

Android Power Management & Ways to Reduce the Power Consumption in an Android Smartphone



^{#1}Varsha Shinde, ^{#2}Rani Magar, ^{#3}Shailendra Kumar Pandey,
^{#4}Prof.Suvarna Bhatsangave, ^{#5}Prof B. Padmavathi

¹varshashinde9923@gmail.com

²magarrani08@gmail.com

³pandey_shailendra.ghrcempcse@raisoni.net

⁴suvarna.bhatsangave@raisoni.net

⁵b.padmavathi@raisoni.net

^{#1234}Department of Computer Engineering,

G. H. Rasoni College of Engineering and Management

^{#5}Prof.Department of Computer Engineering,

G. H. Rasoni College of Engineering and Management

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. It is not a common thing in Smartphone's. Now days, more powerful with power consuming technologies like GPS, 3G and 3GS.Thus our application proactively manages the energy in android smart phones battery .These can be achieved by our suggested Android Application which analyze the largest percentage of power consumption and provide its solution by showing user the notification ,managing brightness according to the value set by user while launching application for the first time . It takes action to kill or avoid the Launch application as stated by the user .When battery level reach to the critical point only message and call facilities are provided to the user .Thus these are power saving options presented by which user can save their battery life.

Keywords- Power-saving strategies, Android, Battery interface, mobile device, energy.

ARTICLE INFO

Article History

Received :31st January,2016

Received in revised form :2nd February, 2016

Accepted :3rd February,2016

Published online : 4th February 2016

I. INTRODUCTION

Power consumption of Smartphone applications such as Android apps one of the major concerns because Smartphone's have batteries with limited power capacity. Android operating system is offering features, functionality and an open architecture on the market. Due to rapid development of phones, the users requirements are increasingly demanding. Many features available on Android devices can cause batteries to become drained very quickly. It is possible by the Power Conserver Application. It has become necessary to search the ways to reduce Power Consumption in Android Smartphone. The analysis of measured power consumption data could produce possible Android power-saving modes or a low power consumption mechanism, or lead us to the design of a new power consumption monitoring and power saving software for

Android. In this project we are using an Android Power Conserver application and wake lock mechanism to reduce the power consumed by the applications of Android. We have various features of Android Power Conserver Application.The application checks phone which application is using the largest percentages of power. Battery usage information is derived from battery usage statistics and values which is inbuilt in Android Operating System.Then the Power Conserver application kills the other application running when it reaches that battery percentage value which is entered by the user. At that time, it will kill all the applications .If user wants to launch the applications, then during launch of application, a selection screen will appear which gives you warning not to start the application and provides you option to Kill or Launch the requested application.The Power Conserver application controls the brightness of the Android Smartphone screen when it

reaches that battery percentage value which is entered by the user. At that time, the brightness of the screen will decrease according to decrease in Battery Percentage Value of the Android Smartphone. Then the Power Conserver application provides Automatic Notification Alarm when Android user wants to launch the application during below battery percentage value which is entered by the user. A warning screen will appear which provides you option to Kill or Launch the requested application. Then The Power Conserver application provides Critical Point that kills the other application running during that time when battery percentage value reaches below Critical Point which is predefined in the Power Conserver application. At that time, it will kill all the applications. If user wants to launch the applications, then the launch of application is also terminated. Only Call and messaging facility is provided to Android Smartphone Users.

II. Literature Survey

2.1 Power Management Techniques in Smartphone's Operating Systems:-

Extend the battery life of mobile handsets at different levels such as operating system, wireless technologies and applications is the aim of the most hardware manufacturers and OS designers, so designing more energy efficient applications and operating systems is the best way to solve the problem, we aim is to provide a summary of techniques employed in mobile computer and especially Smartphone's operating systems that can reduce the power consumption of today's mobile computing devices. Need of considering energy as a fundamental system resource in mobile devices is now the main researchers emphasizing. The development of longer lasting batteries and low power consumption components.

2.2 Who Killed My Battery -Analyzing Mobile Browser Energy Consumption:-

Despite the growing popularity of mobile web browsing, the energy consumed by a phone browser while surfing the web is poorly understood. We present an infrastructure for measuring the precise energy used by a mobile browser to render web pages. We then measure the energy needed to render financial, email, blogging, news and social networking sites. Our tools are sufficiently precise to measure the energy needed to render individual web elements, Such as cascade style sheets (CSS), JavaScript, images, and plug-in objects. Our results show that for popular sites, downloading and parsing cascade style sheets and JavaScript consumes a significant fraction of the total energy needed to render the page. Using the data we collected we make concrete recommendations on how to design web pages so as to minimize the energy needed to render the page. We conclude by estimating the point at which offloading browser computations to a remote proxy can save energy on the phone.

2.3 An Analysis of Power Consumption in a Smartphone:-

Mobile consumer-electronics devices, especially phones, are powered from batteries which are limited in size and

therefore capacity. Good energy management requires a good understanding of where and how the energy is used. We measure not only overall system power, but the exact breakdown of power consumption by the device's main hardware components. We present the power breakdown for micro-benchmarks as well as for a number of realistic usage scenarios. These results are validated by overall power measurements of two other devices: the HTC Dream and Google Nexus One. They develop a power model of the free runner device and analyze the energy usage and battery lifetime under a number of usage patterns. The significance of the power drawn by various components, and identify the most promising areas to focus on for further improvements of power management.

2.4 Power saving and energy optimization techniques for Wireless Sensor Networks:-

Wireless sensor networks have become increasingly popular due to their wide range of applications. Energy consumption is one of the biggest constraints of the wireless sensor node and the limitation combined with a typical deployment of large number of nodes have added many challenges to the design and management of wireless sensor networks. Therefore, the devices need to be powered by batteries and alternative energy sources. Because battery energy is limited, the use of different techniques for energy saving is important in WSNs. It present a survey of power saving and energy optimization techniques for wireless sensor networks, which enhances the ones in existence and introduces the reader to the most well known available methods that can be used to save energy. They are analyzed from several points of view: Devicehardware, transmission, MAC and routing protocols.

2.5 Smartphone's Operating Systems Power Management Techniques:-

Smartphone are as powerful as the PCs. Also the increasing popularity of power-hungry applications that take advantage of the Smartphone's resources and the diverse range of wireless interfaces and sensors can reduce the battery life of Smartphone's. With the new technologies however come new challenges in computer operating systems development, these challenges include many items such as frequent network disconnections, communications bandwidth limitations, resource restrictions, and power limitations. It analyses general solutions for energy consumption on mobile devices and especially Smartphone's, concentrate on techniques can be employed in mobile computer operating systems that can reduce the power consumption of today's mobile computing devices. Energy-aware policies in mobile devices should be performed by applications. Both applications and operating system collaborate to reduce the power consumption in a mobile phone. Ideally, the operating system must know applications' resource demands and the available energy resources until the next charging opportunity to reduce the power consumption while maximizing user experience.

III. System Architecture

We used Wake Lock mechanism in an Android system. Power wake lock mechanism is used to analyze the power consumption in an android Smartphone's. Battery usage information is derived from battery usage statistics and power profile values.

Battery Usage Statistic :-

The framework automatically determines battery usage statistics .In battery statistic it shows that battery usages and battery profile values .battery usage statistic shows the percentage of battery values of applications.

Class - PowerManager.WakeLock

A wake lock is a mechanism to indicate that your application is stay on.It not acquire PowerManager.WakeLocks unless you really need them, use the minimum levels possible, and be sure to release them as soon as possible.We can obtain an instance of this class, such as by calling Context.getSystemService().The primary API will create a PowerManager.WakeLock object. You can then use methods on the wake lock object to control the power state of the device.In the wake lock mechanism two functions are used such as acquire() and release().Suppose if you are transferring some file like music etc. to the other android mobile that means application is in running mode.At the time if one mobile having call by other that time background application is go in sleep mode that means it will pause .After the ending call it will automatically resume application.That means background application go in resume mode. It gives the highest priorities to the calling and messaging facilities. Android operating system is a stack of software components which is roughly divided into five sections and four main layers as shown below in the architecture diagram.

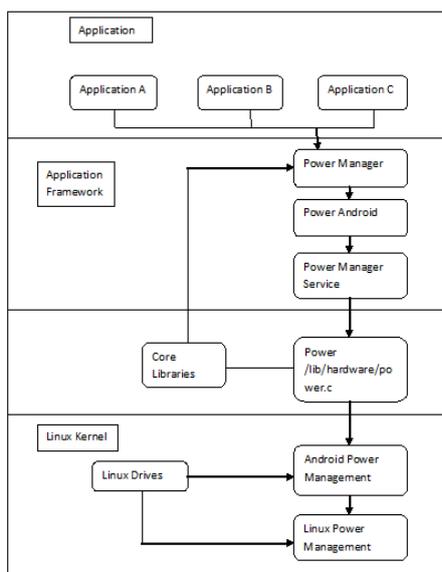


Fig 1. System Architecture

Applications:- It is the the top most layer. And all the Application is in Application layer .Examples of such applications are Contacts Books, Browser, Games etc.

Application Framework

The Android framework includes the following key services:Activity Manager, Content Providers, Resource Manager,Notifications Manager .

Android Libraries

Following are the some libraries which are used android.app, android.content, android.database, android.opengl, android.os , android.text, android.view, android.webkit

Linux Kernel:- It is a bottom most layers. This provides a level of abstraction between the device hardware and it contains all the essential hardware drivers like camera, keypad, display etc.

IV. Conclusion

Android power management distribution. Analysis of power consumption in an Android Smartphone's .Ways to reduce the power consumption in an Android Smartphone. The paper gives the survey on various Android Phones techniques which is having deep explanation of the how we are going to implement the Android phones technique through the system architecture . How to save the more power in Android Smartphone. Android Power Management Distribution. Analyses of Power Consumption in an Android Smartphone. Ways to reduce the Power Consumption in an Android Smartphone.

VI. Acknowledgment

We would like to thank our guide and various technological experts who researches about Android Smartphone techniques and improve the result by implementing new methods. We would also like to thank Google for providing details on different issues on Android phone related to power .

References

- [1] Power Management Techniques in Smartphone's Operating Systems Wu, School of Computer Science and Technology, Harbin Institute of Technology, China - Harbin.
- [2] An Analysis of Power Consumption in a Smartphone, Aaron Carroll NICTA and University of New South Wales, Aaron, Gernot Heiser NICTA, University of New South Wales and Open Kernel Labs.
- [3] Aabdelmotalib and Z. Wu, "Power Consumption in Smartphone's (Hardware Behaviorism)", International Journal of Computer Science Issues (IJCSI) 2012.
- [4] N. Valliant-Rodriguez and J. Crowcroft, "Energy Management Techniques in Modern Mobile Handsets", IEEE COMMUNICATIONS SURVEYS, February 2012.
- [5] Who Killed My Battery : Analyzing Mobile Browser Energy Consumption Department of Computer Science, Stanford University, CA, R andD USA, Department of Electrical Engineering, Stanford University, A.
- [6] High-Performance Low-Power Carry Speculative Addition With Variable Latency IngChao Lin, Senior Member, IEEE, Yi-Ming Yang, and ChengChian Lin.

- [7] J Flinn and MSatyanarayanan, "Powerscope: A Tool for Profiling the Energy Usage of Mobile Applications," in Proceedings of the Second IEEE Workshop on Mobile Computer Systems and Applications, Washington, DC, USA: IEEE Computer Society.
- [8] A. Lago and I. Larizgoitia, "An applicationaware approach to efficientpower management in mobile devices," in Proceedings of the Fourth International ICST Conference on Communication System software andmiddleware (COMSWARE), ser. COMSWARE '12. New York, NY,USA: ACM.