International Journal on Applications in Computers
Volume1: Issue 1: May 2018, pp 53- 56 www.aetsjournal.com ISSN (Online) : XXXX - XXXX

Solar Powered Display for Smart phones

K.Sivakumar[#1] and D.Shobana[*2] and S.Salini[*3]
[#]*Assistant Professor, ECE, Sri Ranganathar Institute of Engineering and Technology, Coimbatore*
**UG Scholar,ECE, Sri Ranganathar Institute of Engineering and Technology, Coimbatore*

***Abstract*—**This paper presents the recent technology about to harvest solar energy for smart phones. The technique to harvest energy from wasted sun light through a phone display. Smartphone with the solar cell display act as a battery chargers . As this result, we can achieve recharging from direct sun light in a simple way. The different strategies has been followed and this discusses about some techniques that how it works and their advantages.

Index Terms—Solar cell, Wysips technology, Solar powered Smartphones

I. Introduction

Mobile phones is a developed and recent communication device. Today's mobile phones provide unlimited features for their users. The different price for mobile phones depends on their functionalities. In past years, outstanding standby and operating times were provided, while nowadays a recharge is needed in every day. Smartphone batteries cannot stand for more time, even though battery technologies were improved. [1].

Solar energy has a great potential among the renewable energy sources. Photovoltaic (PV) chargers for mobile phones were introduced to offer power for recharge during a day. These type of chargers contain small photovoltaics and a battery, which can be recharged by solar energy .

In Fig.1 that shows an example of photovoltaic charger .The main drawback of chargers are carrying that always wherever go and needs a wire to connect the mobile phones to recharge.

Fig.1 Example for Photovoltaic charger

The solar cells are made of semiconductor material. It is necessary to explain the operation of solar cell uses. When sun light hits the solar cells, energy is absorbed and that allows the electron flow in silicon. The different impurities such as phosphorus or boron are added to establish an electric field. This field allows electrons to flow in one direction and it is known as electricity.

II. Wysips Technology

Wysips technology has turned smartphone displays into battery chargers with the help of solar cells.Wysips stands for What You See Is Photovoltaic Surface and a subsidiary of Sunpartner group has invented the component to supply enough energy for smart phones to stay as permanently charged.

Fig.2 Transparent Layer

.

Fig.2 shows the transparent layer and it is designed to be build into smartphones and turns sunlight into power. This transparent material can be installed under the glass screen of mobile devices, or built into add-on charging devices. It's 90% transparent, and 0.5mm or less thick, and uses a combination of micro-lenses and photovoltaic materials to charge the

International Journal on Applications in Computers
Volume1: Issue 1: May 2018, pp 53- 56 www.aetsjournal.com ISSN (Online) : XXXX - XXXX

battery of the device in or with which it's used.

The semi-cylindrical lenses are designed to increase the light capture while keeping the layer invisible to the naked eye, and the system will work on either natural or artificial light. The lens system also has the advantage of increasing the viewing angle of a screen.

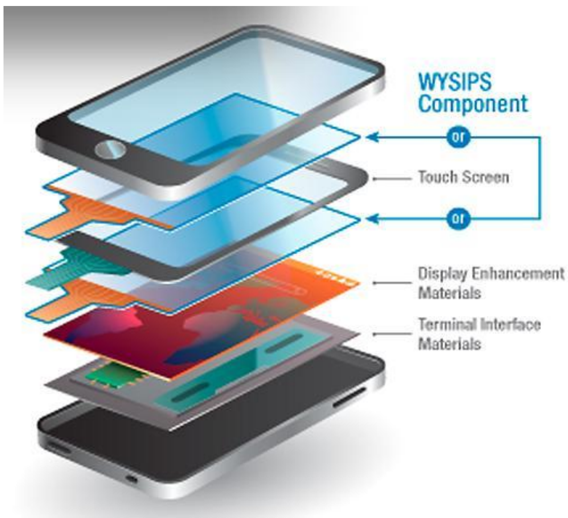

Fig.3 Wysips integration in Smart phones

The applications of Wysips technology including watches, tablets and laptops, as well as self-powered advertising displays .Wysips Glass technology is usable for windows in buildings, cars, planes and the like, delivering a 30W peak output per square metre.

Fig.4 Implementation on Smartphones

In Fig.4 shows that implementation of solar cells in a smartphones. The top layer is lens surface and beneath that stripes of photovoltaic cells is embedded and used for recharge the battery in the phone.

III. Benefits of implementation on Smartphones

1.It can be used for charging wirelessly

2.It is easily embedded in smart phones with no industrial design change.

3.It can be integrated into any LCD or LED display.

4.For 1 hour sun exposure it provides 30 minutes of talk time for the users.

IV.Technical Specification of Wysips component

The Wysips Crystal component is only 500 microns thick. Placed between the screen and the phone's touch panel, it is totally integrated in the device without affecting its design aesthetics or touch screen properties. It generates optimal power when ex-posed to artificial or natural light. The Wysips Crystal component is 90% transparent (measured by industry standards) and is invisible to the naked eye. It has no impact on the phone's intrinsic qualities : contrast, readability, angle of view or luminosity. Light energy is recovered and transformed into electric power that is directed back into the phone charging circuit, as if it were plugged into the grid or connected to a USB port

Fig.5 Non contractual of wysips component

The power generated by the component reaches 2.5 mW/ cm^2 in the sunlight (1 sun), providing two to four extra minutes of communication time for 10 minutes of exposure on a 3G network. By the end of 2014, Wysips aims to reduce the exposure time for 1 minute of communication by four (5Mw/cm2). And for products requiring only 60%-70% transparency, it can generate power of up to 10 mW/ cm A warning light illuminates on the demonstrator when the phone is exposed to a light source to show that the device is recharging

V. How Wysips Technology works

Wysips technology allows light to pass through a semi-cylindrical lens onto thin strips of photovoltaic cells below, while also allowing the surface underneath to show through. The developers say that many surfaces could potentially become self-sufficient power producers.

International Journal on Applications in Computers
Volume1: Issue 1: May 2018, pp 53- 56 www.aetsjournal.com *ISSN (Online) : XXXX - XXXX*

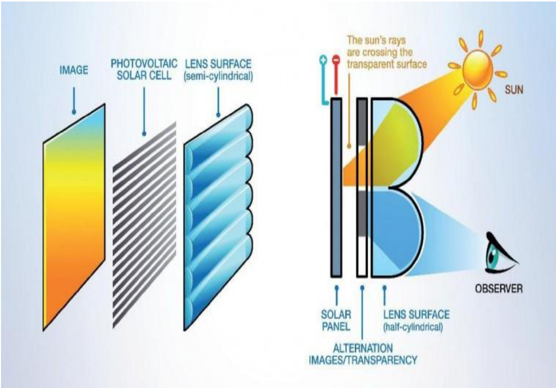

Fig.6 Diagram of how Wysips works

The Fig 6. shows that how Wysips works. Wafer thin and flexible Wysips film technology allows light to pass through a semi-cylindrical lens onto thin strips of photovoltaic cells below, while also allowing the surface underneath to show through.

The Wysips film is underlying LCD screen as it is attached to the top of the LCD using an "optically clear tape" that is not 100% optically clear and would have the film embedded into the display to make the film invisible to the consumer.

VI. Nano technology in Solar cell

The development of solar cell has brought the new technology in charging of smart phones. The various types of Solar cell has been used for different applications .In this case, Transparent Conducting Oxide (TCOs) might be suitable for high efficeiency. Transparent Conducting Oxides (TCOs) are suitable for a various applications due to their high transparency and near-metallic electrical conductivity. This is key components in most optoelectronic devices. TCOs are used as a current collector in solar cells. In this, Tin oxide is mainly used for making good electrical contact and is often doped with either indium or fluorine to achieve high conductivity.

A Thin film technology is mainly used in solar cell. The main purpose of depositing thin film on an optical surface is to provide environmental protection and improve optical performance. This is most cost-effective solution and uses a less support on active component which is applied as a thin coating. The thin film solar cell technology is based predominantly on deposited amorphous silicon (a-Si) thin films, CuInSe2 (CIS), and its higher band gap variant Cu(In/Ga)Se2 (CIGS) and CdTe. The thin film solar cells use very small deposition material and can be deposited on a variety of low cost substrates as stainless steel and flexible surfaces.

VII. Solar cells in OLED screen to power smartphones

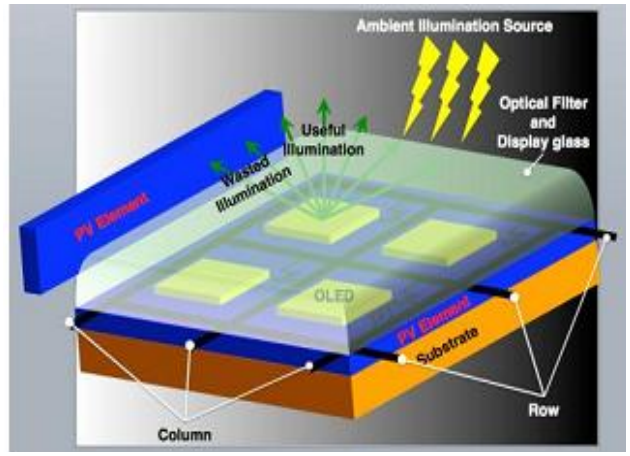

Fig.7 Structure of OLED

An organic light-emitting diode (**OLED**) is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound which emits light in response to an electric current. The idea of a team of researchers at the University of Cambridge is to harvest energy from wasted light in an OLED display. The technology where users will not need to plug in their smartphones for recharging. An OLED screen uses solar cells to absorb scattered and wasted light, sending it back into the screen.

Instead of using charger to charge a battery of cell phone ,which would have involved adding complex circuits to integrate a thin-film supercapacitor for intermediate energy storage. This combination of photovoltaics, transistors, and supercapacitor provides a system with an average efficiency of 11 percent and peak efficiency of 18 percent.

If the PV array converts 5 percent of ambient light to electricity, the energy-harvesting system can generate as much as 165 microwatts per square centimeter under the right lighting conditions. a typical 3.7-inch smartphone screen, that equates to a maximum power output of 5 milliwatts.

Fig 8.An example for Solar cell display

Disadvantage of using OLED display

Only around 36 percent of the light produced by an OLED display is processed and the remaining escapes around the edges, in the form of scatter and bleeding from the edges. This can be reduced by installing photovoltaic cells on the back and sides of OLED screens to capture the loss.

VIII .Applications

The displays on flat-screen TVs and smartphones, as well as the panels on solar cells, all require materials that not only conduct electricity but are also highly transparent to visible light. One transparent electrical conductor that is typically used in the industry is indium tin oxide (ITO).The technique for solar energy harvesting is widely used in above applications mainly in smartphones with the nanotechnology.

IX.Conclusion

The New technique of charging smartphones with the solar cell display were introduced. This paper mainly exposes a method of solar energy harvesting which are recently used in charging of smartphones and their advantages and disadvantages. This reduces the use of mobile charger and brings out the utilization of solar energy. .

References

[1] Christian Schuss, Timo Rahkonen ,University of Oulu "Solar Energy Harvesting Strategies for Portable Devices such as Mobile Phones". PROCEEDING OF THE 14TH CONFERENCE OF FRUCT ASSOCIATION, ISSN 2305-7254.

[2] Filipe Távora, Andrea Sarmento Maia," Solar Battery charger for portable devices application." SiliconReef, June,2012..

[3] http://phys.org/news/2012-01-cambridge-team-solar-cells-oled.html

[4] http://www.gizmag.com/wysips-film-could-allow-any-surface-to-generate-solar-energy/18255/

[5] http://www.whathifi.com/news/wysips-technology-turns-smartphone-displays-battery-chargers

[6] http://www.youthcollection47.com/future-solar-powered-smartphones-wysips-technology/

[7] http://spectrum.ieee.org/consumer-electronics/portable-devices/solar-cells-in-smartphone-screens

[8] http://www.smithsonianmag.com/innovation/solar-panels-in-the-screens-of-smartphones-could-power-the-devices-180954457/?no-ist

[9] http://www.extremetech.com/computing/114609-smartphone-screens-with-built-in-solar-cells

[10] http://phys.org/news/2012-04-low-temperature-method-transparent-zinc-oxide.html