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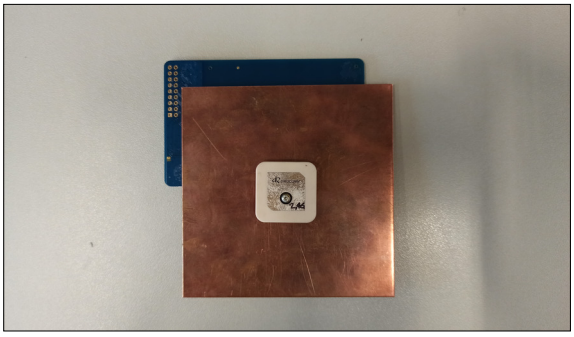
Subject Area	Wireless Communications

Driver Authentication using RFID and Bluetooth

Electric vehicle of ICOM
Own presentment

EVB-6300 with regular BLE antenna
Own presentment



Patch antenna on top of Legics EVB-6300
Own presentment

Initial Situation: The Institute for Communication Systems (ICOM) utilizes its own electric vehicle to carry out test runs of wireless systems and to provide coverage maps of such systems. For each tour, it is required that the driver of the vehicle is identified and the driven kilometers as read from the internally installed odometer are logged. The project on which this paper is based revolves around the identification of the current driver of mentioned vehicle.
In the past the authentication process was carried out by holding the personal badge over an installed RFID reader. This system however does not work anymore as there were a new kind of badges distributed among the students and the employees, which operate with a different RFID norm and therefore cannot be read with the old reader. The goal of this project is to ensure that the driver can use her/his badge for identification like it was previously possible. Additionally the driver should also be able to use his smartphone via Bluetooth Low Energy (BLE) and RFID for authentication. In particular this includes identifying the driver's smartphone among multiple Bluetooth-devices.

Approach / Technology: To receive Bluetooth and RFID signals, evaluation boards (EVB-6300) of the company Legic Identsystems Ltd were used. Their already existing Bluetooth antenna was replaced with a patch antenna to ensure a better directivity. Then these were placed in various locations in the car, with one board being easily accessible for the driver for RFID identification. The main approach was to simulate the process of getting into the car with keeping the smartphone in different pockets. Afterwards the measured signal levels were evaluated and it was attempted to assign the measured data to a known scenario and to assume where the smartphone was located. With this information it was decided how probable it is for the seen smartphone to belong to the driver.

Conclusion: By using a personal notebook running a Python script it was possible to build a system which is able to identify a badge by putting it on the EVB-6300 and to identify multiple smartphones via Bluetooth and pick the one with the highest probability of belonging to the driver. In further steps this information would be displayed on a user interface. So that the driver can confirm or reject the decision of the driver authentication.