

Solar Power Based Helmet Charger

B. L. Narasimha¹ T. Karthik²

^{1,2}Department of Electrical & Electronics Engineering

^{1,2}Institute of Aeronautical Engineering, Hyderabad, India

Abstract— Helmet charger is a product which converts suns light energy into electrical energy. The innovation has given a touch on the idea of helmet concepts that is more useful than before and a prototype that has never existed before. Since wearing a helmet is the most important thing to a motorcyclist, we can use it as electricity generator which can be able to produce electricity through photovoltaic cells (solar panels). This paper describes how the concept of helmet charger is. Furthermore, the things underlying helmets placing solar cells is that the heat of the sun which is quite broad and equitable helmet, that will help the solar cells to have an ideal position by facing the sun directly. At the end, the helmet covered by solar cells will have been ready to store electrical energy in batteries as much as 12 vDC.

Keywords: Solar Power Based Helmet Charger

I. INTRODUCTION

Since the technology is keeps on increasing rapidly now a days, the need for increasing electrical energy is also necessary. Many countries by now already started generating electricity through renewable solar energy sources like solar energy, wind energy, tidal energy, and bioethanol energy etc... Besides, the same people are concerning the technological development work harder in developing the generation of electrical energy and its consumption. For example, “the completion of loop systems to convert waste heat energy in to useful electricity”, “power saving technology for electrical and electronic embedded systems” so on. As the time passes, the trivia will happen to be a surprise with its innovations, as what has happened to helmets. Even though helmet is one of the motor bikers’ outfit, waring for safety. Moreover, helmet is to be worn to anticipate any serious risks which may happen while driving, such as accident. Besides helmet is to be worn to anticipate any serious risks which may happen while driving. Any helmet worn by driving must meet opened and closed standards.

On the other hand, cell phones are now a days have become the one of the main communication tools, on which the most the people spend their most of time. Despite of its use it would be bad when the phone is obstructed by the battery power that is not long lasting. And even worse when the electricity is out of reach. Such condition is the basic or main reason for bringing forward this innovation idea to design a helmet that can provide benefits to users especially while travelling. This innovation lies at the capability of the helmet to supply power for mobile phone, since it is made to able to recharge itself while it is in use(travelling).

II. MAIN PAPER

As the time passes the technology is being developing and advancing day by day, and one among the innovation is solar helmet charger. The present paper is a review from our research on solar helmet charger.

III. THE CURRENT HELMET TRENDS

Helmet is known to be one of the compulsory equipment for motorcyclists of motor vehicles. The police officers, therefore, admonish anyone riding motorcycles who are not wearing a standard helmet. This implies that helmets are to be worn by those riding motorcycles anytime for long, medium, and short travelled distance. The different types of helmet designs are [1] A vibrator helmet to prevent motorcyclist’s from sleepiness on the street, [2] A helmet with aromatherapy, [3] Talkie helmet for two-way communication between the rider and the other person on the motorcycle, [4] A helmet with mask to prevent dangerous substances while riding, [5] A smart helmet which can accept and decline a phone call while person is riding, and [6] A helmet with transition glass that can adjust the sun light.

A. Methodology 1:

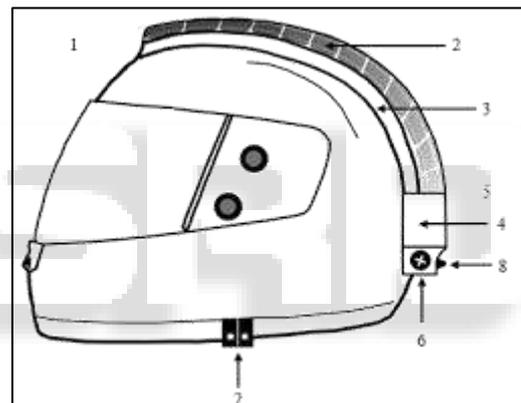


Fig. 1:

This particular helmet charger is an alternative for people those who are taking journeys by motorcycles (like bike riders, delivery boy) and those who spend their most of the time in travelling from one place to another place find trouble of charging their mobile phones. By adding the solar power-based technology to the helmet motorcyclists will not be troubled in finding a place for recharging their mobile phones. Figure 1 is the structure of solar power-based helmet charger invention, A photovoltaic cells or solar cells (nomenclature 2) which is placed in a specific box (nomenclature 3) is the main power source for generating electricity. Therefore, the electricity processed in electronic system that located inside the specific box (nomenclature 4), this is a voltage regulator with manual adjuster and indicating light. Then the electrical energy is stored in a power bank device (nomenclature 5). The voltage controller circuit which is used in this invention can be adjusted according to the requirement, for example: 3VDC to 5VDC, 12VDC to 5VDC and etc. Based on the theorem that “the output voltage which is produced by solar cell increases when the sunlight is brighter and vice versa”. By tuning or manual adjuster facility in this invention (nomenclature 6), the user can control the input voltage in power storing device to 5VDC. The

distribution of electrical power from the power storage cell to the user mobile phone is done by the cable with size of 1 milly, meter which is installed inside the helmet. Therefore, connected to a USB connector (nomenclature 7). During charging process, the light indicator will be blinking (nomenclature 8).

B. Methodology 2:

1) General Methodology

Second methodology is the advanced technology to the first methodology device. In this second methodology the device mostly depends up on IOT. And the design of the helmet is also quite different from the first one.

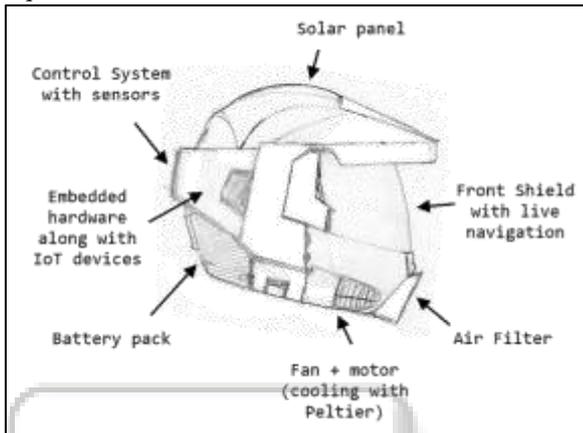


Fig. 2:

The fans present on side walls of the helmet helps in bringing the air from outside and filters it in the front.

The design consists of a solar panel arranged on the outer covering of the helmet in such a manner that it can trap maximum amount of sun light falls on it. The current and voltage specifications of the solar cells should be chosen according to the requirement. At present, a Nvis solar panel of 50watt is capable of charging 12volts battery. The battery pack is placed at the bottom back position in order to minimize the weight borne by the person who is wearing it.

C. Prototype:

As for the given information the prototype was done on a generally available open face helmet. The solar panel used in it was a 50Watt 6 cells connected to a charge controller. The filter used in this helmet consists of 3MTM Gas and Vapor Cartridge capable of protecting against a variety of harmful gases like Carbon monoxide, Sulphur dioxide and so on.

Along with particle matter of diameter size of 10 micrometres.

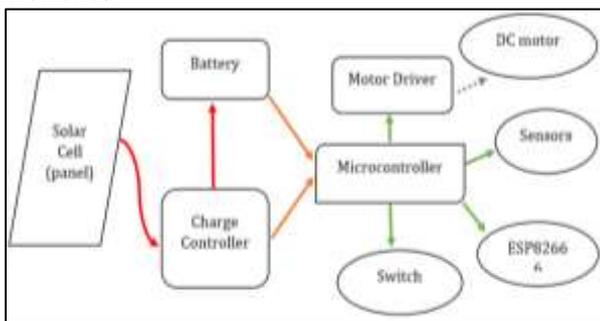


Fig. 3: Basic flow of embedded components and control system

The microcontroller chosen here is an 8-bit AVR architecture, developed by Atmel and loaded into prototyping PCB by Arduino. Currently Arduino Uno was deployed as it suits best for the electronic configuration and consumes very less power. The above block diagram shows the current control system, which is derived from the solar panel.

For the fan, they choose DC brushless sleeve bearing fan, providing 6000 RPM and maintaining air flow of 5.57 cubic feet per minute and at 5 volts and 0.12 amperes of current. For cooling, the thermoelectric Peltier cooler was chosen according to the dimension of the fan this could produce freezing temperature just in few seconds. The power requirement of the cooler was managed with pulse width modulation in order to achieve efficient results. The same concept was programmed on the controller, to automate the cooling mechanism including the motors speed.

The sensors deployed were:

- 1) DHT11 [14] – Temperature and humidity sensor
- 2) MQ2–gas sensor, can detect LPG, i-butane, propane, and smoke.
- 3) MQ7– gas sensor, detects Carbon monoxide.
- 4) MQ135– gas sensor, senses benzene, alcohol and smoke.
- 5) DSM501A– dust sensor, able to sense tobacco smoke, pollen, house dust, etc. and particles of nearly 1-micron size [15].

D. Comparison:

This solar helmet is quite different from other because the normal helmet is used only for the protection. But it is used to protect our head as well as to save power usage charges by using free energy sources like solar energy.

IV. CONCLUSION

The final conclusion of this review paper is to state the major comparison between normal helmet and the solar helmet.

REFERENCES

- [1] Bender, R. (Oct. 1974). Solar Energy Helmet. US3844840 A,
- [2] The Green Helmet (Solar Powered, Safety Lit, Weatherproof Bike Helmet.), Retrieved from Instructables.com, <http://www.instructables.com/id/The-Green-Helmet/>.
- [3] Students in India build solar-powered helmet. CNET. [Online]. Retrieved from <https://www.cnet.com/news/students-in-india-build-solar-powered-helmet/>.
- [4] Solar helmet charges cellphone, cools head - Times of India, The Times of India. [Online]. Retrieved from <http://timesofindia.indiatimes.com/city/hubballi/Solarhelmet-charges-cellphone-cools-head/articleshow/46995312.cms>.
- [5] Hirsch, G. B., Volk, S., Cirrito, W. and Brann, D. (1987). Solar powered headwear fan. Google Patents.
- [6] Solar powered smart helmet with multi features for smart ride - The IEEE Maker Project. [Online]. Retrieved from <https://transmitter.ieee.org/makerproject/view/ba344>.