

# Wireless Communication Module-based User Identification Technique

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**Abstract.** In this paper, we propose a user identification scheme based on wireless communication. To accomplish this, the access point is implemented using a conventional low-complexity microprocessor-based general-purpose board. Then, a packet signal extraction module is developed to collect the approved media access control (MAC) address for the WIFI signal collection to identify the user. Experimental results show that the proposed method is able to collect MAC addresses for various devices.

**Keywords;** User identification; wireless communication; signal extraction

## 1. Introduction

A wide variety of marketing services are possible if customer behavior patterns are available. For this reason, various methods for user pattern analysis are being developed recently, not only online but also offline [1], [2]. Especially, the connection between various types of online and offline users makes it possible to analyze various behavior data which has been difficult to analyze before, and it opens up many possibilities. In this paper, we propose a novel user-identifiable device using the wireless communication module. The proposed hardware device basically collects the approved MAC address information of the mobile devices through the WIFI receiver so that basic information about the user having the mobile device in the place where the proposed hardware device is installed can be obtained.

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## 2. Proposed Method

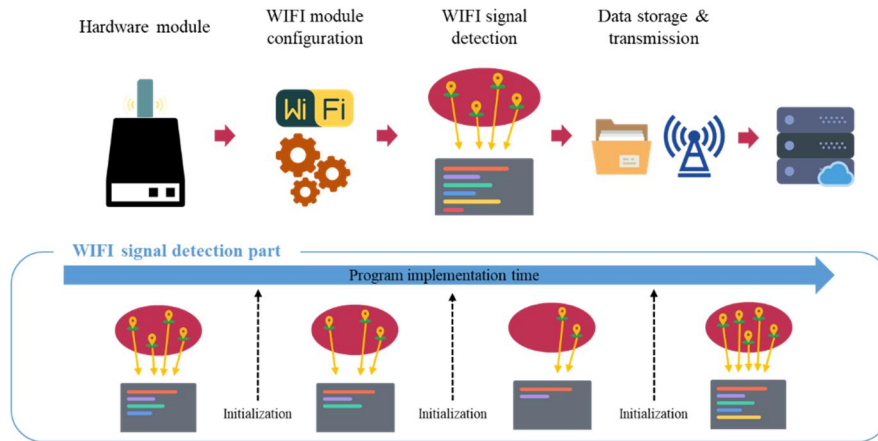


Fig. 1 Overall procedure of the proposed method.

Fig. 1 show the overall procedure of the proposed method. First, the configuration of the WIFI module for MAC address collection is made in the proposed device. Thereafter, detection is performed on a WIFI signal within a range in which signal identification is possible, and the data, which is approved by users, is transmitted to the server after the data accuracy is determined. The server identifies the user through the information of the encrypted form.

Specifically, the proposed method attaches an WIFI module to the hardware and changes the WIFI module to a promiscuous mode [3]. In general, the WIFI module supports the monitor mode and it can search the surrounding packet information [4]. By using this, the MAC address of the users is grasped to the extent that the WIFI module can receive, and only the approved information is transmitted to the server. In order to prevent accumulation of data, the data can be initialized at a predetermined time interval and transmitted in real time. Through this, it is possible to grasp the personnel of the store and to manage the visit status of the main customer.

## 3. Experimental Results

In hardware, the Raspberry pi 3 model was used. The function of grasping the sending and receiving signals of the devices and the method of transmitting data to the server were implemented using Python. Experimental environment was collected MAC

address near the laboratory. Data initialization was performed every 10 minutes and data transmission to the server was set to 5 seconds

Table 1: MAC address acquisition of device using real-time sampling

Mac address	First time seen	Last time seen	BSSID
D8:84:66:30:XX:XX	2017-09-22 12:57:34	2017-09-22 13:06:10	(not associated)
3C:A0:67:28:XX:XX	2017-09-22 12:58:11	2017-09-22 13:07:12	(not associated)
00:03:2A:1C:XX:XX	2017-09-22 13:01:56	2017-09-22- 13:05:55	00:01:36:31:XX:XX
64:E5:99:F6:XX:XX	2017-09-22 12:58:13	2017-09-22 13:05:46	90:9F:33:66:XX:XX
D0:13:FD:53:XX:XX	2017-09-22 13:05:45	2017-09-22 13:05:46	00:01:36:31:XX:XX

The proposed method could detect the first time seen and the last time seen in the corresponding data format while searching MAC addresses of the devices. In addition, the proposed method could identify the network to which these devices belong. "Not associated" was described when using 3G or 4G network. Through this process, it was possible to estimate the customer information in real time from the hardware module, and it was possible to use the method which is easy to analyze and manage the personnel access data in the server.

#### 4. Conclusion

This paper proposed the wireless communication-based user identification technique. First, we developed the access point using a low-complexity microprocessor-based board. Then, we extracted packet signals to collect the MAC addresses to identify the user from the WIFI signals. In the experimental results, the proposed method could collect MAC addresses for various devices and the user identification was possible. However, in order to use such information, consideration of privacy protection is necessary, and the related approval work is indispensable for individual customers when necessary.

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