

DEVICE TRACKING SYSTEM THROUGH SMARTPHONE VIA WIRELESS ACCESS POINT

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ABSTRACT

The study focuses on developing a device tracking system using smartphones via a wireless access point that will monitor and track active devices within a 100-meter range. It involves the establishment of an antenna that can detect active devices (mobile, laptops, or tablets). The system is capable of managing user accounts and their devices' corresponding Media Access Control (MAC) addresses; monitoring

active devices inside the radius; providing device logs on a daily and monthly basis; producing daily and monthly reports of detected devices; viewing users based on user type (system users and admin users); and searching for system users.

KEYWORDS: Media Access Control (MAC), smartphones, access point, antenna

I. INTRODUCTION

Technology has become a way of life; it now plays a wide range of roles in serving our needs in most every part of our lives. People communicate in a variety of ways thanks to technology. Because of current technology, the society is becoming more versatile, dynamic, and powerful as it opens the door to the modern world of civilization.

Technology also introduced the way of performing task easily. With all of the advance technologies, innovation has changed the lives of human being wherein computers have taken

the place of human being in performing different activities. This innovation has also changed the quality of lifestyle of human beings and the society has become modernized as it opens for new dimension (Allam, 2009).

Across the world, one utilization of the advancement of technologies is the use of a tracking system in different forms embedded in vehicles, people, even in sports and health organizations. Tracking system has been a help to most of the business and companies who wants to monitor their transactions and even people (Moose, 2014).

Smartphones can be used as tracking devices since they have radio transmitters in addition to their mobile network interface. They usually also have Wi-Fi and Bluetooth support. These signals are transmitted with less power than a mobile signal and can normally be received only within a short range (such as within the same room or the same building), although sometimes using a sophisticated antenna allows these signals to be detected from an unexpectedly long distance. Both of these kinds of wireless signals include a unique serial number for the device called the Media Access Control (MAC) address, which can be seen by anybody who can receive the signal. Whenever Wi-Fi is turned on in a typical smartphone, the smartphone will transmit occasional signals that include the MAC address and thus let others nearby recognize that the particular device is present. In comparison to the Global System Monitoring, these forms of tracking are not necessarily as useful for government surveillance. This is because they work best at short distances and require prior knowledge or observation to determine what MAC address is built into a particular person's device. However, these forms of tracking can be a highly accurate way to tell when a person enters and leaves a building (SSD, 2015).

To monitor or track the location of the employee or students inside the premises, one has to search the entire building in order to check if the person is within the premises. If the person being searched for is not around, then the one searching will be disappointed and efforts will be wasted. In terms of monitoring faculty members, the same thing applies. Searching requires a lot of work, effort, and time on the part of the person looking for another person. Though the person can be contacted using cellular phones, this requires a load from the user. But in cases where the person does not have a contact number for the person being searched for, then this becomes a problem.

To address the previously stated drawbacks of monitoring a person, the researcher came-up with a system that can periodically monitor a person through its smartphone device based on its MAC address.

The main objective of the study is to design and developed a Device Tracking System through Smartphone via Wireless Access Point. Specifically, it aimed to develop a system that has the following features.

1. establish an antenna that can detect active devices (mobile, laptops, and tablets) within 100-meter radius.
2. develop a system with the following features.
 - a. managing of system and admin user accounts and their device's corresponding MAC addresses monitor active devices and inactive devices within the radius
 - b. provide device logs in a daily and monthly basis
 - c. produce daily and monthly reports of detected devices
 - d. view users based on user type (system users and admin users)
 - e. searching of system users.

The monitoring system is designed to use a router that will use the MAC address of the smartphone device for the monitoring. It will also provide a user-interface that can access the database of the system where the MAC address and other information about a user is stored. It also includes a search function that allows a user to check whether a certain person is within the vicinity or the person has been in the vicinity within time duration. This new monitoring scheme will help facilitate faster and more convenient monitoring of students and faculty members and staff. The system is a stand-alone application. Monitoring of devices will be done thru tracking smartphones and tablets and other hand-held devices. The monitoring will be done using the device's MAC address. The low-cost antenna used can only monitor up to 100 meters radius. A database was designed to store the tracking and monitoring of devices. The system will only track devices using the MAC address stored in the system; only one device per person will be monitored. The system will not track the actual location of the device but will provide only information if the device is within the radius or not. It is presumed that all students and employees hold their devices at all times and are connected in the network while in the vicinity or range.

II. METHODOLOGY

The primary purpose of the study is to develop and test a Device Tracking System via Smartphones via Wireless Access Point to monitor a person on a regular basis via their smartphone device based on their MAC address.

Hardware development

Figure 1 shows the block diagram of the system in which the access point serves as the receiver of end devices MAC-address (smartphones, laptop) which will be stored in the standalone server where the develop software installed.

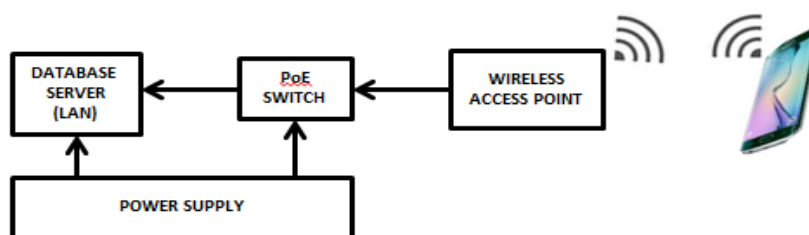


Fig. 1: Block diagram of the proposed system.

Hardware Requirements

The following computer specifications were used.: 1 GB of RAM and 500 GB of storage space With regard to implementation, a computer with at least a dual-core processor, 2 GB of memory, at least 250 GB of hard disk space, a monitor, keyboard, mouse, and printer are needed. Likewise, mobile phones enabled with wireless fidelity are required to be monitored. A network switch and an access point are also needed.

Software Development

The Waterfall Model (Winston, 2008) was used as a guide for the development of the Device Tracking System. As shown in Figure 2, it consists of four major phases: planning, analysis, design and implementation.

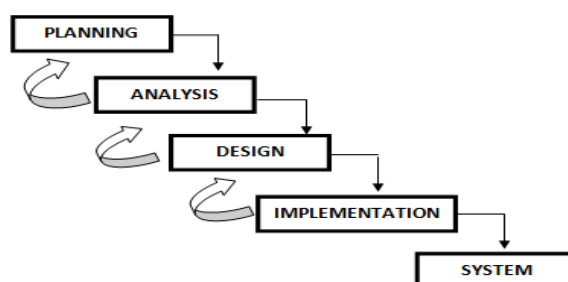


Fig. 2: Water model of the proposed system.

III. RESULTS AND DISCUSSION

System Analysis

The framework of the system is presented in figure 3 using the Input-Process-Output (IPO) model. It shows the different inputs entered into the system, the process to be executed and the output to be generated.

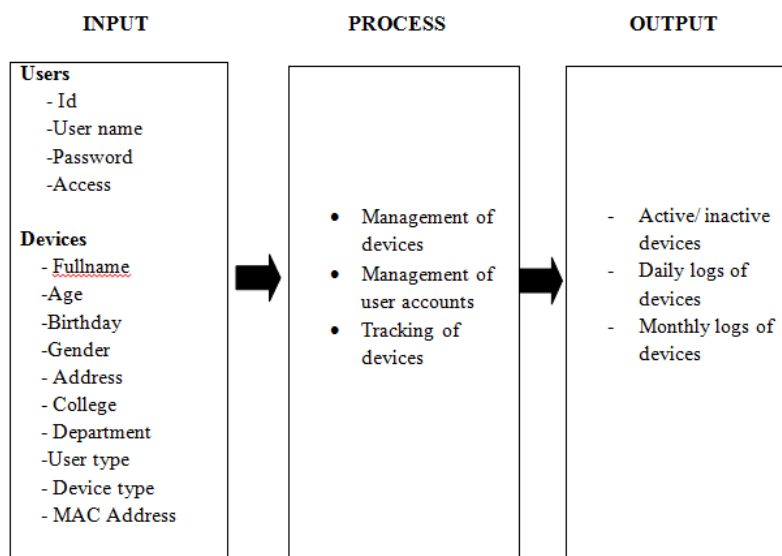


Fig. 3 Project Framework of the system.

System Features and Functionalities

The management of admin users as shown in figure 4 shows the different operations that can be performed such as adding, editing and deleting of admin accounts.

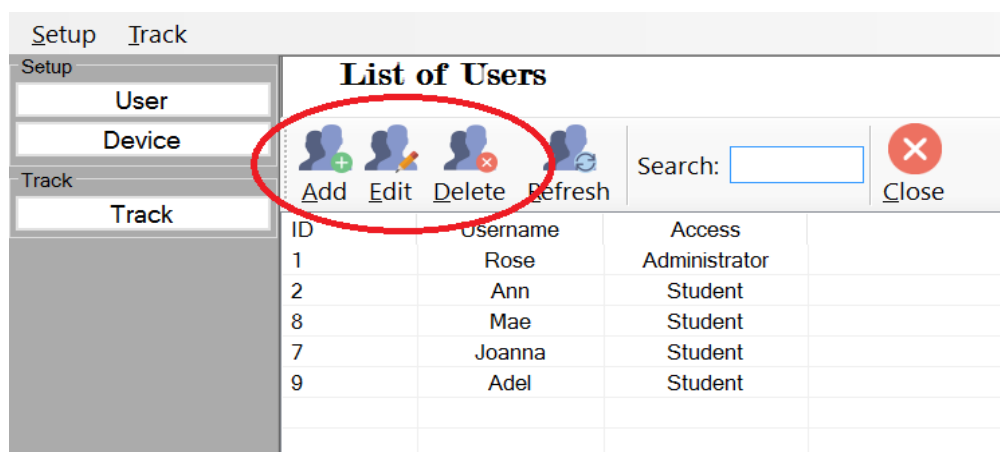


Fig. 4: Management of admin user accounts.

Figure 5 shows how the devices of the system users are managed (adding, editing and deleting of accounts). The MAC address of the device of the system users is also stored in this interface; the MAC address is used in tracking the devices.

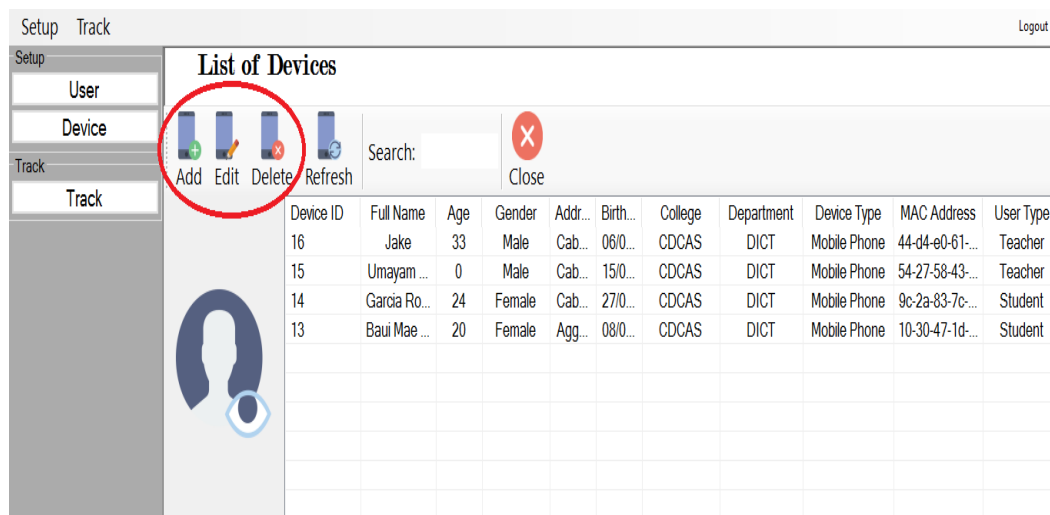


Fig. 5 Management of system user's account

The system through the device's MAC address assigns a unique IP address to the devices. It pings all IP addresses available in the network then sends a command in the command prompt to check all MAC addresses connected in the network. The IP address will be scanned by the system as shown in figure 6 and displays the devices that are active or detected within a given range through the list of MAC address.

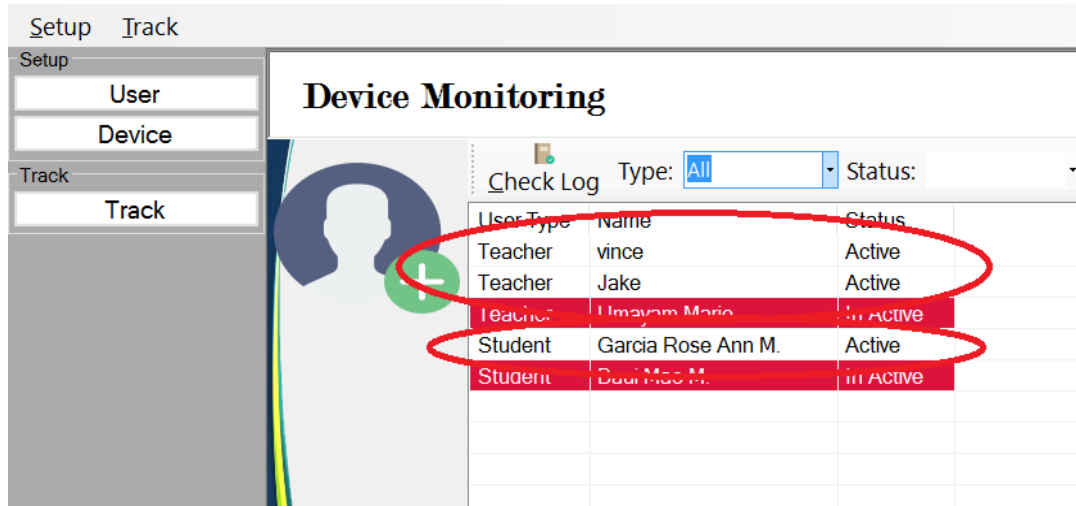


Fig. 6 Monitoring of active devices.

IV. CONCLUSION

Based on the results of the testing, the access point of the system is capable of detecting devices with MAC address within the 100 meter radius which was established and working, managing of system and admin user accounts and their device's corresponding MAC addresses, monitoring of active and inactive devices within the 100 meters radius, viewing of

logs on a daily and monthly basis, printing of daily and monthly reports of detected devices, viewing different type of users (system and admin), and search functions for system users.

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