Battery Power Saving Profile with Learning Engine in Android Phones

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ABSTRACT

Android is an open platform which is becoming very popular operating system. Its open source code is easily handled by the users to get and use new contents and applications on their handsets. Android is based on Linux kernel. Android device are being activated per day and power management of these device is becoming an issue. The one problem is common that is Low battery life of the device. It is not a common thing in smartphones. Now days, more powerful with power consuming technologies like GPS, 3G and 3GS.In this approach we do not require the client server architecture .we will include a learning engine. This learning will monitor the user behavior in terms of apps used, battery consumption and contexts, and then we will collect the information for a period of time and the fed to a learning engine. Artificial neural can be used to implement the learning engine. This pattern based learning engine intelligently decide, how to control the smartphones features. This will build after the learning of user behavior, would not include any statically define power saving profile.

General Terms

Battery Viewer Techniques.

Keywords

Battery Viewer modeling system, Mobile Phones.

1. INTRODUCTION

Now a days, more powerful with power consuming technologies like GPS, 3G and Wi-Fi [10].All these apps consume more power as comparative to other apps like video streaming apps like YouTube .Most of the users frequently uses these types of apps[1,2,3]. If you know that where your phone's battery consume, then you can get a solution to solve these types of problem .So many apps start automatically in Android Phones. They also consume too much battery .The applications start automatically due to two reasons as it can be seen in permission of the applications as for the reason of network access many applications reports constant usage and error so they are run in background in order for the developer to improve the applications features and functions in the near future..

Most of the end users have difficulty determining which applications are more energy efficient application designers have an incentive to develop energy efficient smartphones software[4,5] .Their main barrier is the difficulty of determining the impact of software design decisions on system energy consumption, but that barrier can be overcome.

This paper describes the battery viewer modeling techniques. This model provide an accurate real time application power consumption on each application .The most famous smartphones power consumption components are GPS,Wi-Fi,LCD(Screen Brightness),CPU Utilization and Audio. We are also providing a real power estimation method called Battery Viewer that uses as a function to determine system-level power consumption.

We have noticed that the different phones and have different power consumption. In this paper, we show that phones of different types have significant differences in power consumption properties.

2. Related Work

Many papers have mentioned that the energy consumption has become an important problem in energy management of mobile phones and have their own ways to save energy .We should first know the energy consumption of the applications on mobile phones .Monitoring the energy consumption of smartphones is very important for saving energy to extend the lifetime of battery[12].

Battery Viewer that includes both the hardware and software setup. Along with the observations from energy profiling of a mobile phones. The main focus on understanding the energy consumption of real time applications. The most real time applications that are consuming more energy as comparative to other real time applications likes Wi-Fi, GPS, LCD, AUDIO, VIDEO and CPU[8,9].Our Battery Viewer will generate a Power Saving Profile According to the usage of users[10,11].

3. Battery Viewer System Model

To analyze the energy consumption of the application on mobile phones, we designed Battery Viewer System. First we will start the application. Second it will check the energy consumption of the application on mobile devices according to the data it collect. Then third, it will show on the screen according to the select of tab that will show on the application. Last one is it shows the graphical view of energy consumption of applications.

Battery Viewer is used to check the information of the battery and application, especially the energy consumption information. It draws the real time graphical view of energy consumption

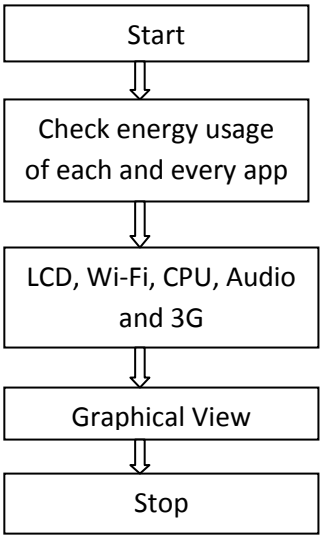

Fig 1: Flow chart of Battery viewer model

4 Battery Viewer Implementation

Based on the design described above we develop a model of our Battery Viewer System. This model is programmed by the Java program language .It is developed on Android SDK (Software Development Kit) by using Eclipse IDE (Integrated Development Environment) with the ADT (Android Development Tools)[6,9].

First we implemented a data collection application for analyzing user usage pattern. Our application was written in java and runs on any Android based platform. It periodically records the following information to a log file. Currently it is scheduled to store the information every second.

1. Screen Status:-Whether the screen status is in the "ON" state or "OFF" state.

2. Wi-Fi Status:-Whether the Wi-Fi status is in the "ON" state or "OFF" state.

3. GPS, 3G and Audio Status:-Whether the GPS, 3G and Audio status is in the "ON" state or "OFF" state.

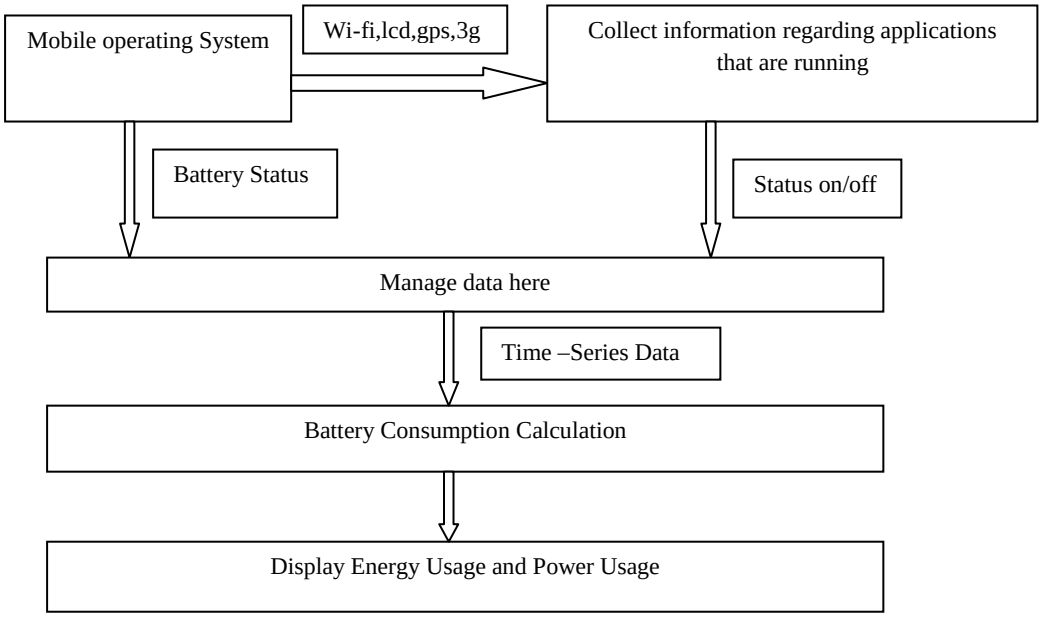

Fig 2: Block Diagram of Battery Viewer System

4.1 Results and Snapshots

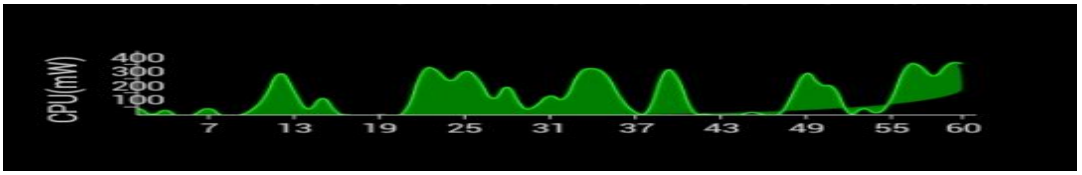

Fig 3: CPU Energy Utilization

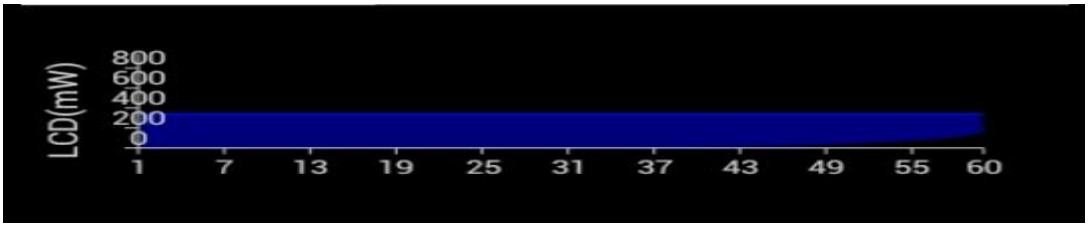

Fig 4: LCD Energy Utilization

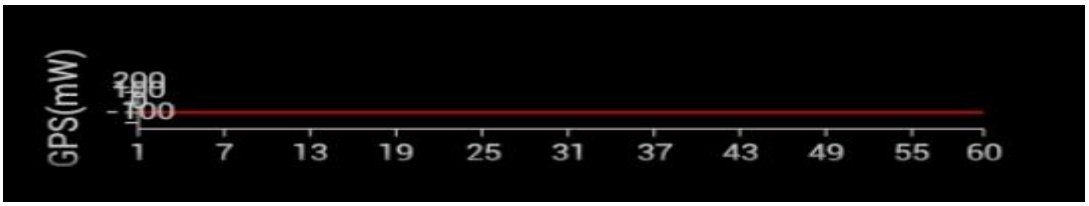

Fig 5: GPS Energy Utilization

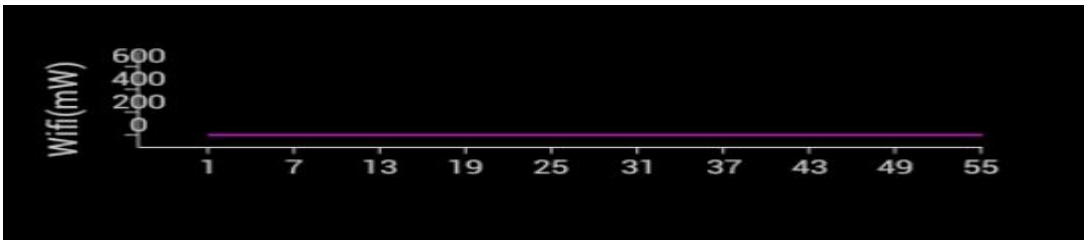

Fig 6: Wi-Fi Energy Utilization

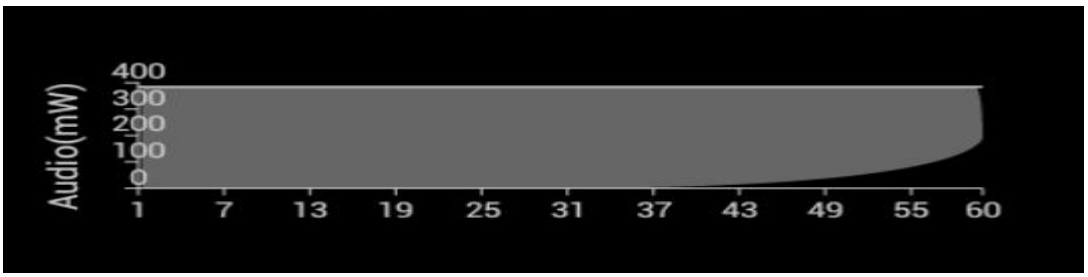

Fig 7: Audio Energy Utilization

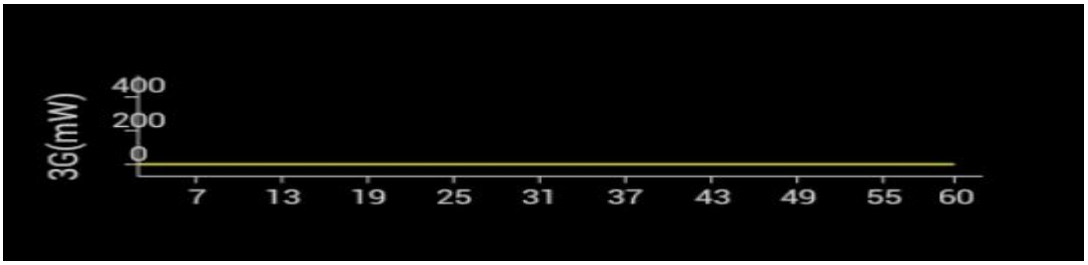

Fig 8: 3G Energy Utilization

5. CONCLUSION

The conclusion from the above is that the energy consumption in android devices has become more important issue to save energy it is critical to monitor the energy consumption of application on android device. This paper described online power estimation. The Battery Viewer main focus on more energy consuming components likes CPU, Wi-Fi, LCD, and GPS etc. Now, at the end of our project, we have reached our goal of almost fully. We have shown that, by learning the resource utilization of user's activities we have been able to predict and supply the minimum required resources and thereby successfully save energy on mobile device. In this project, we proposed unique power management frameworks which leverage the user's behavior to save energy. Additionally we created an accurate power estimation model, which allow estimating power consumption of individual

components and applications in real time. Validation tests indicate that the model is highly accurate. The estimation model can be used for estimating current consumption and forecasting the future resource availability.

Future Work We can add more components to check battery consumptions like Video, Gaming Application etc. Another possible future work could be developing a software tool that measures the power consumes by main components and application of a smartphone on a very detailed level

6. ACKNOWLEDGMENTS

The report has been written with the kind assistance, guidance and active support of my department who have helped me a lot in completing this report. I would like to thank all the individuals whose encouragement and support has made the completion of this dissertation possible.

First, I would like to express my deep gratitude to Mentor Ms. Anu Garg, whose guidance, support, and encouragement made both of the projects presented in this dissertation possible. I expressed interest in her areas of research; Ms. Anu Garg took me under her wing. Since then, I have received an enormous amount of valuable advice and knowledge from her that will be forever valuable in my professional and personal life. Thank you, Ms. Anu Garg, for providing such a great experience for me during the past years.

Second, I would like to extend a very sincere thank you to Mr. Charanjit Bhalla, who acted as my helper while working on both of the strategies presented in this dissertation. Mr. Bhalla is one of the best colleagues I have ever had the pleasure of working with – his work ethic, knowledge, and companionship were all vital to my completion of this work.

I express my deep regards particularly to my esteemed guide Ms. Anu Garg .Assistant Professor in department of electrical Science and engineering Lovely Professional University Phagwara for the valuable advice and support to complete this work.

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7. REFERENCES

[1] Ahmad Rahmati, Angela Qian, and Lin Zhong (2008),” Understanding Human-Battery Interaction on Mobile Phones”, Proceedings of the 9th international conference on Human computer interaction with mobile devices and services.

[2] Fangwei Ding, Feng Xia, Wei Zhang, Xuhai Zhao, Changchun Ma School of Software, Dalian University of Technology, Dalian 116620(2011) “Monitoring Energy Consumption of Smartphones “,IEEE International Conferences on Internet of Things, and Cyber, Physical and Social Computing.

[3] Hans Fredrik Unelsroed Computer ScienceUCSB Email: hfu@cs.ucsb.edu Per Christian Roeine Computer Science UCSB Email: roeine@cs.ucsb.edu Fahad Ghani Computer Science UCSBEmail: fahad@cs.ucsb.edu (2011)”Power Guru: Implementing Smart Power Management on the Android Platform”, IEEE.

[4] Joon-Myung Kang, Joon-Myung Kang, James Won-Ki Hong(December 2011) “Personalized Battery Lifetime Prediction for Mobile Devices based on Usage Patterns” ,Journal of Computing Science and Engineering,Vol. 5, No. 4).

[5] Murmuria, R., Medsger, J., Stavrou, A., Voas, J.M (2012),” Mobile Application and Device Power Usage Measurements”, SERE.

[6] Narendran Thiagarajan, Gaurav Aggarwal, Angela Nicoara another (April 16-20, 2012)”Who Killed My Battery: Analyzing Mobile Browser Energy Consumption “, WWW 2012 – Session: Mobile Web Performance.

[7] Si-Hyuk Yi and Sung-Bae ChoI (2012),” Battery-aware Energy-efficient Android Phone with Bayesian Networks”, 9th International Conference on Ubiquitous Intelligence and Computing and 9th International Conference on Autonomic and Trusted Computing.

[8] Soumya Kanti Datta, Christian Bonnet, Navid Nikaein,(2012) “Android Power Management: Current and Future Trends”, The First IEEE Workshop on Enabling Technologies for Smartphone and Internet of Things.

Websites:-

[7] http://www.google.com/events/io/2011/index-live.html

[8] http://www.engineersgarage.com/articles/what-is-android-introduction?page=1

[9] http://android.stackexchange.com/questions/11400/what-are-the-names-of-the-various-versions-of-the-android-os-and-how-are-these

[10]www.ece.ncsu.edu/wireless/MadeInWALAN/AndroidTutorial

[11] http://sundries-article.blogspot.in/2012/11/tips-battery-saving-on-android-phone.html

[12]ttp://en.wikipedia.org/wiki/Advanced_Configuration_and_Power_Interface.