

Manufacturing and Working of Smart Mobile Case

Ummed Singh¹, Varun Agrawal², Kapil Patodi³

UG Student, Department of Mechanical Engineering, IES-IPS Academy Indore, M.P., India¹

UG Student, Department of Mechanical Engineering, IES-IPS Academy Indore, M.P., India²

Assistant Professor, Department of Mechanical Engineering, IES-IPS Academy Indore, M.P., India³

ABSTRACT: In the current scenario of world, human civilization completely depends on the electronic technology and cell phones are the most casual thing among all of us. Charging the batteries of any electronic product is the basic requirement before its use. The electricity for charging the battery cannot be made available everywhere. There is a need to develop a device which can generate electricity anywhere and that can be utilized for the basic need like charging of cellphone battery. In this paper an attempt is made to explain the manufacturing and working of a solar energy harnessing device i.e. SMART MOBILE CASE. It is a multi-purpose device which provides proper safety to the cellphone as well as it charges the battery of cellphone when proper sunlight is available. The elective utilization of the sun oriented vitality as a power source is useful in outside crisis circumstances and evades the customary method for holding up adjacent to an electrical attachment or outlets for charging.

KEYWORDS: Smart Mobile Case, Solar Energy, Cell phone, Modeling, 3D printer.

I. INTRODUCTION

In the today's era, cell phones are at the apex in the electronic market. As the use of cell phones is increasing, demand of electricity is also increasing. For the ease of life, the number of features in the phones are changing and increasing every second. This is leading to the demand of highly powered battery life. Cell phone companies are manufacturing the battery of 3500-4000 mAh but then also it is not able to satisfy the demand of man. For charging the batteries, we need the electric socket, but they are not available at every place (A.H. Tirmare et. al. [8]). In this paper, an electronic device is proposed which harness the energy from sun and convert it into electricity, which then used for the charging of battery of cell phones (Sudarshan Khamhari [5]). By using solar panels, solar energy is converted into electricity which is then converted into desired voltage for the purpose of charging the battery by using dc to dc convertor. This device can be used by anyone even in the remote areas (Rohit Kamble et. al. [6]). The paper also explains the manufacturing procedure of mobile case by using 3D Printer.

II. BASIC COMPONENTS

The basic components of this device are solar panel, dc to dc convertor amplifier, an integrated back cover, and a charging pin. The description of the components is explained below: -

Solar Panel: - Solar cell is a device that converts the energy of sunlight directly into electricity by the photovoltaic effect. Sometimes the term solar cell is preferred for devices intended specifically to capture energy from sunlight, while the term photovoltaic cell is used when the light source is unspecified. Generally they are made of semiconductors like silicon and germanium. Assemblies of cells are used to make solar panels, solar modules, and photovoltaic arrays. Photovoltaic is the field of technology and research related to the application of solar cells in producing electricity for practical use. The specifications of the solar panel which has been used in the device are-
Output Voltage – 12 V

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

Output Current – 500 mA
Dimensions – 136 x 72 x 2 (in mm)



Figure 1 Solar Panel

dc to dc Convertor Amplifier: -dc to dc converter is an electronic circuit or electromechanical device that converts the voltage in direct current from high to low or vice versa. It is an electric power converter device. It is generally used in the mobile charger circuits. In this circuit, various devices like diodes, capacitors, Integrated Circuits are used to convert voltage. (Diary R. Sulaiman et.al. [2]) The convertor module which has been used in the device has following specifications-

Non-isolated buck module (BUCK) synchronous rectification

Input voltage: dc 6-24V

Output voltage: 5.1-5.2V

Output current: 3A Maximum

Conversion efficiency: can up to 97.5%



Figure 2 dc to dc Convertor Amplifier

An Integrated Back Cover: - Mobile Back Cover is used to support solar panel and also give protection to the sides and edges of mobile phone. They are basically used to provide safety to the mobile phones.

A Charging Pin: - A charging pin is used to charge the cell phone. In the device, the two wires of the charging pin are soldered directly with the convertor module and the charging pin is connected to the cell phone. The length of the pin which we has been used is around 75mm.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

III. MANUFACTURING TECHNIQUE

CAD modeling: - Before manufacturing a cell phone case by 3D Printer, its CAD model is required. So, the CAD Modeling of the back case is completed in the CAD software 'Solidworks'. The dimensions of the back case are taken from the actual case of a cell phone (Sony Xperia Z). The dimensions are as follows-

Length = 140 mm, Width = 74mm, Height = 10mm, sheet thickness = 1mm, Chamfer on edges = 1mm

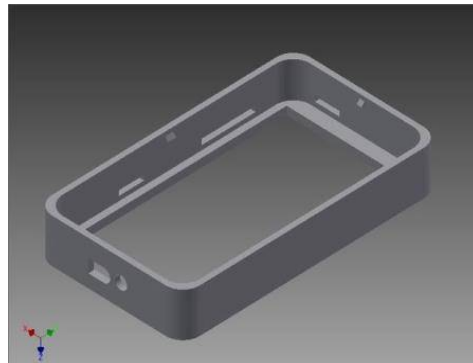


Figure 3 CAD Model of Back Cover

3D Printing: -It is a technique used to manufacture 3D objects in which layers of material are formed under computer control to create an object. Objects can be of almost any shape or geometry and typically are produced using digital model data from a 3D model or another electronic data source such as an Additive Manufacturing File (AMF) file. (Evans B. [5])



Figure 4 3D Printer

Once completed, the CAD file needs to be processed by a piece of software called a "slicer," which converts the model into a series of thin layers and produces a G-code file containing instructions tailored to a specific type of 3D printer (FDM printers). This G-code file can then be printed with 3D printing client software (which loads the G-code, and uses it to instruct the 3D printer during the 3D printing process).

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

IV. WORKING PRINCIPLE

Smart mobile case is a device that is used as an alternate charging source to charge mobile. It works on the principle of photovoltaic effect i.e.the creation of voltage or electric current in a material upon exposure to light. When the solar panel fitted in the back part of mobile case comes in contact with the sunlight it start generate potential difference and the send it to dc converter circuit. The circuit converts and amplifies the current and decreases the voltage and start charging cell phones.

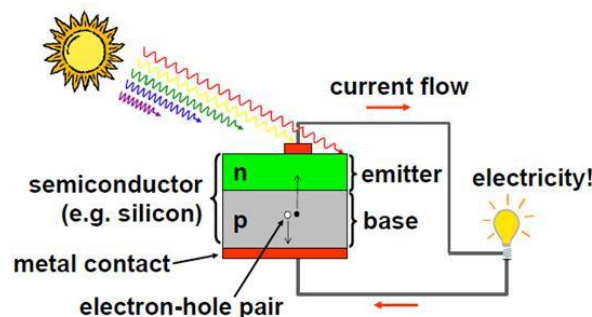


Figure 5 Working Principle

V. RESULT

In the device, the solar panel produces a maximum voltage of 12V and 500mA current. This voltage is then transferred to the dc convertor module which converts the voltage into 5V and amplifies current to 3A. Generally, a cell phone requires this much of voltage and current to charge. Therefore, our mobile is charged properly.

VI. CONCLUSION

This paper gives the concept of charging a mobile phone efficiently even without the use of electricity. It is a complete environment friendly device which uses solar energy for charging the mobile phone. Following points can be concluded from the current work-

- (i) It is a cost effective device which can manufactured in only Rs 500 and it can change as per the requirements.
- (ii) This device can charge the empty battery under the proper exposure of sunlight.
- (iii) This device is very efficient in rural areas where there is a huge lack of electricity.

In the future, this device can be expanded to charge the battery of different specifications by using different rating solar panel and dc convertor module.

REFERENCES

- [1] G. Park "Overview of Energy Harvesting Systems (for Low-Power Electronics)". Presentation at the First Los Alamos National Laboratory Engineering Institute Workshop: Energy Harvesting, 2005
- [2] Diary R. Sulaiman et.al., "Design of High Efficiency DC-DC Converter for Photovoltaic Solar Home Applications"
- [3] A. Al-Mohamad, "Efficiency improvements of photo-voltaic panels using a sun-tracking system", Applied Energy, Vol. 79(3), pp. 345- 54, 2004.
- [4] Evans B., Practical 3D Printers: The Science and Art of 3D Printing, Apress Publisher, 2012.
- [5] Sudarshan Khamhari, "A Review on the Solar Mobile Charger", ISSN (online): 2456-4788 International Journal for Technical Education and Research Innovations, December 2016
- [6] Rohit Kamble et. al., Solar Mobile Charge, International Journal of Innovative Research in Computer Science & Technology (IJIRSET) ISSN: 2347-5552, Volume-2, Issue-4, July-2014



ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

[7] Satyendra Kumar Gupta et al, Solar Portable Charger for Mobile Phone Devices using the Solar Energy as a Source of Electric Power, ISSN (Online) 2393-8021, ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology (IARJSET).

[8] A.H. Tirmare et. al., Solar Energy Based Mobile Charger, International Journal of Research in Engineering, IT & Social Sciences ISSN 2250-0588, Impact Factor: 5.850, Volume 5, Issue 6, June 2015