal display panel. Liquid crystal displays. liquid crystal displays) have materials, which integrate the properties of both drinks and crystals. rather than having a melting point, they have got a temperature range within which the molecules are nearly as cell as they could be in a liquid, however are grouped collectively in an ordered form just like a crystal. An LCD consists of two glass panels, with the liquid crystal fabric sandwiched in between them. The internal surface of the glass plates are lined with obvious electrodes which define the man or woman, symbols or patterns to be displayed polymeric layers are found in among the electrodes and the liquid crystal molecules to hold a described orientation attitude. One every polarizer's are pasted out of doors the 2 glass panels. those polarizer's could rotate the mild rays passing through them to a specific perspective, in a selected course whilst the lcd is inside the off kingdom, mild rays are rotated by the two polarizes and the liquid crystal, such that the light rays come out of the lcd with none orientation, and for this reason the liquid crystal display appears obvious. whilst enough voltage is carried out to the electrodes, the liquid crystal molecules could be aligned on a selected path. The mild rays passing through the

lcd would be circled by way of the polarizes, which would bring about activating/highlighting the favored characters.



Fig6. LCD Diagram.

**V. EXPERIMENTAL OUTCOMES**

The hardware setup for coin primarily based cellular charger the usage of sun tracking tool demonstrated beneath in fig5. Whenever the system is ON the 1st led will glow,if the phone is charged through solar panel the 3<sup>rd</sup> led will glow otherwise it charges through grid indicates through 2<sup>nd</sup> led ..while charging the phone and untill the charging time completes the 4 th led indicates and project execution is shown in the below



Fig7. Switch ON the circuits.



Fig8. Insert The Coin Display.



Fig9. The coin will be inserting.



Fig10. The mobile will be charged.



Fig11. The Time Display.

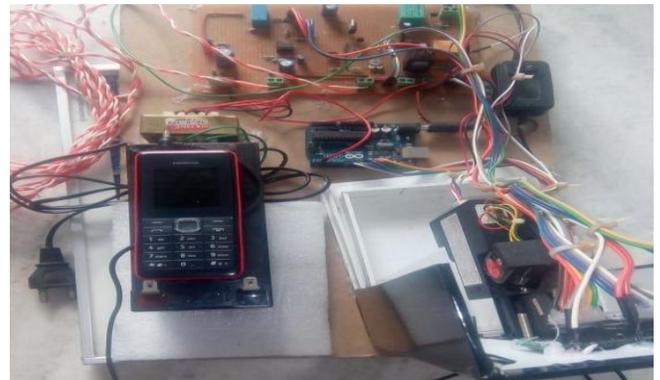


Fig12. Hardware setup for Coin based mobile Charger using solar panel.

**A. Benefits**

- Effectively obtain most energy from sun closer to earth rotation
- Greater useful to keep energy from solar and shrewd monitoring solar power
- Simple and hand green
- Less high priced
- decreased man electricity
- Low electricity consumption

**B. Applications**

- Solar structures
- Strength management structures
- Commercial applications

**VI. CONCLUSIONS**

In this WORKs a novel approach of charging cellular batteries of various manufacturer the usage of solar strength has been designed for rural and faraway areas where the present day supply isn't always to be had all the time. This paper is very useful in today's lifestyles. Because now days the necessity of conversation is very vital, so every person having mobile cell phone but whenever we can't carry charger with us. When we are going for lengthy journey we may additionally neglect to carry cellular cell phone charge.

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