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MOTORCYCLE SAFETY TECHNOLOGY WITH IOT

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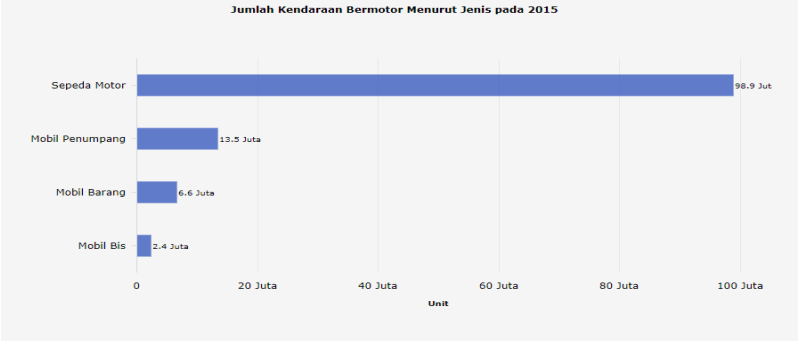
ABSTRACT

The number of population growth rapidly, so the needs of motorcyle increase. The rapid growth of Population also has a negative impact, such as unemployment and crime. This device that can be mounted on a motorcycle and able to reduce the theft of motorcycles on. This tool facilitates security and control the motorcycle by the owner. By using the main components of ARDUINO UNO as a microcontroller, RFID module as motorcycle engine controller, BLUETOOTH module serves as liaison arduino and android phone. The Android app serves as a controller and gives access, using FIREBASE as a data storage medium and user information. To access the device, users must sign in or register first, if they do not have an MIOT (Motor Internet Of Thing) account. Data entered by the user will be stored in the FIREBASE database so it's easy to sync the existing data. Owners can only access MIOT devices if the Bluetooth address on the MIOT device is the same as the Bluetooth address stored in the FIREBASE database. RFID Cards and MIOT Applications have a dependence on each other to operate the MIOT device, if the owner loses the RFID card or loses the android phone, the user can not access the MIOT device.

Keywords : Arduino, Android application, RFID, Bluetooth, Motorcycle.

1. INTRODUCTION

Motorcycles is one of the most popular means of transportation so that the growth of motorcycle use in Indonesia increased dramatically. In 2015 the Central Bureau of Statistics released data on the number of vehicles in Indonesia dominated by motorcycles with the number of 98.88 million units (81.5 percent), followed by car with the amount of 12.48 million (5, 45 percent), 6, 6 million units (5.45 percent) and buses with 2.4 million units (1.99 percent) with total 121.39 million units.



From the data above can be concluded that the number of criminal acts of vehicle theft increases along with the number of vehicles circulating in the public. Development of motorcycle security system is very small. Unlike motorcycles, cars are now equipped with GPS tracking, Smart Driving, Collision detection cars, and others.

Given the relatively small development of security systems and the increasing percentage of motorcycle theft cases, the public wants to update the security system by following the current technological advances.

To update the motorcycle security system can be done by changing the manual system of motorcycles to be automatic, digital, flexible and use the latest technology, one of them created a device that implements IOT (Internet Of Things). Given the people's desire to improve safety and ease of operation on a motorcycle, then I made a device called MIOT (Motor Internet Things). In July 2009 Ashton said that the Internet of Things has the potential to change the world as ever done by the Internet, maybe even better. (Ashton, 2009).

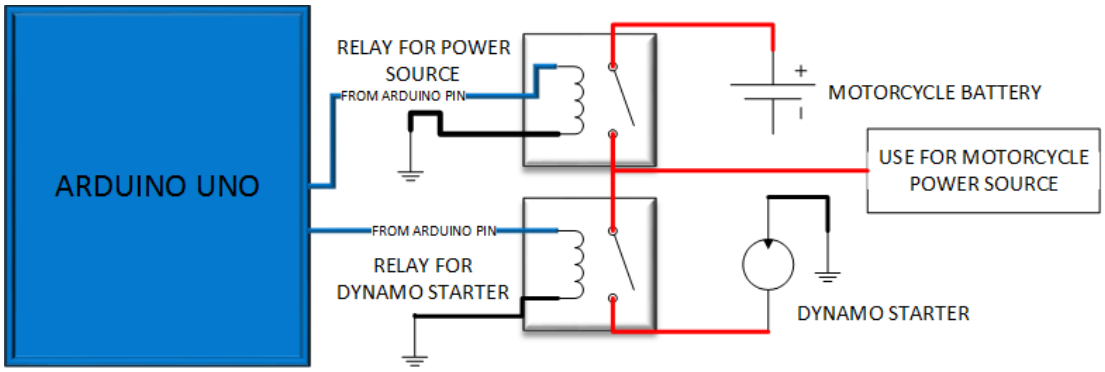
2. METHODOLOGY

MIOT (Motorcycle Internet Of Things) is a device that connects your android phone, cloud data storage and smart keys with the motorcycle. The design of this tool is divided into two parts:

A. Hardware Design

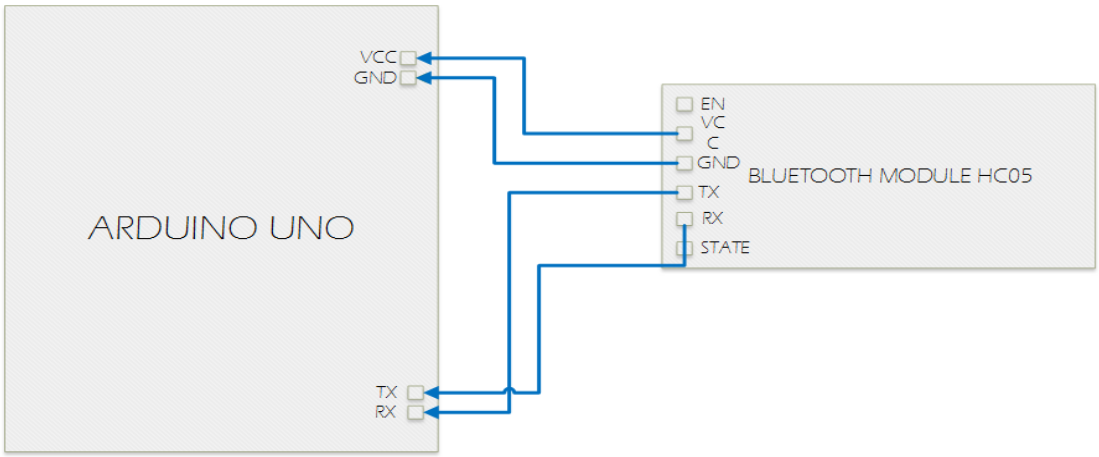
This MIOT hardware consists of several components that have different functions, to combine components with other components is done by soldering each component into one complete device. The Arduino uno component, the HC05 bluetooth module, the bell, the 5v relay is arranged in a container, while the RFID RC522 is removed from the container to be placed on the head of the motorcycle..

Arduino Uno is a microcontroller that works to process data received from the bluetooth module HC05 and also RFID RC522 into an action, which will eventually connect / disconnect the power voltage to the coil magnet on the relay so that the relay keeps the flow closed / open electricity on a motorcycle.



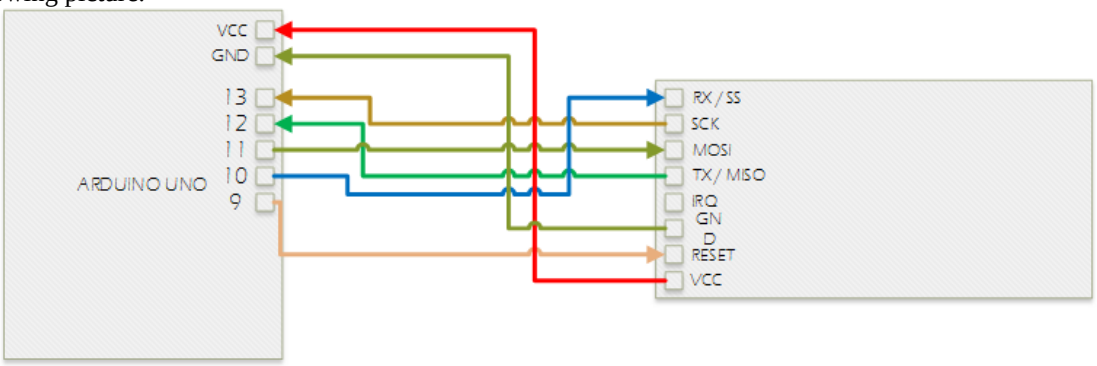
Picture 1. Scheme of relay mounting circuit

The bluetooth module has 6 pin counts consisting of VCC, GND, TX, RX, STATE and EN. Each pin has a different function that is, VCC pin serves as a pin to supply 3.3 volts DC power to the bluetooth module, GND pin serves as a pin for grounding, TX pin serves as a pin to transfer data to arduino uno, pin RX functions as a pin to receive data from arduino, EN pin function to reset bluetooth module like name and password, and STATE pin function to view and collect bluetooth module status.



Picture 2. The bluetooth module installation circuit scheme

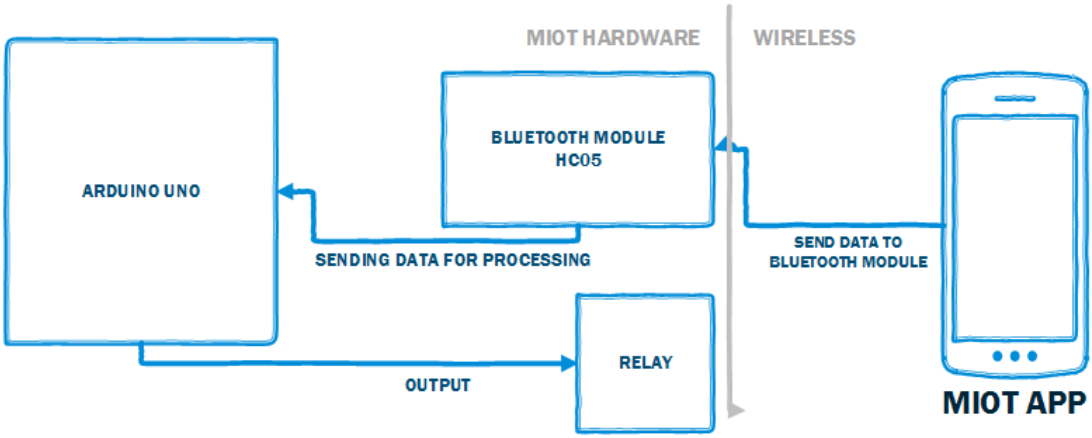
RFID MFRC522 module is a product of NXP that uses "fully integrated" that works in frequency 13.56 Mhz "non-contact communication card ship" for reading and writing. MFRC522 supports all MIFARE Ultralight variants, MIFARE DESFire EV1 and MIFARE Plus RF Identification protocols. Configuration of the RFID MFRC522 module pin with arduino uno is shown in the following picture.



Picture 3. Scheme of RFID MFRC522 module installation circuit

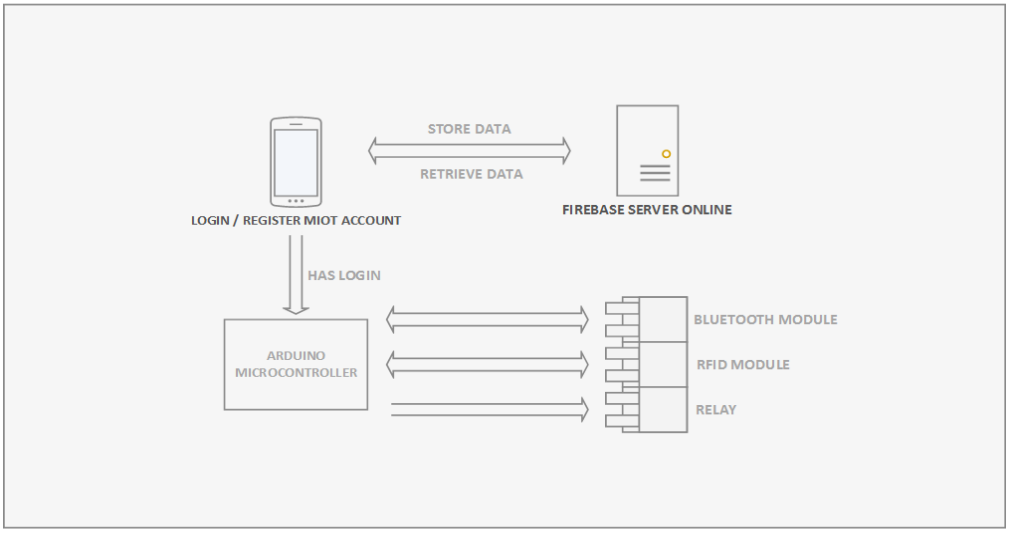
B. Software Design

The software includes the android app MIOT and FIREBASE data storage. The MIOT application is used to control hardware by sending data-shaped commands with integer data types to arduino uno using bluetooth connection. The MIOT application has a login and register feature, so each user is required to register by filling in the user's data and MIOT hardware used such as bluetooth address and motorcycle police number. Once the user has registered, the data will be stored in the FIREBASE database. Every time user uses the MIOT application, the user's data will be synced automatically, even if the user is not connected to the internet network (offline) or connected to the internet (online). The relationship and workflow of MIOT hardware with MIOT android application can be seen in picture 4.



Picture 4. MIOT device workflow

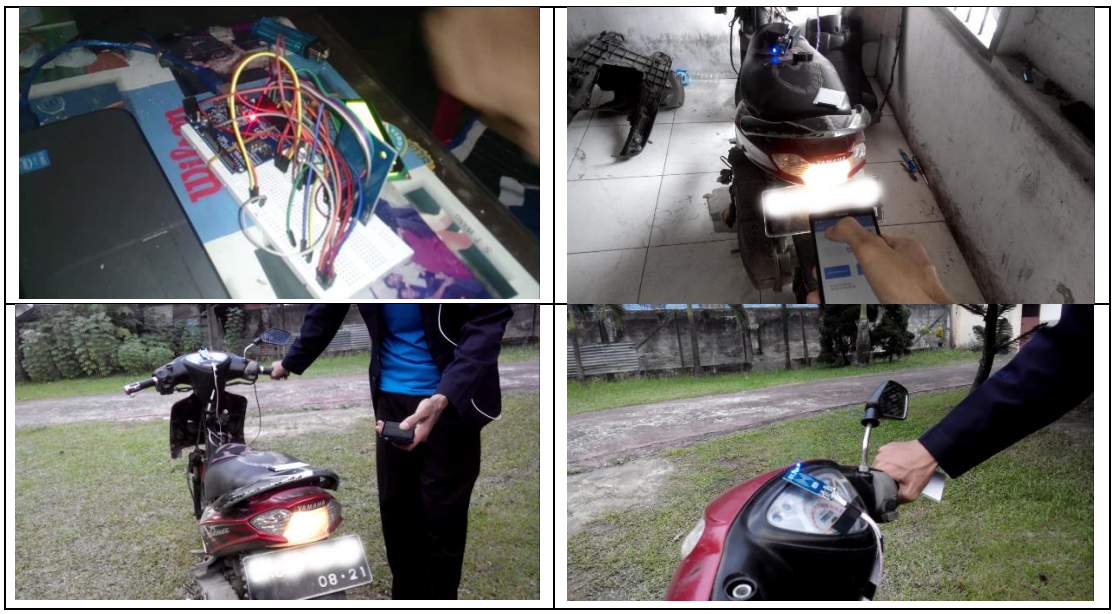
The following is the workflow of MIOT android Apps with MIOT Hardware as a whole.



Picture 5. MIOT workflow as a whole

3. MOTORCYCLE SAFETY TECHNOLOGY WITH IOT

After all component installation is completed, experiments are performed with the installation of MIOT devices on motorcycle.



Pictures 4,5,6,7. Installation of MIOT Device on Motorcycle

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