

Spying Of Internet Information For Android Smartphone

Ola Basil

Dep. of Dentistry, Al_Hadi University College, Iraq

ABSTRACT

Observing for smartphone internet information is one of the most important requirements in the world, where the user now can do everything he want by using smartphone device. So managers or parents are always looking for a way to access other smartphones to monitor their activities and obtain sensitive information such as geographical locations etc. for security issues or educational purposes. This study proposed a spying system for kids' smartphone to protect them from some wrong websites which may cause psychological effects on them, or monitoring employees and others for security issues. This system include three module, the first one is Victim Client app., second one is PC- Server, and last one is Spy Application. The Victim Client app is designed to collect the sensitive information like visited web sites, Global Positioning System information, and Internet Protocol address in order to send it to Server-PC for display and store purpose. And the Map application designed to display the specific location of Victim Client. The system implementation and performance give good result in compared with other previous designed monitoring systems, where some useful features added like multi victim mentoring, and map tracking. Some problems and their solution have also been identified that face such like systems.

Keyword: Spying, GPS, Android, V. Client.

1. INTRODUCTION

More of people spends a lot of time using their personal smartphone and share their personal information with others. The smart phone is always running by particular Operating System (OS). Thus, there are many different Operating System (OS) available for smartphone devices such as IOS, Android , Windows and Symbian, but the common use OS is Android, which make it simple goal for attacker to violate user privacy [1] [3] [13].

The aim of this paper is to build smart phone monitoring system for teenagers and employees, its importance lies in knowing the history of the websites and their geographic locations during the working or study hours. Such systems are required because every organizations, or companies, or even families have there polices and rules so the security, confidentiality, and privacy must be mange by their parents or owners [8].

Android is open source operating system. It's depending on the Linux Kernel and it designed for touch screen mobile phone for example smart phone devices and tablet devices. This OS is released by Google under the "Apache License" that enable the developers to improve it freely and then they can distribute it to the manufacturers of smart phones [3]. The

android OS was released in Sept., 23,2008 and later more updates were occurring to improve the features of Android OS, fixed bugs and to enhance the performance [4].

The application which installed on smart phone devices is almost programmed by using java programming language. This application is already include SDK (software development Kit) which provide with libraries which demands the hardware communication, design and deployed the android application [5].

2. LITERATURE SURVEY

There are many researches presents mobile phone activities monitoring systems which used to monitor the users by administrator, some of important studies will be introduce as following:

1. **(Yoshiaki KAKUDA , Shinji INOUE , Tomoyuki OHTA, Eitaro KOHNO and Yusuke AKIYAMA, 2009)** This study discussed the issue of tracking child by using an ad hoc network which work by cluster technology that mean when child find other child in the way this network configured the WiFi automatically to connect with other child's mobile phone to gathered group of information to send to parent to inform those parent whether child was alone or safe with group of children, and also detected the location of that child [6].

2. **(Abhishek Barve & Pragnesh shah , 2012)** In this study the monitoring system to be more efficient and easily transport it need smart phone(which include android operating system) instead of using the computer ,and this system use the sensor such as temperature sensor ,pressure sensor ,humidity sensor and smoke detection sensor to input the digital and analog data to system by using PIC 18F4550 to provider support both type of input [7].

3. **(Nitin P. Jagtap, Kanchan A. Patil, Shaziya Sayyed Shakil, Nitin S. Ingle, 2015)** This study Played an active role in monitored the activities that achieved by employee's smartphone such as tracking location of by GPS during work time if the employee across corporation boundary the E-mail message will send to manager's smartphone and the parents can track their kids when go to school by get there location and send alert message from their children's mobile [8].

4. **(Adrian Dabrowski& Georg Merzdovnik& Nikolaus Kommenda& and Edgar Weippl , 2016)** This study discussed the malicious of Wi-Fi such as login or agreement of Policies that utilized in public place like airports and restaurants and allow to access to browser history by deception the browser ,all that occur by legal form .One of the way to pilfering the browser history, which relied on cookies which consider a valid time session when some of sites send images and the client tends to bring the allege resource ,so this request is register by browser which record this site's cookies and when this cookie is available in store of local cookie that mean this site is visited in former [9].

3. Android operating system

Android operating system (AOS) is commonly used in 2012 - 2013, it consider as operating system for a variety of smart devices. it relied on Linux kernel and is evolved by Google and later on by Open Handset Alliance(OHA).It's based on java programming language .there are many version of it such as Android 4.4 KitKat, Android 5.0 and 5.1.1 Lollipop, and more other versions as shown in table (1) the android OS is provide the smartphones with many features such as multi-touch screen, multi-task, messaging, web browser, and video calling. It can run on some best smartphone devices such as Samsung Galaxy devices and GoogleNexus7 which made progress in the smartphone industry [11].

Table (1) Versions of Android OS [3, 10].

Code name	Version Number	API Level	Release Date	Security Patches
Ice Cream Sandwich	4.0.3- 4.0.4	15	16 Desmber 2011	Unsupported
Jelly Bean	4.1.x	16	9 July 2012	Unsupported
	4.2 .x	17	13 November 2012	Unsupported
	4.3 .x	18	24 July 2013	Unsupported
KitKat	4.4	19-20	31 October 2013	Unsupported
Lollipop	5.0- 5.1.1	21-22	15 October 2014	Unsupported
Marshmallow	6.1	23	5 October 2015	Supported
Nougat	7.0- 7.1.2	24-25	22 August 2016	Supported
Oreo	8.0- 8.0.1	26-27	22 August 2017	Supported

Architecture of Android OS

The main constituents of android architecture as shown below.

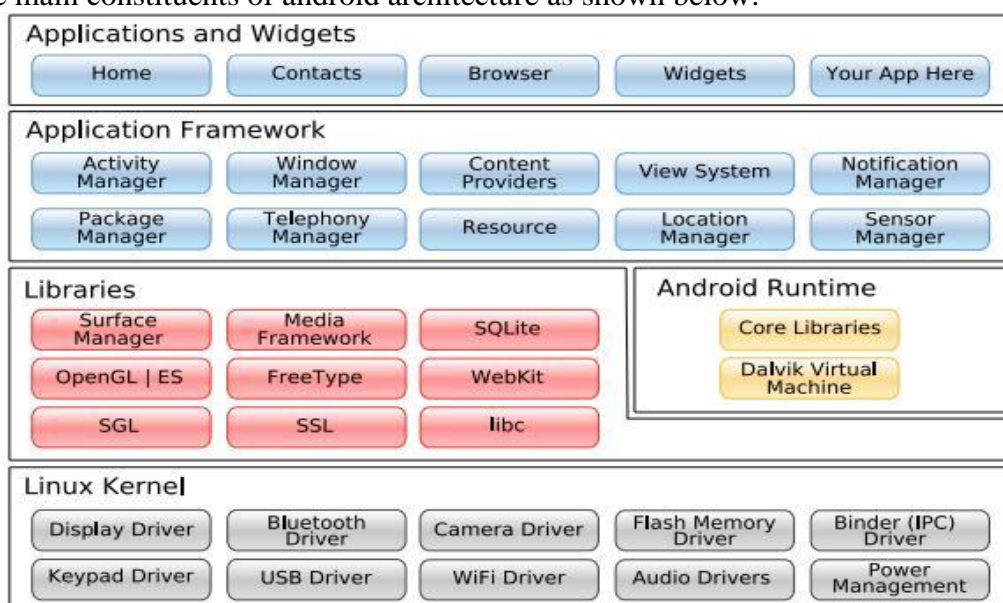


Fig (1): Android architecture [11].

1) **Applications**

A group of applications located on the top level in the framework, including a G-mail app, Maps app, web browser app, contact app, SMS app, and many more applications. Whereas the java is native programming language of these applications [12].

2) **Applications Framework**

The application is a set of software and services, it consists of extensible set of Activities Views which might include it consists of a Buttons, a Text views, and also Map views which developers can be used in every application. Furthermore content Providers that provide the applications with the ability of data sharing, and also Notification Manager which enable the applications to exhilarate users in the Notification Panel [12]. Moreover Location Manager which warning by determine the location of a user if get in or get out a specific geographical location [13].

3) **Libraries**

Android operating system includes a collection of libraries which build in C/C++ programming languages. The libraries are used by various components of Android system. These capabilities are available to application developers. There are some libraries are shown in Fig (1) [12].

4) **Android Runtime**

This part of architecture include a set of libraries available in java programming language, each application running in its' own instance of Dalvik Virtual Machine (DVM). DVM is register-based and executes codes compiled by a Java language, it is shipped with the SDK [12].

5) **Linux Kernel**

Android based on Linux version 2.6 for core system services such as process management, memory management, security, network stack, and driver model. The core also acts as a hardware abstraction layer between the applications and all the hardware [12].

3. **PROPOSED SYSTEM**

The proposed Spying Internet Information of Android Smartphone (SIAS) is used several techniques make this system up-to-date and reliable such as using network protocols to spying multiple users at the real-time simultaneously. SIAS system consist of three subsystem: Victim Client (V. Client) app, PC-server program, and the monitor app, as shown in Figure (1). In this system, the timer has been used to repeat the code at regular intervals, and this sensitive information which coming from V. Client smartphone and this information include IP address, browser history of web-browser app and also GPS information, all these information required a particular permissions which allow the V. Client app access to resources. In addition to, SIAS system use wireless LAN network in its connections to send the collected sensitive internet information to PC-server. After that, server can display this information at the screen of administrator server in form of table; moreover, server can send a part of these information to monitor application to display the victim coordinates in the Map-app. These sub-systems will be explain in detail in subsequent subsections.

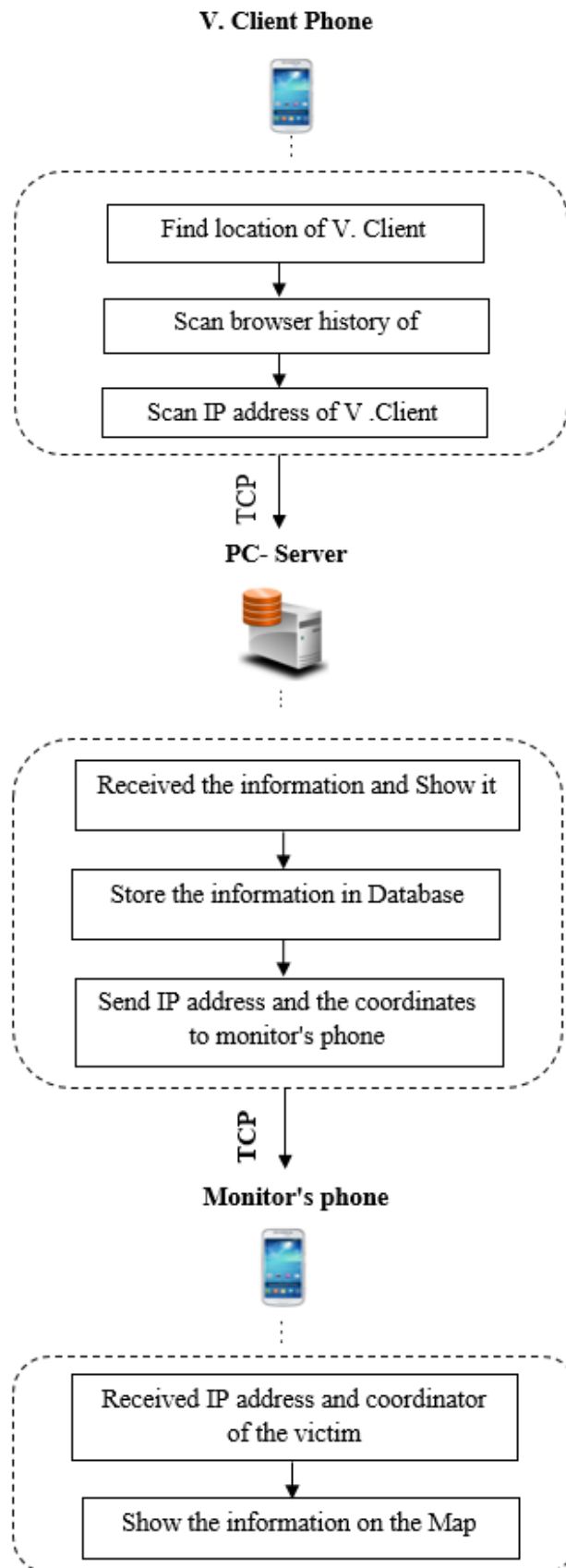


Fig (1): Proposed system block diagram.

3.1 V. Client Application

This application is a first module and most important part of SIIAS system, because it uses to collect sensitive internet information which include web-browser history, GPS coordinates, and IP address then sending it periodically to the server through the network. So it will explain how to get all this information in this application.

3.1.1 Finding a Location

To get a current location of v. client it must to do following steps:

a) Adding following permission in the manifest file :

- **<user - permission**
android :name ="android. Permission.ACCESS_FINE_LOCATION" />.
- **<uses-permission**
android:name="android.permission.ACCESS_COARSE_LOCATION"/>.

b) Access to GPS information by system service and activate the GPS of phone if it is not.

c) Apply the Location Listener to gain coordinates.

d) Calling a request Location Updates method to gain up to date location continually.

3.1.2 Finding A Web-Browser History

All information in Browser application is store in log created by SQLite database of Android OS. So this application can get all visited URLs from default browser in V.Client smart phone. So, there are some steps used in this system to get history of browser:

a) Write the following permission in the manifest file of android studio.

- **<user-permission android : name =" android.Browser. Permission.READ _ HISTORY_BOOKMARKS " />.**
- b) Connect to database of web-browser app to retrieve data from browser log.
- c) Then check the required columns if it is empty or not to retrieve a required data.
- d) Repeat the previous step until arrive the end of log.

3.1.3 Finding an IP Address

Due to spying of multiple victim at the same time, it must to gain IP-address of each victim to distinguish among them, sometime called Internet Address each of which allocate to individual victim that attached to same network. Moreover, each network interface has IP-Address which consist of two parts: network number and host number. For instance the following IP address (192.168.5.2), where the first three partition represents a network number and last one represents a host number. Actually the IP protocol which exists in network layer is used to identify IP address to each host.

There are steps used to gain IP address :

a) Write following permissions in the manifest file of android studio .

- **<uses - permission android : name = "android . permission . ACCESS _ NETWORK _ STATE "> .**
- **<uses - permission android : name = " android . permission . ACCESS _ WIFI _ STATE "> .**

b) Access to network interfaces of smartphone then insert them in a vector.

c) Bring all the addresses which assigned to each network interface and also insert them in another vector.

- d) Check if this address is IPv4 and not loopback address to get right format of victim smartphone IP address.
- e) Repeat the operation from step (b) until access to required IP address.

3.2 PC -Server Application

The second module of this system is administrator's computer which acts as a server to manage data in an efficient manner. The PC- server can be run at any time as long as the V.Client-app is running. So the use of the server as a PC and not as a smartphone because the smartphone's memory is inadequate to save a large amount of information which come from V.Client-app and the smartphone screen is insufficient to show the information in tabular form. Where PC- server works concurrently with V.client-app when there are multiple victim spying simultaneously. Furthermore, it can send the information such as GPS coordinates and IP address to monitor-app.

3.3 Monitor Application

This application is third module of SIISP system which installed in the Administrator's smartphone. It used to show the location and IP address of the victim on the map. So there are two method to use Google Map service, either by move to other application called Google Map app which already exist in administrator's smartphone by using the intent permission, or by directly connected to services of Google Map. The second method has been used in this system because it provides a flexibility in features than the first one. The minimum API-level of android OS which used this kind of services is 19 that means it works with android version 4.4 which known as KitKat.

3.4 SIIS System Connections

There are two connections in this system, the connection between V.Client Application and Server-PC and Connection between Computer Server and Monitor Application. Both of these connections is used Transmission Control Protocol (TCP).

TCP is one of a basic protocol for transport layer that existing at TCP/IP protocols suite, it used for connecting oriented transmissions, where a network is established before sending any data. TCP is so reliable protocol, because it provide the retransmission and acknowledgement facilities [14]. This protocol treated the data as segments. So, when the segment transmitted from source process the timer is started and when the timer is expired before the acknowledgement arrived the source process retransmit a segment again [15].

TCP is also provided with other services such as error control, flow control and congestion control to reduce the amount of data segments that may be lost over network because of the congestion. The flow control service that the sent data rate of the source host is matching with the receiving data rate of the destination host to prevent overwhelming the destination. While error control service used to guarantee that the data segments arrive at the destination without error and resending the corrupted ones [16].

4. SYSTEM REQUIREMENTS

- a. Android studio version 2.0.1. which is Integrated Development Environment (IDE)
- b. NetBeans IDE version 8.0.2.
- c. Oracle 10g to use SQL developer.

- d. Java as programming language.
- e. Android version 5.1 (Lollipop) is an operating system of victim smartphone.
- f. Android version 8.0(Oreo) is an operating system of administrator's Smartphone.

5. THE RESULT OF SPIAM SYSTEM AND IT'S DISCUSSION

The implementation of this system is beginning at the first application which known as V.Client Application show in Fig (2). It has been designed to collect some sensitive information not only from real device but also from Android Virtual Device (AVD) that already exist in android studio, but it can't running until the AVD operating file in SDK tools is installing to be able to gather information from more than one V.Client at the same time.

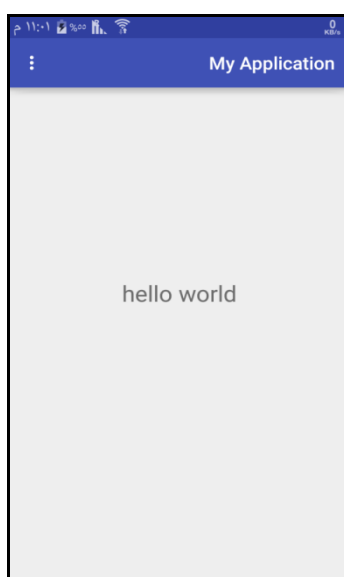


Fig (2): Activity of V.Client Application.

When the sensitive information is arrive to Server-PC which programmed in Netbeans program by using java programming language. Where Server-PC shows this information in form of table that include IP address, History information, Date-Time, Longitude and latitude, as shown in Fig (3).

IP ADDRESS	HISTORY INFO	DATE TIME	Lati	Long
10.0.2.15	Turkey - Wikipedia	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	mobile - بحث Google	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	hawaii - بحث Google	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	Hawaii - Wikipedia	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	هواي - ويكيبيديا، الموسوعة الحرة	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	Lolo	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	https://www.google.iq/setprefs?si...	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	Lolo	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	https://www.google.iq/search?cli...	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	Yolla	2018/09/18 01:29:26	0.0	0.0
10.0.2.15	english music - Google Search	2018/09/18 01:29:26	0.0	0.0
192.168.0.114	33.23260958102996	2018/09/18 01:29:29	33.23260958102996	44.38832537421838
192.168.0.114	44.38832537421838	2018/09/18 01:29:29	33.23260958102996	44.38832537421838
192.168.0.114	google - بحث Google	2018/09/18 01:29:29	33.23260958102996	44.38832537421838
192.168.0.114	google - بحث Google	2018/09/18 01:29:29	33.23260958102996	44.38832537421838
192.168.0.114	google - بحث Google	2018/09/18 01:29:29	33.23260958102996	44.38832537421838
192.168.0.114	google - بحث Google	2018/09/18 01:29:29	33.23260958102996	44.38832537421838
192.168.0.114	Google	2018/09/18 01:29:29	33.23260958102996	44.38832537421838

Fig (3): View sensitive information at PC- Server.

This study differs from others which get telephone information for instance incoming calls, miscalls, SMS, outgoing calls, while this study does not need these information because it is not considered internet information. Moreover, this system updated the location continuously, in opposite of other systems which dedicate the location when the user is only cross the specific location. And then the location send to server, after that send to map application that installed in administrator android mobile phone to show on map, but others are satisfied with bringing the coordinates without drop them on the map.

6. CONCLUSION

SPIAM system is building to be run on AOS. The main objectives for this system are to monitor the teenagers or other users, in case what web pages have been visited, exact location for the teenagers or other users, and by whom the information is came from. All this information is need to send to the Server-PC of the parents or administrator. In addition to send the location and IP address from server to parents' smart phone to determine the location on the map in the monitor application and also showing the toast which appear for short time at the screen of V.Client phone. The location updates and sends continuously. This system is used for different purposes. It will improve the performance of teenagers in their study hours effectively. Meanwhile, it maintains the security of teenagers through their going to school.

One of problem appears in this system is the gradle of latest version of android studio like android studio 3.0 is do not support the android SDK tool V.22 because it is ignored this tool from android studio. And this tool contain all required libraries which work to support the system's code. Therefore, a slightly older version like android studio 2.0 was installed to provide these tools.

Another problem that faced this system is removed the permission of browser history (READ_HISTORY_BOOKMARKS) from android 6.0 API level 23 and higher because of the browser data is stored internally and the global provider cannot access to it, but this permission works up to android 5.1 API level 22 .

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