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Android Battery Manager Application and a Solar Based Portable Mobile Charger

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Abstract- The fuel hikes making news and lots of power electricity cuts, solar energy is the most sought after energy source. Solar chargers are simple, portable and ready to use devices which can be used by anyone especially in remote areas. Going solar can solve more than one problems, right from cutting down on carbon emissions and dependence on fuels, to solving the energy crisis. This project aims to make a simple solar charger which can be used on the go. Solar panels don't supply regulated voltage while batteries need so for charging. Hence, a DC-DC booster circuit is used to have the desired constant voltage. Along with the solar charger, an application to monitor the charge and manage the usage of battery, with a suggestion mechanism is a plus, people nowadays use smart phones running multiple applications and with those huge screens the battery doesn't last for even a day. So by monitoring the use of battery it's better to manage the usage. An algorithm to manage the consumption and an option to prioritize the applications while closing the unwanted ones is the main focus of the software in this project.

Index Terms- A-GPS, WiFi, Solar, Battery..

1. INTRODUCTION

Solar panels are simply solar cells lined up together in series and parallel so as get sufficient voltage and are p-n junction semiconductor devices with pure silicon wafer doped with 'n' type phosphorous on the top and 'p' type boron on the base. If the PV cell is placed in the sun, photons of light strike the electrons in the p-n junction and energize them, knocking them free of their atoms. These electrons are attracted to the positive charge in the n-type silicon and repelled by the negative charge in the p-type silicon. Connecting wires across the junction will have a current in them. Solar cells have come a long way from bulky 6% efficient chunks to thin films with as much as 30% efficiency. They are selling like hot cakes today given their necessity and utility. Even 15% efficient solar panels installed across the world's wastelands can produce enough clean energy to sustain mankind for a year [5].

With the development in technology the hike in usage of smartphones is drastic. Smartphones nowadays run on limited battery life as they have to sustain the packet data, calls and messages and sometimes usage of WiFi, A-GPS, Bluetooth and much more services. These services consume the short battery life very quick and as they've become the need for every person, management is also in need.

2. BACKGROUND AND MOTIVATION

Due to the extensive use of smartphones the battery consumption and its sustenance has become an issue. Usage of smartphones isn't going to be reduced; hence the solution for portable charging has made its place. While considering the current market scenario the options for portable charging are many but usage of sun as a free source for energy is the idea. Also the usage is on smartphones which support multiple services and applications, so an application to manage the services and maintain the battery consumption is an add-on solution. Thus, a runtime based portable solar panel with a battery manager application to manage the services and applications has been thought of.

3. PROBLEM STATEMENT

In this project the focus on the solar panel is as the hardware for portable charging of mobile phone and the software application which will manage the battery consumption and usage by various applications and services.

- The user has to place the solar panel in good sunlight as the solar panel (photovoltaic panel) need ample amount of sunlight.
- The solar panel should be light and portable while providing efficiency enough to charge a mobile phone.
- The battery application should display all the details of the last one month, i.e. the usage by the applications, charge and discharge timings.
- The application should also provide an optimizing option, so that we can turn off or stop the applications which are not needed.
- The advance function of the battery application could be prioritizing frequent applications and terminating unwanted applications consuming the battery.

4. REVIEW OF LITERATURE

Battery manager application for an instance will have the capability to manage the application and the other services of the smartphone. While the hardware application on usage of solar energy for the charging purposes is prudent. There is a decent study done on both the topics and also a good amount of research has been done. The researchers have been keen on developing the solar based solutions for portable charging.

4.1. Battery monitoring and analysis for android based system

In this paper, the testing over the embedded systems and the rapid consumption of battery for mobile phones is done. The mobile phones referred to be phones using advanced operating system like android and are therefore referred to as smartphones too. Testing the usage of services provided by the smartphones like WiFi, and other services which consume the battery much more drastically than simple calls or messaged from the phone is done. The monitoring of battery at stand-by time and with usage is done and similarly the analysis result is produced. Individual application-wise consumption is also analyzed and displayed. While the system based application have the root access and might not be possible to be stopped, still the analytics show the consumption and monitoring option is clearly available. [1]

Advantage: Battery consumption and monitoring is done, application-wise analysis is also completed and stand-by detailed time is also calculated.

Drawback: Restriction option is provided, whereas an idea to just stop the services of third-party unwanted application isn't done.

4.2. Solar power charger with universal USB output

This paper considers the all the cell phones and other portable devices like electronic music players. These have bigger screens and are very complex. Process of these devices requires high power demand which can cause battery consumption problem if over used. Nowadays, smartphones and other portable electronic devices are more widely adjustable to charge via a universal usb port. In this paper, portable device charge system is proposed by solar energy with DC-DC boost converter circuit. The universal USB becomes the most prominent and feasible solution for connection, communication and charging. [2]

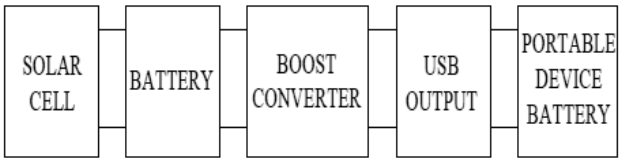

FIG1: Solar power charge system

Advantage: Charging capability of more than just mobile phones is considered. DC-DC boost converter also becomes the main reason as the charging in low voltage inputs is also taken care.

4.3. Design of a solar powered battery charger

In this paper, a solar powered battery charger is presented, which is a photovoltaic (PV) panel that converts the solar power into electricity.[3] A DC/DC converter circuitry is used to control the output power of the PV panel and the charging current for the battery. The design becomes proper and the solar charger is huge in size which charges the maximum possible devices or battery during daytime with good sunrays and an efficiency of up to 17% is seen.

Advantage: Complete detail for solar based charging is made available with possibilities of implementing an algorithm to get more power out of the solar.

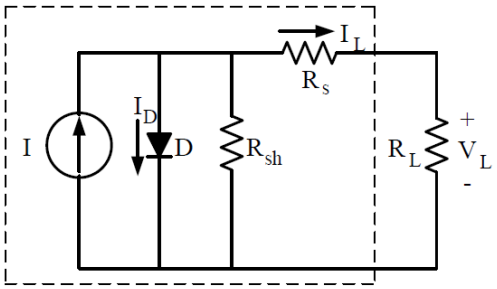

FIG2: Solar cell equivalent circuit

5. PROPOSED METHOD

The methods of monitoring and analysis from the first paper and an algorithm to stop the services of the unwanted application and the save battery. Statistical analysis on the consumption and a proper graph to display the usage with an hourly refresh. The application should be able to manage the system services like Wi-Fi and A-GPS while monitoring the battery as to save the battery consumption.

Prioritizing the frequently used applications and shutting down the rarely used while the battery consumption becomes immense. Application wise

display of consumption and an option for the user to manually kill the running applications so that the battery is managed.

Battery % check leading to stopping of system services when the battery gets low below a manually adjusted %. Like the Wi-Fi and A-GPS would turn off automatically under the 20% charge.

The connection over a USB output gives variable options for connection of various electronic devices and similarly the more possibility for the usage of the portable solar charger.A portable solar charger which is efficient and is also small in size which could make it feasible while carrying it during travelling or commute.

6. IMPLEMENTATION

The solar portable panel is a thin sheet photovoltaic panel of 7 inch in size. This panel is fabricated to hard plastic on the background and thin clear sheet on the front. The two terminals of the solar panel would be connected to the end circuit which would have the universal USB output. A preferable DC-DC booster circuit is put up and the relative output is tested.

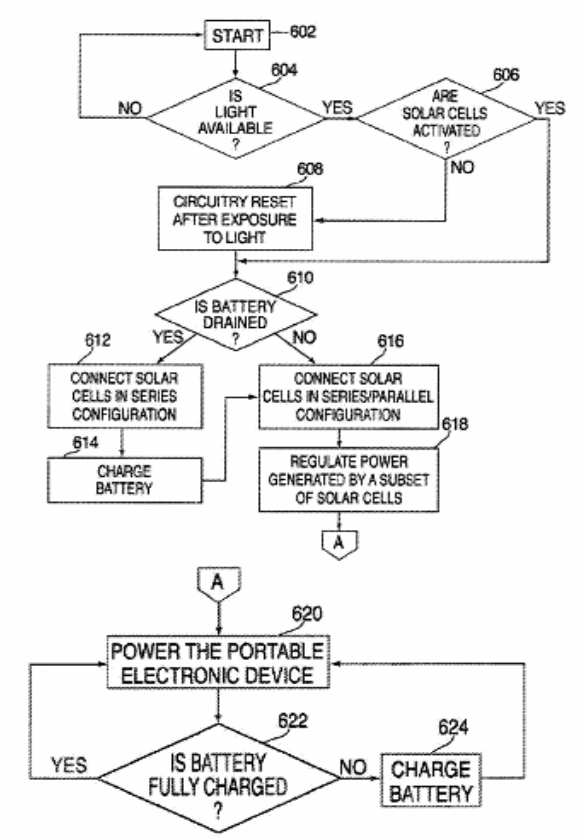

FIG3: Solar Charge Flow Chart.

Home pane consist the battery status and some shortcuts which can change the brightness settings also pre-defined functions to turn off or on the data, Wi-Fi, and GPS. An algorithm to set priority of applications and to stop its services when the consumption increases or the battery level decreases below a particular %.

The Android Battery Manager Application is a vivid application which shows the battery consumption which is monitored and analyzed while also displays the graph of the battery. The Application analyses hourly consumption of the battery and predicts the time to empty according to the current battery status. A statistics pane displays all the basic information of monthly usage and gives the average battery consumption details for the whole 30 days.

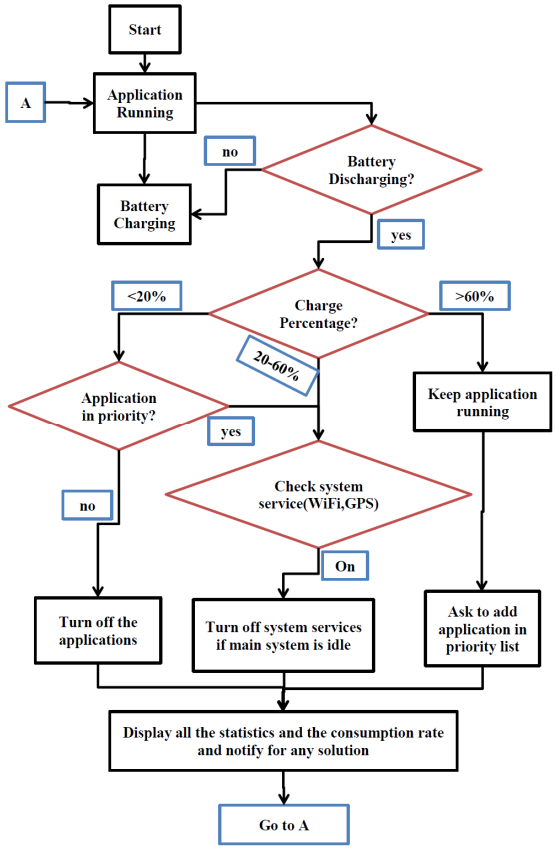

FIG4: Battery Manager Application Flow Chart.

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