**GreenDroid: Automated Diagnosis of Energy Inefficiency for Smartphone Applications**

**ABSTRACT:**

Smartphone applications’ energy efficiency is vital, but many Android applications suffer from serious energy inefficiency problems. Locating these problems is labor-intensive and automated diagnosis is highly desirable. However, a key challenge is the lack of a decidable criterion that facilitates automated judgment of such energy problems. Our work aims to address this challenge. We conducted an in-depth study of 173 open-source and 229 commercial Android applications, and observed two common causes of energy problems: missing deactivation of sensors or wake locks, and cost-ineffective use of sensory data. With these findings, we propose an automated approach to diagnosing energy problems in Android applications. Our approach explores an application’s state space by systematically executing the application using Java PathFinder (JPF). It monitors sensor and wake lock operations to detect missing deactivation of sensors and wake locks. It also tracks the transformation and usage of sensory data and judges whether they are effectively utilized by the application using our state-sensitive data utilization metric. In this way, our approach can generate detailed reports with actionable information to assist developers in validating detected energy problems. We built our approach as a tool, GreenDroid, on top of JPF. Technically, we addressed the challenges of generating user interaction events and scheduling event handlers in extending JPF for analyzing Android applications.We evaluated GreenDroid using 13 real-world popular Android applications. GreenDroid completed energy efficiency diagnosis for these applications in a few minutes. It successfully located real energy problems in these applications, and additionally found new unreported energy problems that were later confirmed by developers.

**EXISTING SYSTEM:**

* Existing studies show that many Android applications are not energy efficient due to two major reasons.
* First, the Android framework exposes hardware operation APIs (e.g., APIs for controlling screen brightness) to developers. Although these APIs provide flexibility, developers have to be responsible for using them cautiously because hardware misuse could easily lead to unexpectedly large energy waste.
* Second, Android applications are mostly developed by small teams without dedicated quality assurance efforts. Their developers rarely exercise due diligence in assuring energy savings.

**DISADVANTAGES OF EXISTING SYSTEM:**

* Sensing operations are usually energy consumptive, and limited battery capacity always restricts such an application’s usage.
* Hardware misuse could easily lead to unexpectedly large energy waste.
* Locating energy problems in Android applications is difficult.

**PROPOSED SYSTEM:**

In this work, we set out to mitigate this difficulty by automating the energy problem diagnosis process. A key research challenge for automation is the lack of a decidable criterion, which allows mechanical judgment of energy inefficiency problems. As such, we started by conducting a large-scale empirical study to understand how energy problems have occurred in real-world smartphone applications. By examining their bug reports, commit logs, bug-fixing patches, patch reviews and release logs, we made an interesting observation: Although the root causes of energy problems can vary with different applications, many of them (over 60%) are closely related to two types of problematic coding phenomena. They are Missing sensor or wake lock deactivation and Sensory data underutilization.

**ADVANTAGES OF PROPOSED SYSTEM:**

* Release wake locks could quickly deplete a fully charged phone battery.
* We will show in our later evaluation, GreenDroid is able to analyze the utilization of location data for the aforementioned Osmdroid application over its 120K states within three minutes.

**SYSTEM REQUIREMENTS:**

**HARDWARE REQUIREMENTS:**

* System : Pentium IV 2.4 GHz.
* Hard Disk : 40 GB.
* Floppy Drive : 1.44 Mb.
* Monitor : 15 VGA Colour.
* Mouse : Logitech.
* Ram : 512 Mb.
* MOBILE : ANDROID

**SOFTWARE REQUIREMENTS:**

* Operating system : Windows XP/7.
* Coding Language : Java 1.7
* Tool Kit : Android 2.3 ABOVE
* IDE : Eclipse

**REFERENCE:**

Yepang Liu, Chang Xu, S.C. Cheung and Jian Lü “GreenDroid: Automated Diagnosis of Energy Inefficiency for Smartphone Applications” **DOI 10.1109/TSE.2014.2323982, IEEE Transactions on Software Engineering, 2014.**