Enhance A Control Method in The Smart Gate Door Based On Sensor Metal Detector

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Abstract. The development of technology is increasingly advanced and provides a lot of convenience in the use of devices or tools related to human needs. With this in mind, the author made a gate controller using a bluetooth signal from an Android mobile and a garage door controller using an Arduino-based metal detector. This study describes users are not required to get off the car to open the gate and garage, because through a bluetooth signal from an Android phone, users can open and close the garage gate automatically and through detection of metal sensors, the garage door can be opened and closed automatically without burdening people to open the garage.

1. Introduction
Today the development of technology is increasingly advanced and provides many facilities in the use of devices or devices that are directly related to the needs of human life. One manifestation of the times is automation in all aspects of life[1] By automating equipment, it is expected to facilitate human work (S Aryza, et al, 2011). The gate control device uses a security blue-tooth signal in an area. From an Android cellphone and garage door controller using a metal sensor is a practical controlling tool that makes it easy for humans to not burden people to open the garagewith the existing technological advancements in the field of electronics(Wibowo P, et al., 2017), this research was made under the title of the New Controller Method on Smart Gates Based on Sensor Metal Dectector requires a gate door and garage control device that is practical, users are not required to get off the car to open the gate and garage, because through a blue-tooth signal from an Android mobile the user can open and close the gate, meanwhile the garage door opens and closes the gate and garage door. This tool is ideal to be applied directly in everyday life. In our daily lives we are automatic( Singla, Marwaha, 2006)

2. Literature Review
The basic principle of how this tool works is to control automatic gates using Android based Arduino(solly Aryza et al, 2017). First of all we have to install Basic for Android on Android phones as software to program the gate. Then we program the Arduino to be able to connect with Android via Bluetooth. If Android is connected to Arduino, then we just press the Open Gate button as a command to open the gate and the closing button to close the gate(Z Lubis & S Aryza, 2017). To open the garage, the car only needs to approach the metal detector 1 with a certain distance then the sensor detects the metal content contained in the car so that the garage door will open automatically. If the car is approaching metal detector 2 which is inside the garage, the sensor will detect the metal content in the car so that the garage door will close and lock automatically. To remove the car from the garage, the car must move away from the metal sensor so that the sensor cannot detect the metal content in the car, so the garage door will open automatically.
3. Method Of Research
In this Final Project Writing, the writer collects data as follows:
1. Data collection by studying literature by searching for books or information related to this tool.
2. Hold consultations and directives / guidance from supervisors and other sources that can be used as a reference and comparison in designing this tool.
3. Looking for the data needed in making this project using internet facilities
4. Result and Analysis.
A port used in this tool is port 0 to port 11 DC and ports A1 to A2 analog. This device is programmed to control the tool based on the program provided. Thus Arduino detects input from bluetooth and metal detector sensors. Picture of Arduino uno R3 pin circuit can be seen in Figure 1.

![Figure 1. Wiring Arduino uno R3](image)

The Bluetooth circuit functions as a signal sender to the arduino board to give commands to the DC motor to move the gate to open or close the gate. A Bluetooth circuit image connected to Arduino can be seen in Figure 2.

![Figure 2. Wire of Bluetooth connection on arduino](image)

| Distances | Connection | Conditions |
|-----------|------------|------------|
| 2 m       | Have connection | Motor run |
| 4 m       | Have connection | Motor run |
| 6 m       | Have connection | Motor run |
| 8 m       | Have connection | Motor run |
| 9 m       | Unconnection | Motor stop |
To turn on and turn off the doorlock solenoid, 1 relay circuit is used. This relay circuit consists of several resistors, 1 BC547 transistor, 1N4148 diode, 1 led and 1 relay. To open the doorlock solenoid at the gate, Arduino gives high logic on pin 7 and to open the doorlock solenoid in the garage, Arduino must provide high logic on pin 6. The image of the solenoid circuit connected to Arduino can be seen in Figure 3.

![Figure 3. Wiring solenoid doorlock have connection with Arduino.](image)

The motor driver circuit functions as a DC motor controller to open or close the garage gate or door. The motor driver used in this system is 1 piece. The entire control of the DC motor driver circuit is controlled by Arduino. To open the gate, Arduino must provide high logic on pin 2 and to close the gate, Arduino must give a low logic on pin 3, while to open the Arduino garage door must provide high logic on pin 4 and to close the garage door, Arduino must provide logic low on pin 5. Picture of motor driver circuit connected to Arduino can be seen in Figure 4.

![Figure 4. Wire Driver Motor with connection Arduino](image)

4.1. Wiring of Limit Switch.

Contact on the limit switch is divided into 2, the first contact is contact Normally Open (NO) is a limit switch that works non-automatically which does not maintain contact and the second is the contact Normally Close (NC) is a limit switch that works automatically that maintains contact. In the circuit limit switch tool we made, we used the Normally Open (NO) contact. When the gate is open, the NO contact on pin 9 is connected, so the DC motor gate will stop. When the gate is closed, the NO contact on pin 8 is connected, so the DC motor gate will stop. At the time the garage door is open, the NO contact on pin 11 is connected, so the DC motor of the garage door will stop. When the garage door is
closed, the NO contact on pin 10 is connected, so the DC motor garage door stops. The picture of the limit switch circuit connected to Arduino can be seen in Figure 5.

![Limit Switch Circuit](image)

**Figures 5. Wiring Limit Switch have connection with Arduino.**

4.2. **Wiring IC Regulator**

Regulator IC circuits made in this design consist of two voltage outputs, namely voltage +5VDC and +12VDC. The output voltage +5VDC is used to supply voltage to the relay circuit, bluetooth module and limit switch. The +12 VDC voltage is used to supply Arduino and DC motors. To produce a stable +5 VDC voltage, IC 7805 is used, where the regulator IC stabilizes the voltage at +5 VDC. To produce the +12 VDC voltage the adapter is used. The picture of the regulator circuit can be seen in Figure 6.

![Regulator Circuit](image)

**Figures 6. Wiring regulator**

4.3. **Sensor Metal Detector**

The sensor metal detector circuit serves to open the garage or close the garage. Pin A0 is used to open the garage door while pin A1 is used to close the garage door. Analog value when the sensor is not touched by metal, which is 500-600 decimal places, whereas if the sensor has touched metal, the resulting quantity is above 700 decimal places. The image of a metal detector sensor circuit can be seen in Figure 7.

![Metal Detector Circuit](image)

**Figure 7. Wire Sensor Metal Detector with connection Arduino**

5. **Conclusions.**

After doing hardware testing and software analysis, the writer can conclude the following:

1. To be able to open the gate is automatically used Bluetooth on an Android mobile phone which must be programmed using App Inventor software to connect the Bluetooth HC-06 used.
2. To be able to open the garage door automatically, a metal detector sensor with type FR12-4DC is used which will detect the metal content contained in the car at a distance of ≤ 2 mm.
3. Bluetooth will command properly at a distance of 9 meters without a hitch.
4. Solenoid door lock is used as a lock on the door requiring a current of 330 mA and can be used on the actual system.
5. The gate and garage door are fully open for 13 seconds to the limit switch.

References.

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