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Mobile phone By Renable Energy

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Abstract: The objective of The ability to harvest energy from the environment represents an important technology area that promises to eliminate wires and battery maintenance for many important applications and permits deploying self powered devices. This paper suggests the Application of Charging Mobile Phone by solar energy. In the beginning, a comprehensive overview to the energy harvesting concept and technologies is presented. Then the Application of Charging Mobile Phone by solar energy its efficiency to charge the aimed batteries under sunlight or an indoor artificial light**.**
However it becomes very inconvenient for persons occupied with work or travelling long distances as the average lifetime of a mobile phone battery is less than 10 hours.Solar phone chargers use small solar panel to absorb light. This process still forces customers to carry another device along with their cell phone.
Keywords, mobile phone , battery , sun , solar energy

I. INTRODUCTION

Solar energy is the energy produced directly by the sun , The solar energy is a daily energy for that good when use it in many projects. The small projects of solar power help many people and easy to pick up. Solar table collects all the energy from the sunlight and helps to charge the electronic. A Photovoltaic energy is the conversion of sunlight into electricity. A photovoltaic cell, commonly called a solar cell or PV, is the technology used to convert solar energy directly into electrical power.[1]Sunlight is composed of photons, or particles of solar energy .These photons contain various amounts of energy corresponding to the different wavelengths of the solar spectrum. When photons strike a photovoltaic cell, they may be reflected, pass right through, or be absorbed. Only the absorbed photons provide energy to generate electricity The sun has the ability to generate free and almost unlimited energy that can be converted into electricity using solar panel. The converted energy from the sun can be used to power any kind of electricity including intermediate storage battery as solar powered mobile phone charger

II. LITERATURE REVIEW

SOLAR POWER OPERATED TABLE FOR CHARGING ELECTRONIC GADGETS by Dinesh Keloth etal.[2] That The design of the table still looks very elegant and stylish. The present project will be an eco-friendly solar panel table.The solar panel needs to consume power from the battery at night and for that a diode will be used. There are USB ports to charge. The first port is for low charge and the other for high charge. The output from the table will be 1A and 2A. In conclusion, the solar table is taking advantage from the sunlight. Solar table will collect all the energy from the sunlight to help the people to charge the electronic gadgets. This will be an eco-friendly solar panel table.

The solar table also features. The terminal voltage variation of a super capacitor causes degradation in associated power converter efficiency by offsetting the operating voltage and current from the optimal point as per Kim et al. [3]. Thus, careful charge management such as the MPTT should be performed to maximize the chargers efficiency. A Solar USB charger for smartphone shows the maximum power transfer. A USB-compatible solar charger for smartphones using super capacitor as the energy buffer supports the maximum power transfer tracking (MPTT).The conversion efficiency is expressed as a function of input voltage, output voltage and output current.

Chafle et al. [4] presented a coin base mobile charger using solar tracking system is provided. In this research, the system is designed for public in rural as well as semi urban areas. This is designed base on microcontroller that does the countdown time for a period for a 3 min. with LCD display showing the actual time left. The mobile coin charger consists of solar panel, battery, coin detected sensor and microcontroller. The output parts are LCD Display and multiple charger connectors. The charger driver will be between the microcontroller and multiple charger connectors. This circuit is for charging the mobile phone. Specifications are: AC voltage 230V and DC voltage 6V, current up to 4.5 AH. Schematic representation of the system is

provided in this paper. The controller reads the program. Then the controller will give a signal to multi pin charger for use to charge more than one.

Smartphones should automatically get recharged so that users do not need to worry about recharging their smartphones as per Liu et al. [5]. However, existing solutions cannot achieve this desirable goal. Automatic charge smartphones is a system to charge phones from the light beam. The circuit of the project consists of solar panel, MSP430, charging circuit, LED light and smartphone. Specifications are charging voltage 4.2V, power output 2.5W to 5W (1A). In this paper auto charge is introduced, a new approach that enables automatic smartphone charging.

Application of Charging Mobile Phone by solar energy its efficiency to charge the aimed batteries under sunlight or an indoor artificial light. This paper has successfully presented a functional solar solution for mobile charging centers in south of libya. Though the system has a high initial cost, it has a higher yield on the long-run. The energy from this system is environmentally friendly devoid of noise pollution and toxic gas emission. This system saves these mobile charging Most of the materials used in the construction of this system are readily available in the market. [6]

A portable solar charger by using a solar cap has been designed and constructed successfully. Battery has been charged directly by the dc voltage produced by a solar panel through a USB port. In the results of battery charger was found satisfactory. It took almost same amount of time to be fully charged from main. Storing of charge and also charging from the reservoir were checked and found satisfactory. Performance of storing of charge and charging of battery were found satisfactory and both were found satisfactory and both were delayed in cloudy sky was also observed.[7] .

Wireless Solar mobile phone chargers are simple, portable and can be used by anyone especially in remote areas. It has borne an innovative way of charging phones. However, there are always ways for improvement in the future. An improvement that can be worked on is decreasing the thickness of solar cells without losing efficiency [8].

III. METHODOLOGY

As shoes in figure. 1 in this experiment model presented solar panel charges a rechargeable battery storage, This means you can charge your phone even when there is no sunlight at night when you've charged your battery during the day.

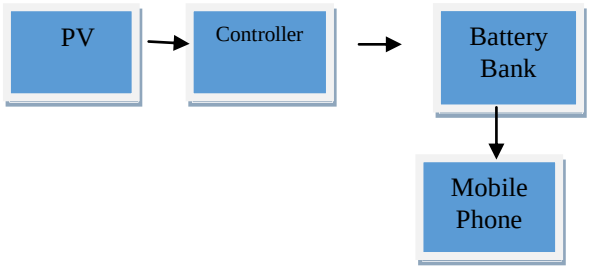

Figure 1 Experiment of solar panel charges a rechargeable battery.

IV. RESEARCH OF EXPERIMENT

In solation is the solar radiation, when the energy is emitted by the sun in all directions and it reaches the earth's surface, after being measured the solar radiation in eight different times start at 8:00 AM in the morning until 4:00 PM in the afternoon. The device that is used for measuring the solar radiation, is called Pyranometer device, and the highest solar radiation around 989.1W/M^2, which was at 01:00 PM as it is shown in the table 1.

Time	solar radiation
08:00 AM	631.4 W/M^2
09:00 AM	689.1 W/M^2
10:00 AM	748.2 W/M^2
11:00 AM	868.5 W/M^2
12:00 PM	976.1 W/M^2
01:00 PM	989.1 W/M^2
02:00 PM	838.4 W/M^2
03:00 PM	728.1 W/M^2
04:00 PM	612.9 W/M^2

Table 1 Intensity of solar radiation.

In the figure 3. of the result measurement of solar radiation the radiation is increasing from at 8:00 AM, in the morning until 04:00 PM in the afternoon but at 04:00 PM the radiation reduced to 612.9 W/M^2 that because sunset starts in the after noon.

Figure 2 Variation in intensity of solar radiation with time.

Output of photovoltaic (PV)

The solar mobile charger is the device for transferring the sun light power into electrical power, working as the solar panel transfer the sun energy into the electrical energy which is stored in the built in 1000mA/h Lithium battery. The stored power is then exported to mobile phone.

$$P = V*I \qquad \ldots\ldots\ldots\ldots\ldots\ldots 1$$

Solar radiation	PV voltage (V)	PV voltage (I)
631.4 W/M^2	13.29	01.42
689.1W/M^2	13.41	01.38
748.2W/M^2	13.45	01.37
868.5W/M^2	13.50	01.38
976.1W/M^2	13. 03	01.44
989.1W/M^2	13.12	01.43
838.4W/M^2	13.17	01.47
728.1W/M^2	13.21	01.45
612.9W/M^2	13.32	01.48

Table 2 Intensity of solar radiation

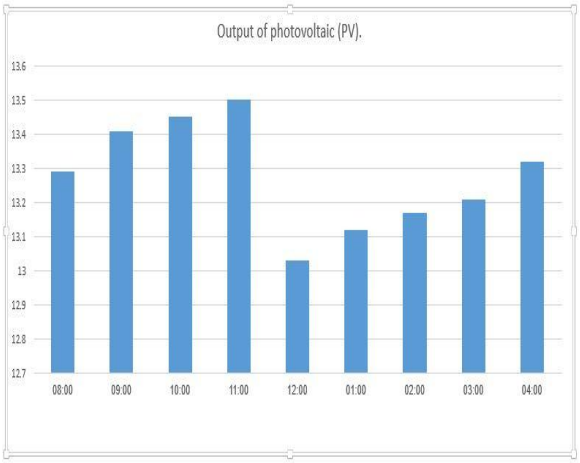

Figure 3 Output of photovoltaic (PV).

The figure. 3. Explains the voltages that measured from PV Cell at open connection (no load) at various time. It can be seen that the peak voltage that can be produced by the PV cell is during 8:00am until 4:00pm

Battery Bank

In this research, the type of battery is Panasonic, each battery has DC voltage at 8V, 1.5 Ah. The battery bank is a set of batteries that connected in parallel, therefore able to supply 3.2Ah.

The General rule to calculate the average charge time : Take Amp/hour rating of the battery and Divide by the charger rating (in amperes) and then add about 10% for the extra time to top off the battery.

Power Battery :-

Voltage = 8 volt DC , 3.2 Ah

Power (watts) = Voltage (V) x Current drawn in Amps (I)

$$P = 8 \times 3.2A = 25.6Wh$$

Daily PV output needed 25.6 Wh

30 % PV Power Loss Estimation

30 % x 25.6Wh = 7.68Wh

Average sun hours / day 8 hours

Minimum system size

(25.6 Wh + 7.68Wh) :8h = 4.16 W

Chosen system module > 4.16 watt

As show in the figure 4. There is a gradual change of voltage in the battery bank reach approximately 8.5 volts of the battery bank, and increasing from at 8:00 Am until afternoon at 4:00 Pm start from around 20% until 100% for about 6 hours.

Table 3 . Test result of Overcharge

Minutes	Battery Bank Voltage (volts)	Battery Bank current(A)
0	5	0.54
3	5.08	0.53
6	5.13	0.52
9	5.25	0.51
12	5.39	0.5
15	5.49	0.49
18	5.6	0.48
21	5.74	0.47
24	5.84	0.46
27	5.94	0.45
30	6.04	0.44
33	6.35	0.43
36	6.41	0.42
39	6.47	0.41
42	6.48	0.39
45	6.49	0.37

48	6.5	0.36
51	6.51	0.35
54	6.52	0.34
57	6.53	0.33
60	6.54	0.32
63	6.55	0.31
66	6.56	0.3
69	6.57	0.28
72	6.58	0.27
75	6.59	0.26
78	6.6	0.26

From above data, graphic below shows that there is a gradual change of voltage in the battery bank and the current that flow to the battery bank is also decreasing relatively linear which then stop recharging at the desired value by prior calibration of voltage divider for overcharge controller.

Figure 4, line graph below shows that the recharging state is initiating to maintain the peak voltage at approximately 6.5 volts of the battery bank. The voltage will remain relatively at 6.5 volts by appropriate current that slowly decreased until no currents are being drawn by battery bank.

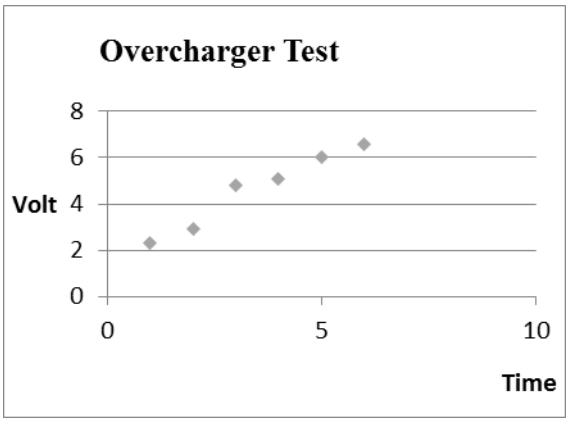

Figure 4 Overcharge volt battery.

The graph above contains two line graphs. The square-dotted line graph is the voltage rise at battery bank during recharging process. The voltage is rising from 2 volts to 6.5 volts within approximately 6 hours. Meanwhile, the line graph with triangle dot displays the current flow from PV to battery bank. It can be seen that during recharging process the current is gradually decreased from 700mA to 100mA, it means that over the time of charging, the current is starting to saturated due to balanced voltage between PV and battery bank.

Moreover, it shows that the recharging state is initiating to maintain the peak voltage at approximately 6.5 volts of the battery bank. The voltage will remain relatively at 6.5 volts by appropriate current that slowly decreased until no currents are being drawn by battery bank.

Discharge Test

Based on actual values of the test, below is the table of test results. Voltage on PV Cell is now removed. Due to the fact that SCHMIDT TRIGGER has two voltages to distinguish ON and OFF states, there are two procedures that must be follow to measure the ON voltage (VTL) and the OFF voltage (VTH).

First is to reveal the VTL by doing the following steps. The Load will be simulated by a mobile phone battery that able to drain the battery bank. The voltage and current between Battery Bank and load will be recorded during the test. The measurement diagram is shown below.

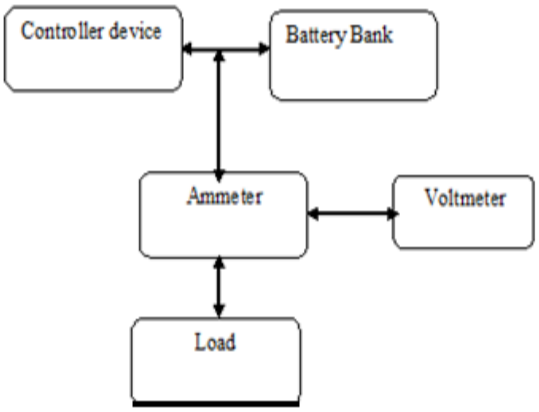

Figure 5 Discharge test

Secondly, to measure the ON voltage (VTH), the LOAD must be replaced by voltmeter and the battery bank is recharged slowly until the voltage in Load pins shows a value. The result is shown in Table 3

Table 3 Discharge test result

Minutes	**Battery Voltage (volts)**	**Battery Mobile Voltage (volts)**	**Battery Mobile Current (A)**
100	6	6	350
110	5	6	350
120	4	6	350
130	3	6	350
140	2.9	6	350
150	2.6	6	350
160	2.4	5.5	350
170	2.3	5	350
180	2.25	4	350
190	2.24	3.56	0
200	2.3	3.56	0
220	2.4	3.55	0
260	3	3.53	0
310	4	3.50	0
320	4.5	3.48	0
350	4.8	3.47	0
370	4.9	3.46	0
380	4.97	4	350
390	5	5	350
410	5.1	6	350
430	5.2	6	350
450	5.3	6	350

And, to visualize better, Figure 6 shows the SCHMIDT TRIGGER works at discharging state.

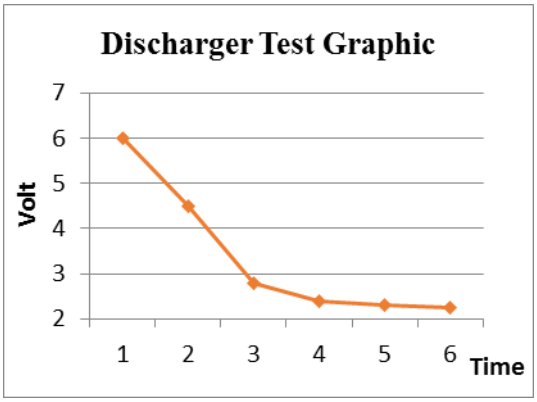

Figure 6 Discharger Volt Battery.

In figure 6, there are two line graphs, the dotted and solid line graphs. The first, the dotted line graph, shows the voltage that measured from the battery bank. There are two features:

- VTL represents the lowest voltage drop at the battery bank, where the battery is still allowed to be discharged. VTL measured at 2.24 volts. If the voltage of the battery bank is lower than VTL, any connected Load will be disconnected.
- VTH represents the voltage of the battery bank which the load is reconnected to ground. When VTH reached 4.97 volts, the device will automatically reconnect the load and discharging is allowed for another cycle.

The second line graph, the solid one, is the voltage at Phone's Battery (Load), of which measurement of VH = 6 volts and VL = 4 volts.When the voltage at the load reach 6 volts, recharging process occurs. Otherwise, when the load voltage measured 4 volts, there are no charging process. These condition is due to required voltage for charging phone's battery is at least 0.7 volts higher, where the phone's battery generally has 3.7 volts. So the voltage for recharging should be more than 3.7 + 0.7 volts, equals to 4.4 volts.

For this test, a battery (battery mobile phone) is used that able to drain the battery bank. In the diagram figure 6 shows the voltage decreases when the load is connected to the device. The load used was capable to drain the battery from 6 vdc to lower than 2.3 vdc within around 5 hours

V. CONCLUSIONS

In conclusion, the solar table is the design of solar-powered portable battery charger for mobile phone has achieved successfully to maintain the life of battery bank. The circuit design is successfully converts solar panels to be able to charge mobile phone battery. The design of Photovoltaic charger as a prototype are implementing operational amplifier to perform overcharge controller using comparator circuit and Schmitt Trigger for discharge controller. Those controllers are for protection of overcharging and excessive discharge to the battery.

From the experiments which conducted to verify the requirements of automatic capability of the prototype, it can be found that solar panel charges the battery bank whenever there is appropriate sunlight and will never overcharge it, on the other hand when the prototype charges mobile phone, it will stop charging process when the battery bank's voltage has reached a certain lowest voltage (2.24 volts) and continue to charge whenever the voltage of the battery storage has reached a certain higher voltage (4.97 volts). From that characteristics, battery bank will always operate at a safe state, in other words, the requirements to preserve the battery bank's life has been met.

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