

# A driver identification method for a car through a wireless communication

Jaemyoung Lee  
 Department of Electronics Engineering  
 Korea Polytechnic University  
 2121 Jungwang Shihung, Kyunggi  
 Republic of Korea  
 lee@kpu.ac.kr

**Abstract:** - To prevent car thefts, we propose a driver identification method through a wireless communication using a smart phone and a system equipped with an NFC chip in a car. Driver identifications are carried out by approaching the driver's NFC device to the NFC system in the car which does not require complicated systems to install the NFC in a car. For a theft case in which driver's NFC code does not match to the registered, subsequent steps could be taken into action. In the proposed method, we can trace the stolen car by sending GPS information to the owner. The proposed method which does not require advanced technology to implement has high identification rates.

**Key-Words:** - wireless communication, near field communication, theft, smart phone, identification

## I. INTRODUCTION

Recently the demands for cars have increased not only for business purposes but personal enjoyment. Many research topics are involved for improving car functions and other related techniques such as driving speed, automatic driving control, plate recognition, vehicle detection, etc. One area of those research topics is preventing car thefts, of which the number has greatly increased, [1, 2]. To prevent or trace stolen cars, many groups have suggested technologies employing car systems such as alarm systems, plate number recognition technique, face recognition technique, global positioning system (GPS) based tracking systems, etc, [3, 4, 5, 6]. Those proposed systems can be effective to prevent thefts and to track down the stolen cars. For theft alarm system, if someone does not break into a car by force, the car needs to be equipped with a system to identify the qualified drivers for the car. To differentiate the not-qualified from the qualified, some cars employ the face recognition technique which requires state of the art technology to

implement. However, the technology of face recognition needs to be further studied before it can be used because of the error rate of the current face recognition technology which cannot be ignored.

In this paper, we propose a method to identify qualified drivers who are registered in the proposed system and to trace a stolen car. To identify the qualified drivers, the proposed method uses a wireless communication function on smart phones such as wifi, bluetooth, or near field communication (NFC) function which enables smart phones to communicate with other devices, Fig. 1. Among these wireless communication functions on smart phones, we believe the NFC function of which working distance is approximately less than 0.2 m is more suitable for our proposed method of the qualified drivers identification.



Figure 1: Wireless communication of a smart phone with a car.

## II. QUALIFIED DRIVERS RECOGNITION METHOD

To prevent car thefts, we propose a method to identify qualified drivers using a wireless communication function on smart phones. Smart phones have communication functions such as wifi, bluetooth, and NFC. Each technology has been developed for different purposes: wifi for replacement of Ethernet, bluetooth for substitution of USB connection, NFC for secure two way wireless communications. In our qualified drivers

recognition method, we believe the NFC is suitable technology, because, compared with other wireless communication technologies, the NFC is more resistant to radio interferences from other devices due to short working distance between the two connected devices.

The working distance of NFC is less than 0.2 m and the maximum data transfer speed of it is 424 kbps. The NFC devices can conduct financial transactions like credit cards, communicate each other to share and exchange files and information, read data stored on NFC and write data on NFC.

The proposed method requires two NFC devices: one of driver which is usually embedded on smart phones, and the other in a system in a car. The system in a car which has an NFC chip can be an audio/video multimedia system, a black box, or

other system in a car. The system which is equipped with an NFC has the code of this paper's proposed algorithm to identify the qualified drivers. In the proposed method, the system equipped with an NFC in a car has registered information about the qualified drivers which can be compared with the information of the NFC approached by the driver on board. Before some one draws near his or her NFC device, we assume the driver closes the door after getting on the car. After closing the door, the driver approaches his or her NFC to the NFC device which is installed in a system in the car. If the NFC information is identified as registered drivers' in the car, no further action is taken. However, if the NFC information does not match to one of the registered information, subsequent steps could be taken into action planned for the theft case.

The flow diagram in Fig. 2 shows a management case in which text messages are sent to the registered driver in the system at every certain time interval. To accomplish the above-mentioned functions in a car, the system with an NFC device in the car should have hardware units such as central control unit, sensor units for car movement, for door closing, and for the NFC communication, which is shown in Fig. 3. By sending GPS information to the registered drivers, the owner could trace the track of the stolen car.

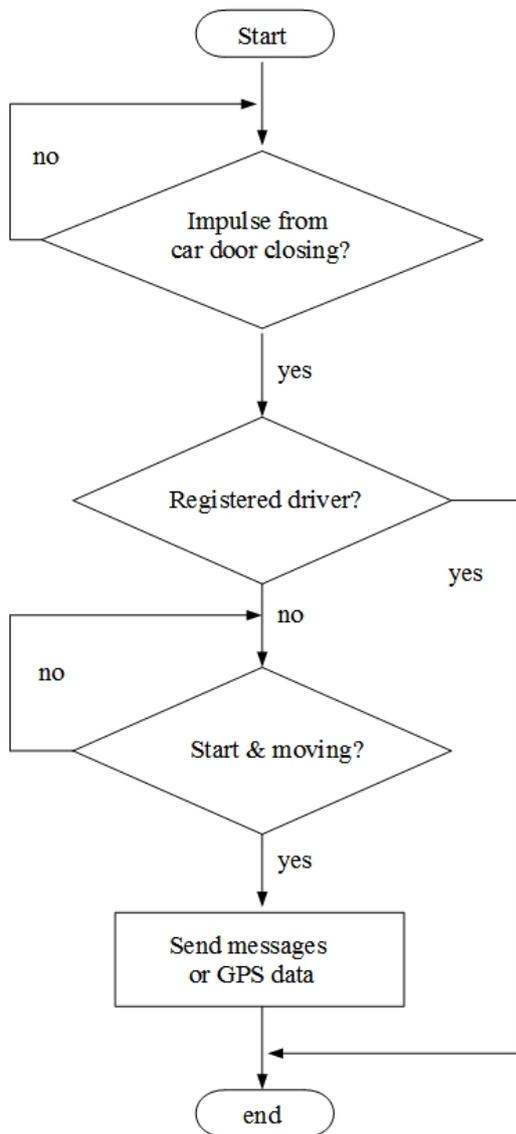


Figure 2: Qualified drivers recognition algorithm.

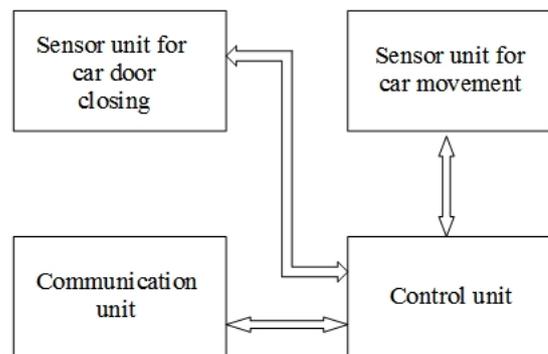


Figure 3: Unit diagram for the proposed system implementation.

### III. CONCLUSION

In this paper, we propose a driver identification method through a wireless communication using a smart phone of a driver and a system equipped with an NFC device in a car. After getting on a car, the driver is supposed to approach his NFC chip to the NFC device in the car. If the code is not matched as registered drivers, subsequent actions are taken to trace the car movement by sending GPS information to the owner. The proposed system does not require

any advanced technology to implement and has high identification rate which is related to the recognition rate of the NFC system. Even though we make the system send GPS information to the owner in the proposed flow algorithm for the case of a car theft, other emergency actions could be employed in the proposed system.

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