Sim-based detection tools to minimize motorcycle theft

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Abstract. The number of motorcycles in Indonesia spurs the increased criminal acts of motorcycle theft. In addition, the number of motorcycles increases the number of traffic accidents caused by improper motorists. The purpose of this research is to make METEOR (SIM Detector) which is a tool to detect the feasibility of SIM (driver license) which is used to operate and protect motorcycle against theft. METEOR is made through the assembly, encoding, testing, and sequencing stages of the motorcycle. Based on the research that has been done, METEOR generated that can detect the SIM by using additional RFID chip and can be set on the motorcycle. Without the proper SIM, motorized chests coupled with METEOR cannot be turned on. So it can be concluded that motorcycles with additional METEOR is able to be a safety device against theft and as a tool to test the feasibility of motorcycle riders.

1. Introduction

According to the Law of the Republic of Indonesia Number 22 Year 2009, SIM is proof of registration (identification) given to someone who has fulfilled administrative requirements, physically and mentally healthy, understands traffic rules, and skillfully drives motor vehicles. The number of motor vehicles in Indonesia from year to year increase, especially motorcycle. Along with the number of motorcycles, motorcycle theft was increasingly widespread [1]. Based on the 2016 Criminal Statistics Data [2], it is known that the number of motor vehicle theft in Indonesia is 38,389 cases. In addition to cases of motorcycle theft, traffic accidents cases are rife, with the majority of road traffic accident victims not having a driver's license.

In this research, the writers design SIM-based detection tools to minimize motorcycle theft. SIM-based here means the tool made used to check the feasibility of SIM (driver license) that will be used to turn on the motorcycle. The use of SIM as a condition in the operation of a motorcycle due to SIM is a mandatory thing that must be owned by someone to drive a motorcycle. The author uses Raspberry Pi instead of Arduino microcontroller which is widely used by previous researchers, because Raspberry Pi can accommodate more pins, so the module used can be more for the freedom of the development of the tool. If the SIM used is not detected by METEOR, then the motor cannot be operated.
Based on the description of the background, the formulation of the proposed problem is how to design and create METEOR, SIM detector tool that is able to detect the feasibility of a SIM used to operate a motorcycle, then instal it on a motorcycle. This tool is expected to minimize the case of motorcycle theft so that people feel safe and comfortable in owning and using a motorcycle. In addition, this tool is expected to assist the police in preventing the motorcycle driver under the age of.

Application of technology for motorcycle security has been done. Artika [3] uses a ping sensor to sound an alarm if the motorcycle is lifted to a certain height and the encoder sensor will work in the event of motorcycle removal at a certain distance. Suki et al [4] uses RFID to detect whether or not a key is embedded in a motorcycle. Firmasyah et al [5] designed an RFID-based security device connected to the motor and warning via SMS (short message send) gateway, using ID card and applying the Arduino microcontroller concept. In addition, Raharjo [6] created a SIM detector and vehicle registration which has been added security card.

2. Methods

2.1. Experimental Scenario

In order to design SIM-based detection tools, the researchers do an experimental which steps are assembling METEOR components, METEOR instrumentation, and instal it to a motorcycle. Motorcycle which was used in the experiment was Honda brand matic motorcycle. Here are the complete experimental scenario.

2.1.1. METEOR Components. The components contained in METEOR and its functions can be seen in Table 1.

| Component                          | Function                        |
|-----------------------------------|---------------------------------|
| Raspberry Pi 3                    | Main material                   |
| RFID Reader (RDM6300 and RC522)   | RFID tad reader                 |
| Jumper DuPont Cable (Male to Female) | Liaison between components     |
| Relay Arduino Module              | Media output power              |
| Regulator Step Up                 | Raise the voltage from 5 volts to 12 volts |
| Regulator Step Down               | Lowering the mains voltage from 12 volts to 5 volts |
| Buzzer                            | Media sound output              |
| Breadboard 830 tie point          | The circuit place before it is soldered |
| PCB 9x15 cm                       | Implementation of assemblies from breadboard |

2.1.2. METEOR Design. The design of the METEOR that has been made can be seen in figure 1. In METEOR design view, one Raspberry Pi board is attached with the electrical power input of the battery / battery to be placed between the electric motors whose electrical voltage is lowered and raised again using the Step down Regulator type LM2596 DC-DC and Step up Regulators.
2.1.3. **METEOR Instrumentation.** In this stage there are three stages of development namely, assembly, writing program code, and installation of tools. This stage consists of the following steps.

1. Entering the operating system on Raspberry Pi 3
2. Recognize GPIO on Raspberry Pi 3
3. Connect Raspberry Pi with RFID Reader type RDM6300 with 125KHz frequency and RFID Reader type RC522 with 13.56MHz frequency
4. Connect Raspberry Pi with LED and relay
5. Code writing for RFID, LED, and relay to work
6. Making the electric slot for the input of the battery whose voltage has been lowered using the Step-Down Regulator LM2596 DC-DC type
7. After the tool is formed then the tool is instal on to the motorcycle.

2.1.4. **METEOR Manual.** METEOR that has been sequenced on a motorcycle can be seen in figure 2a.

When RFID (in this case is SIM) is attached then RFID Reader will ask ID to be scanned / read, if ID received then LED light will show blue light signifies status accepted then motorbike can be turn on (Figure 2b). If the ID is rejected then the red LED light indicating the status is rejected and the motor cannot be start on (Figure 2c).
3. Result and Discussion
In the testing phase of the tool, it is found that if used RFID Reader RDM6300 type then SIM is not readable so use RFID Reader type RC522. However, the SIM is still unreadable. However, it was found that using RFID Reader RC522 type can read E-KTP (electronic ID card), but has not found the type of RFID that can read the SIM. Thus the researcher offered two solutions for METEOR that would be attached to motorcycle, i.e.
- The SIM is replaced by E-KTP
- Attach additional RFID chips to the SIM

The stage of instrumentation and repair has not reached the maximum target; this is because there are still modules that have not been generated encoded into Raspberry Pi, so the SIM cannot be read by the tool if without using additional RFID chip.

Eventhough METEOR which had been created had been able to instal on to a motorcycle. Based on the evaluation, the motorcycle can be the motorcycle can be switched on by using an additional RFID-installed SIM whose ID has been registered on METEOR. However, if the motor is turned on with a SIM that is not registered ID, then the motor can not be start on.

4. Conclusion
The METEOR had been created but still needs some improvements because the METEOR was able to read the SIM, but the SIM must be attached with an additional RFID chip. The researcher conclude that METEOR can be used to minimize motorcycle theft, because the motorcycle that be used in the experimental cannot be start on, whithout the right SIM.

5. References
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