Internet of Things Based Motorcycle Monitoring Application Development

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Abstract. A common problem that occurs very often in society is motorcycle theft. The rampant cases of motorcycle theft, which are even carried out in the parking lot of homes, need to find the right solution. One solution to handling motorcycle theft cases and securing motorbikes is by installing smart vehicle technology. The purpose of this research is to design a motorcycle safety system based on the Internet of Things. The design uses the Arduino Mega microcontroller, the ESP8266 wifi module, a fingerprint sensor, and the Blynk application on a smartphone. Hardware design with fingerprint and microcontroller integration then designing IoT-based applications with the ESP8266 and combining a security system with notifications to smartphones. Application this can help to turn on and off the engine of two-wheeled motorized vehicles remotely, can assist users in supervising or monitoring two-wheeled motorized vehicles.

1. Introduction

The rise in cases of vehicle theft, especially motorbikes, has to find a solution to secure it. And this case of theft has become a common problem, even motorbike theft is carried out in the parking lot of the house. Motorbikes are one of the most widely used means of transportation by the public. To anticipate motorcycle security needs to be done, and one solution is to use or install smart vehicle technology [1].

Design and development of monitoring tools and applications motorbikes using the Arduino Nano and smartphone as an internal controller start the vehicle easily and as vehicle monitoring. The purpose of this research is to design and create a motorcycle safety system based on the internet of things so that the motorbike will not be able to start the engine either with the front starter or the side crank if the fingerprint is not verified or is not registered on the fingerprint sensor. The engine can be started when the motorbike has been verified by the system [2].

2. Methodology

Data collection methods using observation, interviews, and literature study [3] This monitoring application uses the android studio application with the Java programming language as part main of this application. Then the Arduino Nano was programmed using the software Arduino IDE. Which were then combined with various other tools such as the SIM800L v2, Relay, and jumper cables are then installed on the electricity of two-wheeled motorized vehicles some stages to go through, at stages modeling and assembly on Arduino [4].
The system development method with prototyping [5]. Image results for the development of a prototyping system. Prototyping is the rapid development and testing of a working model (prototype) of a new application through an interactive and repetitive process that is commonly used by information systems experts and business experts. The steps of developing a prototyping model are as follows:

a. Collection of needs. Customers and developers jointly define the format and requirements of the entire software, identify all requirements, and outline the system to be made.

b. Build prototyping. Build prototyping by making temporary designs that are centered on serving customers (for example, by making input and output samples).

c. Protoptyping evaluation. The customer makes this assessment to see if the prototyping that has been designed meets the customer's requirements. Phase four will be taken if it is necessary. If not, you can improve your prototyping by repeating steps 1, 2, and 3. Start by typing or pasting something into this box, then hit the enter key.

d. Encoding system. The agreed-upon prototyping is translated into the required programming language at this point.

e. Testing the system. After the system has become a ready-to-use software, it must be tested before use. This test is done with White Box, Black Box, Basis Path, architectural testing, and others.

f. System Evaluation. Customers evaluate whether the finished system is as expected. If so, then step seven is done, if not then repeat steps 4 and 5.

g. Using the system. Software that has been tested and accepted by customers is ready to use

![Prototyping Model](image)

**Figure 1. Prototyping Model**

Prototyping advantages good communication will be established between the developer and the customer. The developer can do a better job of determining the needs of each of his customers. Customers play an active role in the system development process. Save more time in system development implementation becomes easier because the user knows what to expect [6]. Technology design can be seen in table 1.

| Software                  | Hardware                                      |
|---------------------------|-----------------------------------------------|
| Windows 7 Ultimate 64-bit | CPU@ 2,50GHz, RAM 8 GB, HDD 1024 GB           |
| Android studio            | Smartphone                                    |
| Arduino IDE 1.8.9         | Arduino nano, sim 800L v2, module GPS neo-6m, relay 4 channel |

**Table 1. Design Technology**
3. Result and Discussion

Which is needed for communication is as follows communication:

a. User Needs Analysis. Based on the results of the communication that the author has done, a user needs that can be identified by the author include the form of two-wheeled motor vehicle monitoring applications, menus, application usability, and data transmission lines.

b. Equipment. The tools used by the author to create a two-wheeled motor vehicle monitoring application based on Android and Arduino are divided into two categories, namely software, and hardware.

Design Application

![Application Design Diagram](image1.png)

**Figure 2.** Application Design Diagram

In figure 2 use case application design diagram consists of login, vehicle location monitoring and controlling.

![Hardware Design](image2.png)

**Figure 3.** Hardware Design

In figure 3 described hardware design. All equipment is designed to be tested and evaluated accordingly needs. The software used is Windows 7 Ultimate 64-bit as the operating system, Android studio as a programming language software to create Android applications, and Arduino IDE 1.8.9 software is used to create Arduino programs and to upload programs that have been done. The hardware used is an Acer laptop with an Intel® Core™ i5-2450M CPU, 2.50GHz, 8GB RAM, 1024GB HDD, two-wheeled motorized vehicles and an Android smartphone. And the equipment used is Arduino nano, sim 800L v2, neo-6m gps module, 4 channel relay module, jumper cable set, solder, tin, and android smartphone.
In figure 4 described login page interface design. In order to enter this application, you must fill in your email and password. The Arduino and Android-based Two-Wheeled Vehicle Monitoring Application uses the Android Studio application with the Java programming language as the main part of this application. Then the Arduino Nano is programmed using the Arduino IDE software. Which is then combined with various other tools such as SIM800L v2, Relays, and jumper cables and then installed on the electricity of two-wheeled motorized vehicles. The development of this application requires several stages that must be passed, at the modeling and assembling stage at Arduino [7].

4. Conclusion

From the results of the discussion, the authors can draw the following conclusions remote monitoring application for two-wheeled motorized vehicles based on Android and turn on and turn off the engine of a two-wheeled motor vehicle. This application can increase the safety of two-wheeled motorized vehicles. This application can assist users in supervising or monitoring two-wheeled motorized vehicles. After analyzing and implementing this application It is recommended that a directions (direction) feature/route from the location of a two-wheeled motorized vehicle is located to the location where this Android application is located [8].

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