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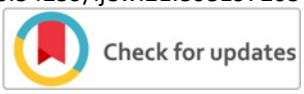

An Efficient Android-Based Application and Tool Development to Trace Smartphones

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***Abstract*—** Nowadays, smartphones are a crucial aspect of life for everyone involved in day-to-day activities. Sometimes mobile phone users need to keep their mobile phones quiet. This silence option is handy in many scenarios or locations such as meetings, lectures, libraries, museums or places of worship, and mobile phones might occasionally be lost. In this article, we have demonstrated that how to make it easier for Android phone users to discover their smartphone that has been lost due to quiet mode and how to monitor mobile phones by sending a single text message on the mobile phone, whether the mobile phone starts ringing, and users can simply search. There is no need to connect to the internet during mobile search if a user knows that the mobile phone is close to the location by listening to the emergency security alert beeping, which is also set up in this application to make it easier for users to find the mobile phone rather than searching through GPS Tracking System. It also tells users about the mobile phone's present position. If the mobile phone is far from the user, the user can only get location information if the mobile phone is linked to the internet or the mobile phone enables data packet. The Coral Draw graphics program is utilized to develop a beautiful interface for this project. Using SDK and JDK packages and libraries, Android Studio is utilized to code portion and performance features of this application.

***Keywords*—**Android, SDK, Security, GPS Tracker, SIM Detection.

I. INTRODUCTION

With the advancement of mobile technology, the world is becoming shorter. As the number of users rises daily, the Possibilities also expand. Starting with simple ordinary mobile phones used exclusively for calls, mobile phones have transformed and become part of our lives. Now, not only do they make calls, but they have countless purposes and may be used as a camera, music player, tablet, TV, online browser etc. In addition, new technologies also require new software and operating systems [1].In the previous 15 years; operating systems have progressed a lot. Mobile OS has gone a long way from black and white to the present smartphones or mini-computers. Mobile OS has progressed from Palm OS in 1996 to Windows Pocket PC in 2000 to Blackberry OS and Android. Especially with smartphones. One of the most popular mobile operating systems nowadays is Android. Andy Rubin, Rich Miner, Nick Sears and Chris White established Android Inc. in California, USA, in 2003 in Palo Alto [2] .Android Inc. was eventually acquired by Google in 2005. After the first release, a lot of upgrades were released in the original Android version. Android is a mobile operating system, including smartphones and tablet computers. It was developed under Google's guidance by the Open Handset Alliance. It's based on Linux. The Open Handset Alliance, a consortium of 83 hardware, software and telecoms businesses devoted to supporting open standards for mobile devices, was founded on 5 November 2007 with the launch of Android distribution [3].This alliance has a shared purpose of promoting mobile device innovation and offering customers with a significantly improved user experience than many on today's mobile platforms. By providing developers with a new degree of openness that enables them to cooperate better, Android will speed up the rate at which consumer's access to innovative and exciting mobile services [4].The green robot on the right commonly symbolizes Android. Since its introduction, Android has progressed significantly. Google called all their dessert projects. Below is a list of the main versions, which must not be memorized; it is just intended to show the fast progress and numerous improvements [5]. Android is developed "on the Internet," which is far faster than the conventional technique (e.g.,

Windows releases, which are typically several years apart). Several programs already on the market include tracking systems and anti-theft programs such as mGuard, which identify illegitimate SIM cards. In contrast to this use, AALTm [6] can identify illegitimate device cards by comparing the Integrated Circuit Chip Card Identification (ICC-ID). For each SIM card, the ICC ID number is unique. The market for mobile phones already has tracking apps such as Mobile Tracking Systems [7], AccuTracking [8], and Phone Back (also an anti-theft application [1]). Most of these systems give specialized solutions using mobile device tracking technologies, but simply enable ring and receiving the new SIM information would not be sufficient for monitoring smartphones. We may use some additional applications such as MSpy, Mobile Location tracker or Live Mobile Location tracker [9]. We've designed a basic Android app to monitor and find the position with an extra enhanced silent mode Finder function that differs from the disadvantages of Android apps before. It is an upgraded and amended application form. This application is installed in the background and does not display in the Task Manager. This will allows the user to follow a mobile device and get an SMS notice to a pre-defined number whenever the mobile phone is lost.

II. PROPOSED APPLICATION DESIGN&DEVELOPMENT

The V-model represents a software development process (also applicable to hardware development) as shown in Figure 1 below, which may be considered an extension of the waterfall model. Instead of moving down in a linear way, the process steps are bent upwards after the coding phase, to form the typical V shape. The V-Model demonstrates the relationships between each phase of the development life cycle and its associated phase of testing. The horizontal and vertical axes represents time or project completeness (left-to-right) and level of abstraction (coarsest-grain abstraction uppermost), respectively. We have used Android Studio in our application development environment. Jdk, sdk, all Android packages, and Coral Draw are all required. The android studio platform will be used to finish the building of a tracking mobile phone application. Although there is an earlier platform called "Eclipse," we choose to utilize Android Studio. Because Android Studio is built on IntelliJ IDEA, which combines all of the functionality of Eclipse's ADT plugin with a slew of new ones. The inspiration for this software arose after i misplaced my Android phone in my room, which was on silent mode, making it extremely difficult to locate. This application is only for An-droid phones. The developer has picked Java and Android Studio as their programming and design tools [10,11]. This application has three phases: the mobile phone recognizes that it must begin beeping right now, thus a condition is set that the phone will only beep when the precise message is received. Some graphic programs, such as Coral Draw and Photoshop, will be utilized to develop the app's logo and user interface. This project's implementation should take three months, after which testing will take place, with the application being installed on the phone and checked to see whether it works properly. Maintenance should be done on a regular basis after the installation and testing phases to keep the project useful for the users. These days, losing your phone may be a major hassle. findmyphone uses audio and video to trace the position of your missing phone in real time. Not only do you lose money, but every lost phone carries personal information about you and your family, such as text messages (SMS), photos, phone numbers, and other information. Lost phones and Droids may be found via findmyphone. When your phone is used, you might also receive a missing phone notification. "Breadcrumb location" allows you to keep track of your gadgets at all times. It may help track down your spouse's and/or children's phones, as well as mobile phones and Droids. This is a one-stop shop for all things relating to the security of your phone.

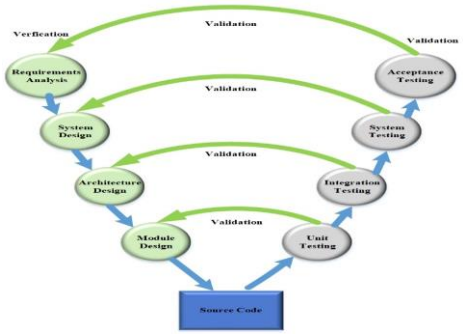


Figure 1. Components of Android structure

A. *Software development tools*

Software development [12-14] tools are mainly based on java and java virtual machine. Java is a computer language created by Sun Microsystems (Sun) in 1991 by James Gosling. The first Java release (Java 1.0) was released in 1995. In 2010, Oracle Corporation adopted Sun Microsystems. New enhanced Java versions have been published over time. The Java platform allows software developers to create program code in languages other than the language of programming for Java. The Java platform is frequently linked to Java and Java's core libraries.The Java virtual machine is especially designed for a certain operating system [15]. For example, Linux, just like Windows, has to be implemented. The Java Runtime Environment (JRE) and the Java Development Kit (JDK).The Java runtime environment (JRE) consists of the JVM and the Java class libraries and contains the necessary functionality to start Java programs. The JDK contains in addition the development tools necessary to create Java programs. The JDK consists therefore of a Java compiler, the Java virtual machine, and the Java class libraries.

III. ANDROID ARCHITECTURE

Android is a mobile device software platform and operating system. It is open source software. It enables developers to create managed Java programs and manage the device through Google-developed Java tools. The Open Handset Alliance announced the availability of the Android SDK in November 2007. Android is a mobile operating system built on top of the Linux kernel 2.6. The following features distinguish it. [12, 15, 16]:

- No fees for licensing, distribution and release
- GSM, 3G EDGE networks for telephony

- IPC messaging
- Background processes and applications
- Shared data storage
- Full multimedia hardware control
- API's for location based services like GPS.

The overall architecture of Android framework and its constituents is shown in the figure 2 below;

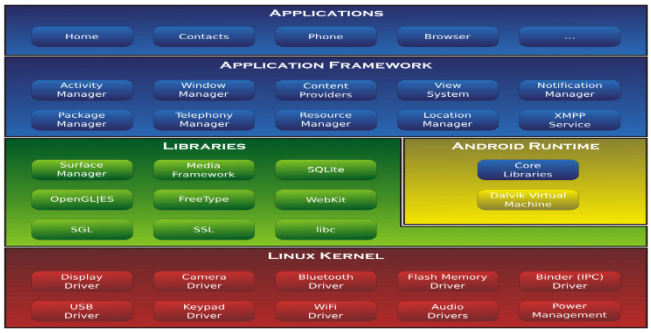
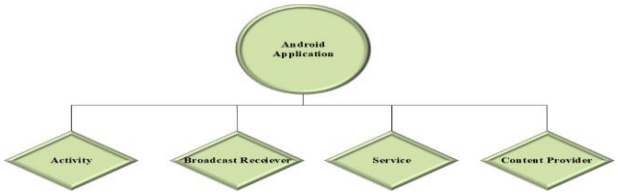


Figure 2. Architecture of Android OS

Android comes pre-installed with a set of essential programs, including an email client, an SMS programs, a calendar, maps, a browser, and contacts. All programs are developed in Java. Each application is designed to achieve a certain objective. All of the capabilities may run in the background of the mobile device and be accessed through a pop-up window. The application framework is the subsequent layer. This cate-gory comprises programs that control the phone's fundamental tasks, such as resource management, phone apps, switching between processes or programs, and monitoring the phone's actual location. Developers have complete access to the Android application framework. This enables users to take use of the processing power and support features of An-droid while developing an Android application. Consider the application framework to be a collection of fundamental tools that a developer may utilize to create far more complicated tools. Libraries Layer comprises the Android native libraries. All of these shared libraries are written in C or C++, are built for the phone's specific hardware architecture, and are pre-loaded by the phone maker. The Android Runtime layer is comprised of the Dalvik Virtual Ma-chine (DVM) and a collection of essential Java libraries. Each Android application receives a dedicated DVM instance. Dalvik was designed to allow the efficient operation of multiple virtual machines on a single device, and it executes files using the dex (Dalvik Executable Format) extension, which is memory-efficient [17-19].

IV. Components of Android

Android application's fundamental components are the Activity, the Broadcast Receiver, the Service, and the Content Provider as shown in figure 3 below. Each of them must be specified in the AndroidManifest.xml file when utilized in an application. The Views define the component's user interface. We employ Intents and Intent filters to communicate between



these fundamental components, which are critical throughout the app development process [12, 13].

Figure 3. Components of Android structure

Fundamentally, an activity is an object with a lifespan. An Activity is a section of code that performs some task; this task may involve showing a UI to the user if required. However, it is not required—some activities never show UIs. Typically, we will use one of our application's activities as the application's entry point. Another sort of component is the Broadcast Receiver, which is capable of receiving and responding to any broadcast announcements. A service is a collection of related pieces of code that operates in the background. Depending on its requirements, it can be executed in its own process or inside the context of another application's process. Other components "bind" to a service and make remote procedure calls to its methods. A service is an example of this; even if the user exits the media-selection UI, she likely wants her music to continue playing. Even after the UI has been closed, the service continues to play music. A Content Provider is a data repository that grants access to data on the device; a classic example is the Content Provider that grants access to the user's contact list. Our application may access data that has been provided by other apps via a Content Provider, as well as establish our own Content Providers to expose our own data.

V. Implementation

A. Activity diagram

The Activity Diagram depicts the phases that comprise a complicated process as shown in Figure 4 below. It depicts the control flow, similar to sequence, but with an emphasis on operations rather than objects. This module determines which action should be taken when the attention word "ringmydevice-vice" occurs. If it is matched, activity begins, allowing the device to ring. If the attention word matches the term "getlocation," it initiates an activity that obtains the device's location and transmits the data to the SMS sender. Simultaneously, it terminates message broadcasting, preventing messages from reaching the native messaging application's inbox.

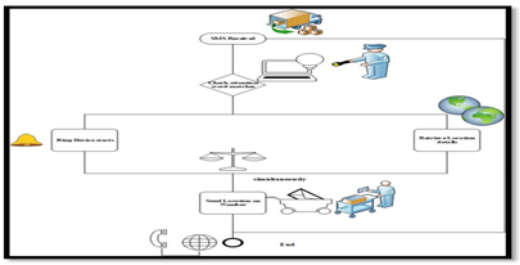


Figure 4. Demonstration of activity diagram

If the attention word does not match the designated key word, then broadcasting is enabled, allowing the message to reach the inbox of the native messaging application.

The components used in this are as follows:

- Rounded Rectangle: It indicates the process
- Arrow: It indicates transition line
- Rhombus : It indicates the decision
- Bars: It represents the start or end of concurrent activities
- Solid Circle: It represents the initial state of workflow
- Encircled Black Circle: It represents the final state of workflow.

B. Sequence diagram

A case diagram depicts the interaction of a collection of items in order to accomplish a complicated function as shown in Figure 5 below. This sort of diagram enables the other developer to validate the interaction. A sequence diagram depicts many processes or objects that exist concurrently as parallel vertical lines (lifelines) and the messages that are passed between them as horizontal arrows in the order in which they occur. This graphical interface enables the defining of straightforward runtime scenarios.

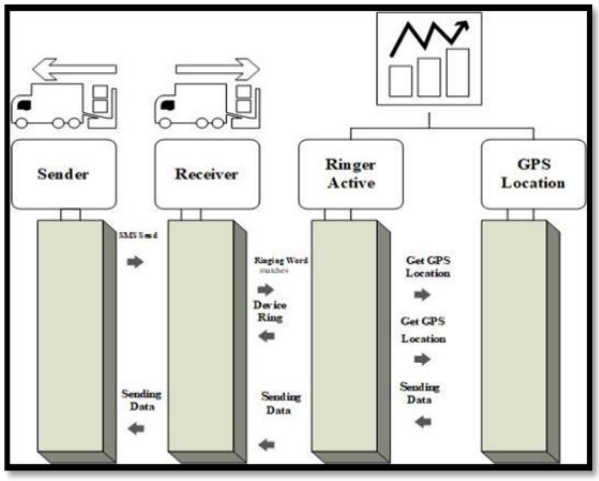


Figure 5.Demonstration of sequence diagram

In order to implement our proposed system modules, we have to meet the requirements for the hardware on the developer as well as software requirements on the client side as well as mentioned below in Table 1 and 2.

Table 1. Hardware requirements on the developer sider

Processor	Dual core or above	Processor
RAM	4GB	RAM
Hard disk	80GB or above	Hard disk
Monitor	15'' LCD or CRT Monitor or above	Monitor
Keyboard	Standard windows keyboard	Keyboard

Table 2. Software requirements on the client sider

Development Kit	Android SDK 2.3, Java JDK 1.6
Languages	Java
IDE	Eclipse Helios, Android Emulator
Platform	Window 7/8

VI. PROPOSED ALGORITHM

Our proposed algorithm is shown in Figure 6 below. It determines which action must be carried out if the word attention matches the keyword "ringmydevice." Ifmatched,the activity commences, which allows the device to ring. When the term 'attention' matches the term 'get-location,' it starts to find the location of the device and transmit information to the SMS sender ,as shown in figure 5 below. At the same time, it aborts message broadcasting in order to prevent a message to the Native Messaging Application inbox. If the attention word does not match the defined key word simply, broadcast the message in the inbox of the native messaging application can be accessed.

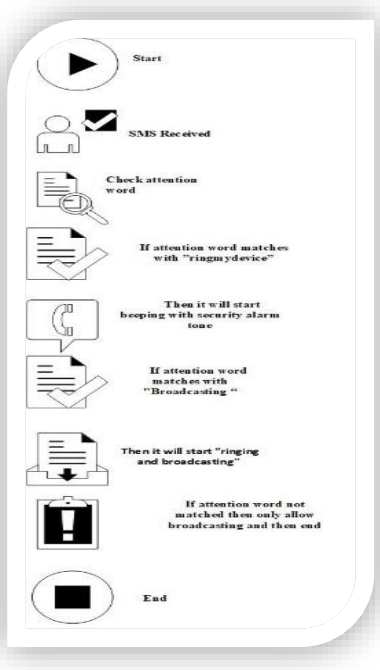


Figure 6. Description of proposed algorithm

VII. TESTING OF APPLICATION

With the various tests that have been made to the developed software to detect the failures it may have. Along this chapter there will be carried out two types of tests: unit tests and integration tests.

A. *Unit testing*

Table 3. Unit Testing

S/N	Scenario	Expected Results	Actual Results	Status
1	Install DroidLoactor.apk file on Android phone	Installation Successful	Installation Successful	Success
3	Send SMS From Application	SMS Sent	SMS Sent	Success
4	Receive SMS Inside Application	SMS Received	SMS Received	Success
5	Read Contents Of SMS	Contents Read	Contents Read	Success
6	Make Device Ring	Device Ringing	Device Ringing	Success
7	Retrieve Latitude And Longitude	Latitude And Longitude	Latitude And Longitude	Success

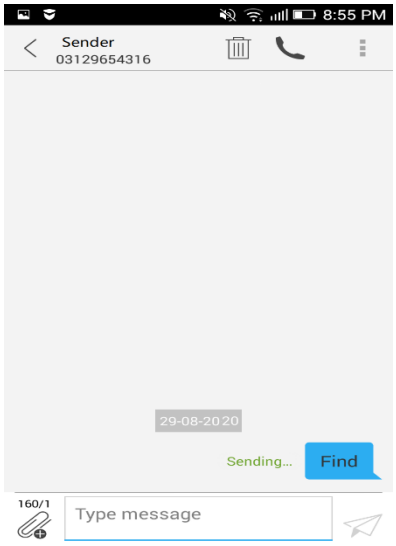
B. *Integration testing*

Ascertain that all of these features are available and correctly integrated into our application.

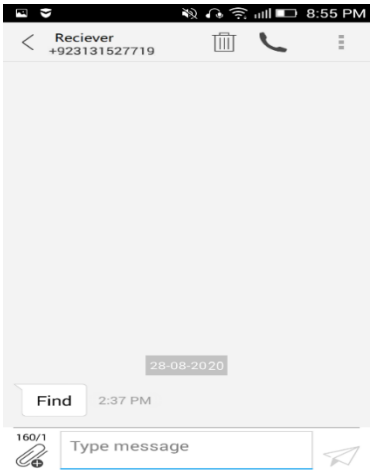
- Application starts receiving SMS
- SMS content reads and fits the word attentiveness
- If it's a ringer word, then the telephone ring is quiet or vibrating
- Recognizes the state of the telephone requested through SMS
- If the GPS attention word matches the current location, information will be retrieved and sent discreetly back to the phone
- Stop application

VIII. RESULTS OF PROPOSED APPLICATION

Each telephone has a unique international identification number for mobile devices, which may be used in case of loss or theft. This number may be obtained by calling * # 06 #, and it is essential to write it down immediately after your phone is purchased. When the telephone is stolen, submit a police first-information report and include the identifying number of the telephone. Give your service provider a copy of the First Information Report and the International Motive Equipment Identity Number, which may then trace your mobile phone. The ID number for international mobile equipment can be used for tracking a device even if it is used with another SIM or is even switched off. Once the device is discovered, ask your service provider to prevent its use until it is re-attainable. The results are being demonstrated in Figure Figures 7 (a), (b), (c), (d) and (e) below.



(a)



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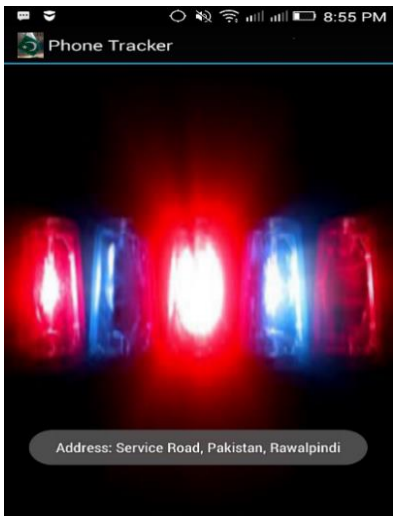
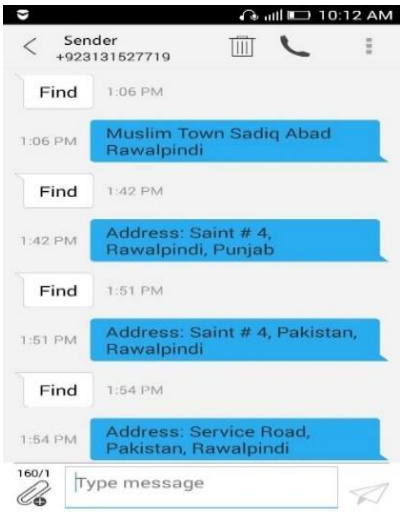


(c)

(d)



(e)

Figure 7. Demonstration of our application results **(a)** Send "find" message **(b)** Mobile number received message **(c)** Start beeping and retrieve location **(d)** Track current Location **(e)** Send location back to the sender or send to the original user of mobile phone.

CONCLUSION

Android Based Application to Trace Misplaced Cell Phone is a one-of-a-kind and very effective application that is used to trace lost/misplaced android phones. All of the functionalities operate via SMS. As a result, the SMS format of the receiving message is critical. Our Android application, which runs on mobile phones, keeps track of all incoming texts. If the SMS is intended for the application, it is read and performed as expected. We've developed features that complement the existing mobile tracking system. The application is distinct from previous systems in that it not only utilizes GPS data but also utilizes GSM/text messaging services, which makes it a simple and distinctive application. Some of the following functions may be enhanced in the future, including: Receive notification when a SIM card is changed to SMS/Call Filtering. Droid Locator enables you to remotely control your An-droid using a web-based interface.

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