

Garbage Management using Android Smartphone

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Abstract—Environmental pollution nowadays is a major aspect to be considered. Pollution has to be avoided and there are several ways to control it. In this paper, we propose an innovative software application, via which a user can send an alert text message and location details to the garbage/waste management department in the campus and also post the same details on the dedicated web server. This information essentially helps the respective department to take care of garbage present in the campus.

Key words: Android, 3G, GPS, Location Manager

I. INTRODUCTION

Open Handset Alliance (OHA) led by Google, Inc developed Android and it is an open mobile platform. It has several layers: the Linux kernel, native libraries, the Dalvik virtual machine (VM), and an application framework. Basic operating system services and hardware abstraction for the upper software stacks is provided by Linux Kernel layer. Miscellaneous functionalities of web browsing, multimedia data processing, database access, and GPS reception optimized for a resource-limited hardware environment are supported by native libraries. The Dalvik VM is Register based and it runs Java code with low memory demand. Component-based programming framework is provided by Android at the top of the layers so that users can easily build their own applications.

A new and reusable application building blocks (example: activity); broadcast intent receiver, service, and content provider etc are used to build android applications. After an application is written, it is deployed as .apk file (Android package file). .apk file contains codes, resources, and a special XML file called the Android Manifest file. This contains basic information about an application such as the package name, component descriptions, and permission declarations. Garbage managing system adopts a mobile cell phone network. Based on the experiences and findings of the field experiments, a new managing system is proposed here. This system is Adaptive for mobility of user and it is Low cost. This proposed system adopts 3G communication function to collect user's location using GPS (Global positioning system).

In addition Android AsyncTask methodology can be used to upload images to remote web server on android. Telephony manager for identifying the information about the Android mobile terminal which each user holds and the server which stores user's information is utilized in this system. The Collected information in this system contains the position and time information of android mobile terminal. When the user calls the garbage managing department, information is sent as SMS and the same is posted on server with location details. With this system it is possible for garbage managing department to Track the and clear the waste from that location.

II. ANDROID ARCHITECTURE

Android is a software stack for mobile devices with an operating system, middleware and key applications. Its SDK provides tools and APIs necessary to begin developing applications on the Android platform using the Java programming language.

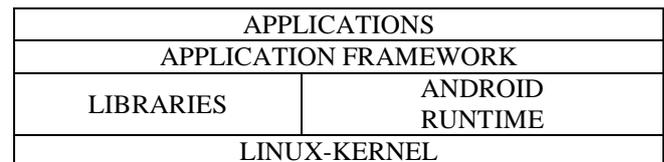


Fig. 1: Android Architecture

Android relies on Linux version 2.6 for core system services. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack. Every Android application runs in its own process, with its own instance of the Dalvik Virtual machine.

The VM is register-based, and runs classes compiled by a Java language compiler that have transformed into the .dex format by the included “dx” tool. Android uses SQLite which is a powerful relational database engine available to all applications. Rich development environment includes a device emulator, tools for debugging, memory and performance profiling, and a plugin for the Eclipse IDE.

III. EXISTING SYSTEM AND ITS DRAWBACKS

In the existing system the individual makes a call and verbally gives information about the amount of garbage and about the location. The department executives may not know the user's current location. There is a high probability of data and loss of resources when the authorized person fails to find the location.

IV. PROPOSED SYSTEM

Different functions have been implemented for the new generation managing system. Android mobile terminal is connected to high speed 3G network for effective data transfer. Monitoring can be made at a very high speed without any distortion in the network. Global Positioning System, shortly known as GPS System, is the system that enables you to know the location of the victim. It consists of minuscule chip which is attached to the object to be tracked. This chip will give out signals which are tracked by the satellite which sends data to the earth giving the exact location of the user. GPS tracking has come to be accepted on a global scale. Due to the usage of 3G network the data is retrieved and stored in the server at a very high speed. When the user calls Garbage Management department, this software starts its execution in the backend as a service. It sends message in SMS format to the department informing about the garbage presence along with location (latitude and longitude) values. This information is also posted on

dedicated web server. This helps the department to keep a track of all the garbage data, location details and also eases the accessibility at any point of time.

A. Features of the Proposed System:

The garbage managing committee can easily get the accurate information. It also brings the current location of garbage located. It is possible to track the exact position with the help of Google Maps; i.e with latitude and longitude values it is possible to locate any position. In future images can be uploaded using AsyncTask methodology.

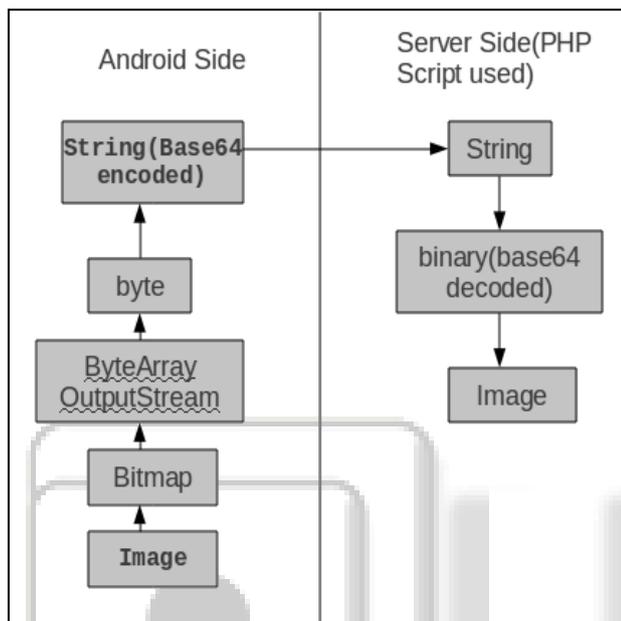


Fig. 2: Image posting architecture

V. ANALYSIS

As we are using Android as an illustrative example, we begin by describing several attack vectors possible on that platform. In the course of paper, we demonstrate how the security architecture addresses the security problems. First, let's briefly explain the basic Android security concepts.

A. Android Security

Android is a Linux platform for mobile phones with a Java middleware on top of the OS. Android applications are usually Java-based, although native code can also be accessed through the Native Development Kit (NDK). Android has two parts of security enforcement. First, applications run as Linux users and thus are separated from each other. A security hole in one application does not affect other applications. However, there is also a concept of inter-process communication (IPC) between different applications, or between the Android components of the applications such as activities and services. The Java-based Android middleware implements a reference monitor to mediate access to application components based upon permission labels defined for the component to be accessed. Any application requires an appropriate permission label before it can access a component. A number of features further refine Android's security model. One example is the concept of shared user IDs, i.e., different applications can share the same user ID if they are signed by the same

developer certificate. Another refinement is protected APIs: Several security-critical system resources can be accessed directly rather than using components. WS-Security (Web Services Security, short WSS) is a flexible and feature-rich extension to SOAP to apply security to web services. It is a member of the WS family of web service specifications and was published by OASIS. This protocol specifies how integrity and confidentiality can be enforced on messages and allows the communication of various security token formats, such as SAML, Kerberos, and X.509. Its main focus is the use of XML Signature and XML Encryption to provide end-to-end security.

B. SOAP

SOAP originally defined as Simple Object Access Protocol. It is a protocol specification for exchanging structured information in the implementation of Web Services in computer networks. It relies on Extensible Mark-up Language (XML) for its message format, and usually relies on other Application Layer protocols, most notably Hypertext Transfer Protocol (HTTP) and Simple Mail Transfer Protocol (SMTP), for message negotiation and transmission. SOAP can form the foundation layer of web services protocol stack, providing a basic messaging framework upon which web services can be built.

VI. IMPLEMENTATION

A. Hardware and Software:

The Android mobile terminal is Google Dev Phone 1 and 2. The operating system for the terminal is Android 2.3(Ginger bread). We develop mobile ad hoc network software using Java programming language and SDK for Android 2.3.

B. Implementation functions:

So far, we have implemented communication software to construct a 3G network by GPS for this system. We took care of security in communication between each pair of mobile terminals using WS-Security. When a mobile terminal communicates with another mobile terminal, it is necessary to establish pairing of such two mobile terminals before their communication occurs. When the user mobile terminal calls a garbage management department, an alert message is sent to the same phone and using 3G network messages are posted on the remote server for later access.

VII. RESULTS

This new generation garbage management is software for phone. When the user makes a call to garbage managing department, the software starts executing loop wise. Once there is an outgoing call, the function "phone State Listener" determines if the call made to that number. Once satisfied, the loop executes to send the alert messages with location details. Flow chart of the software execution is shown in figure 2.

The following snapshots in the figure 4 show the software execution on an actual android phone with toast messages. Toast message is a notification which ensures the successful execution of respective loops. In the snapshot garbage managing committee/BMSIT is the department to which the user has called to inform.

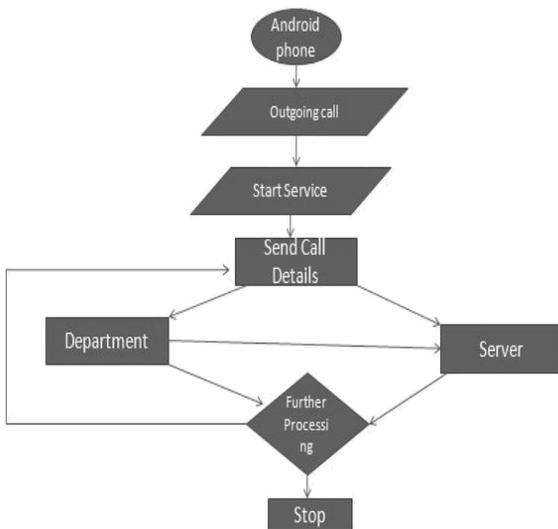


Fig 3: Flowchart of software execution

- 1) Toast message “222Local Call+919620253161” indicates that the function phone State Listener has identified the number for further execution.
- 2) Toast message “message sending” indicates that the message and location details (latitude and longitude) are sent to department.
- 3) Toast message “posted 222-” ensures that the information has been posted on to the web server.

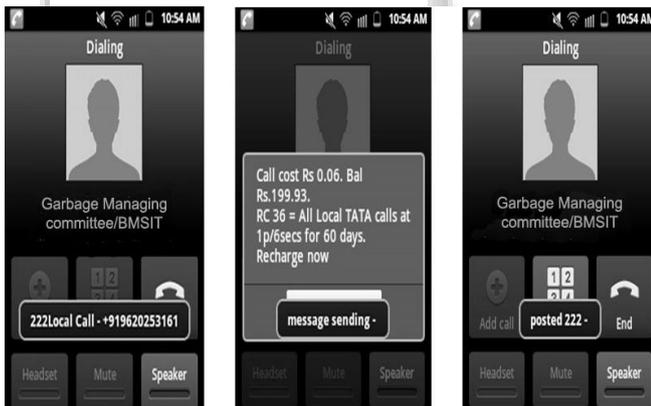


Fig. 4: Snapshots of Execution

VIII. CONCLUSION

Considering the environment pollution, in this paper, we have implemented the new generation garbage management system and system features to meet the requirements. Using this system it is possible for the user to inform the respective department. More importantly it is not necessary for the department to receive the call, the user just has to press the call button and the software starts its execution. Using telephony manager technique, the proposed new generation garbage management system can adapt to various mobility of user by adjusting network.

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