Research Inventy: International Journal of Engineering And Science
Vol.12, Issue 3 (March 2022), PP 34-37
Issn (e): 2278-4721, Issn (p):2319-6483, www.researchinventy.com

Automatic Door Gate Prototype Based On Nodemcu and Database Using Rfid

Matias Kristian Kelviandy
[1] *Department of Computer System, University of Gunadarma, Depok, Indonesia*

Abstract: *Security has become one of the main factors in many ways, for example, security in residential areas. In residential areas, a system is needed that can help improve the security of the population. Ronda, guard posts, road closures are some examples of increasing environmental safeguards that are common in settlements. To further improve security, the authors made writing entitled Automatic Gate-Based Prototype based on NodeMCU and Database using RFID. The way this tool works is by scanning RFID cards, if the card has been registered in the database then the gate will open and the server will add new data to the database. Each card registered can be used to open the gate. This writing aims to improve environmental security. This tool can be applied to housing, office buildings, apartments, and others. From this prototype tool, it can be concluded that electronic gates can be operated using RFID sensors and microcontrollers, in this case using NodeMCU. This prototype is not only for opening electronic gates but also used to improve security system.*

Keywords: *Automatic Door, Database, NodeMCU, RFID.*

Date of Submission: 05-03-2022 Date of Acceptance: 20-03-2022

I. INTRODUCTION

Security has become a top priority in society, since the past until now, crime continues to increase and the mode of crime is always changing with the times. As time goes by, a higher level of security is needed, especially in residential areas to prevent unwanted things from happening. One of the causes of weak security in housing is the freedom of vehicles that can go out or enter the housing without any screening and information on incoming guests, this can be a source of crime that will steal housing residents' belongings, one of which is motorized vehicles. Therefore we need a tool or system that can increase the security factor in housing, namely the portal.

Portal can be one tool that can improve the security system in housing because it can control every vehicle that comes out or enters. Portals can be used on residential main roads and have various forms and ways of use. In general, there are two types of portals that are often used, namely conventional portals and electronic portals. Conventional portals are manually operated using ropes and weights. While the electronic portal is operated using electric power and sensors or buttons.

In this study the author will create a "Prototype of Automatic Gateway Based on NodeMCU and Database using RFID". Every user who uses this portal will enter the database and record the time when using it. When the user scans the card on this device, the scanner will provide feedback to the user via LED.

II. EXPERIMENTAL PROCEDURE

This research was conducted in 3 stages, namely design, implementation, and system testing. The design and implementation produces a prototype in the form of a miniature parking gate that is ready to be tested. System testing includes functional testing of the system.

The design of the tool is made with the aim that the system must be able to detect the unique code on the RFID card. This system uses NodeMCU with ESP8266 microcontroller. Card reading is carried out by an RFID sensor that is connected to the NodeMCU. The server communicates with NodeMCU using WiFi. The components connected to the NodeMCU are RC522 as an RFID sensor, 2 LEDs as display feedback and a servo motor as a gate driver. RFID uses a frequency of 13.56 MHz. The server on the computer serves to communicate with the NodeMCU and access the database. The management of this system is carried out by the admin.

Software development on NodeMCU uses the Arduino IDE application using the C programming language. The applications used to support the server are WampServer and MySQL. The tests carried out are testing the sensor reading distance, the output on the server, and the output on the NodeMCU

In making the Automatic Gate Prototype based on NodeMCU and RFID, first a block diagram design and a comprehensive circuit scheme are needed to be able to make this tool, so that it can work optimally and have the

desired output. The manufacture of this tool is divided into three blocks which divide the components according to their function, namely input, process, and output. The RFID sensor is used to read the UID (Unique Identifier) on the RFID card and is used to open the electronic gate which in this paper uses a servo instead of the electronic gate and then sends the UID data to be entered into the database..

Figure 1. Diagram Block

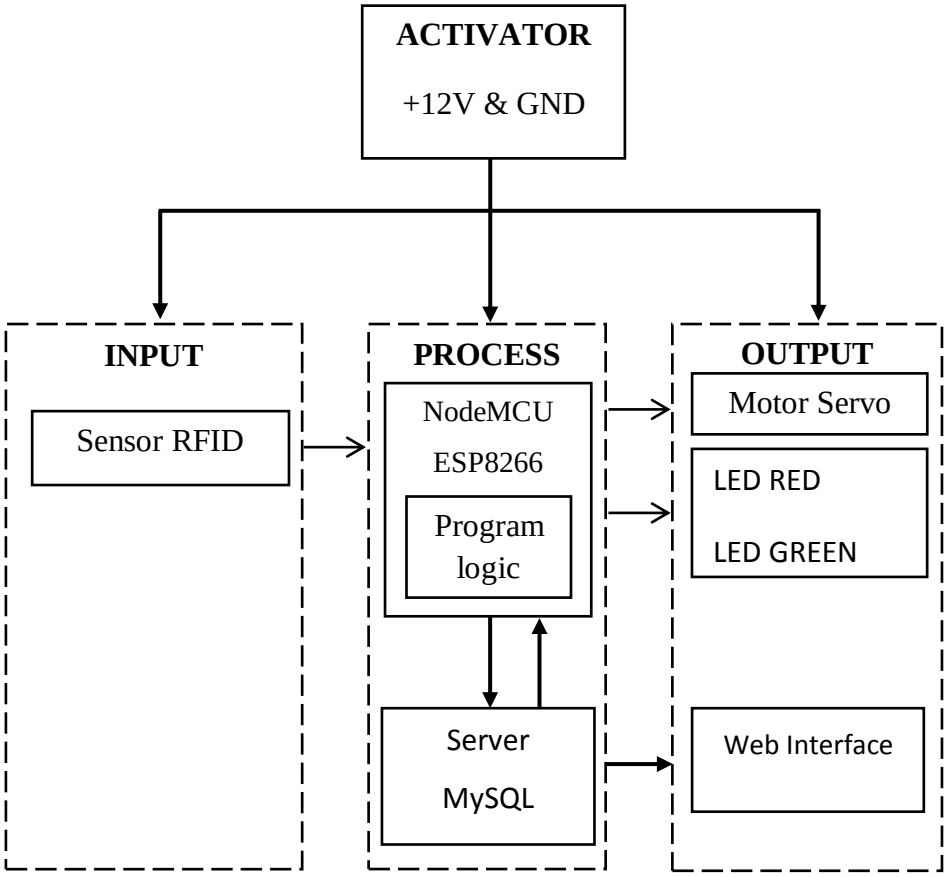

Figure 1 is a block diagram in which each block has its own function. Activator block as a voltage source to activate all other blocks. The activator block has one voltage input from a 12V adapter, then it will be connected in parallel with the buck converter to turn on the NodeMCU, because the NodeMCU has a maximum voltage of 5V and the servo motor uses 12V. Then in the input block there is an RFID sensor that will scan the RFID card and will send data to the NodeMCU. After that, the NodeMCU will process the data and send it to the database and drive a servo that functions as an automatic gate

Activator Block

The activator used in this circuit is a 12V adapter which is used to provide voltage for the 12V servo, then parallel it with the buck converter so that the voltage is lowered to 5V to turn on the NodeMCU. Then the RFID sensor gets a voltage of 3.3V from the NodeMCU, because the NodeMCU has a voltage regulator to lower the voltage to 3.3V.

Input Block

In this block there is an RC522 RFID sensor. This sensor is installed in a strategic place so that it is easily accessible by vehicle users. This component serves to scan the UID (Unique Identifier) on a compatible RFID card. The scanned UID is then sent to the NodeMCU to be forwarded to the database.

Process Block

This process block consists of NodeMcu ESP8266 which has been included in the program in the form of component initialization and digital commands. The Initialization section is used to declare what ports are used in this tool. This program is made to process the incoming data from the RFID sensor and then send it to

the database server. On the server, the data is processed again in order to determine whether the scanned card is registered or not, and will send the data to the NodeMCU so that it can drive the servo.

Output Block

The output block consists of one servo, two LEDs, and a web address that can be accessed via a browser to view a history list of scanned cards. If the server sends data that the card is not registered then the servo will not move and the red LED will light up. If the server sends data that the scanned card is registered, the NodeMCU will instruct the servo to move and the green LED will light up.

III. RESULTS AND DISCUSSIONS

When testing the tool and taking observational data on the design made, the results obtained that can be observed that the tool can run in good condition and in accordance with the flow of the program made. The following are the test results of the NodeMCU and RFID-Based Automatic Gate Prototype

Table 1 Testing the reading distance of the RFID sensor

Distance (cm)	**Status**	**Time (Second)**
1	Read	0,73
2	Read	0,79
3	Read	0,97
4	No Read	-
5	No Read	-
6	No Read	-

In testing the RFID sensor scanning distance in table 1, it can be concluded that the maximum distance the card can be read is three centimeters without any obstacles. Scan distance also has little effect on card scanning time.

Furthermore, testing is carried out on the output of the database after the card is scanned. In this test using two cards. One card is already registered in the database and the other is not registered. This test aims to determine whether the server can output correctly on each scanned card.

Table 2 Server test table

No card	**database**	**Status**
3221920815	Match	Registered
322523315	Not Match	No register

In the server test, the results can be seen in table 3. In the table above it can be concluded that if the card number is registered then there will be a match in the database, so the server will send data to the NodeMCU to open the gate. When the card does not match then the server will send data that the card does not match and will not open the gate.

Next is a test to test the output on the NodeMCU so that it can open the gate and turn on the LED. In this test using two output conditions from the server. The first condition is the condition when the card is registered. While the second condition is when the card is not registered

From the results of this test, the data presented in table 4. When the server conditions provide data that the card is registered, the NodeMCU will move the servo and turn on the Green LED. Meanwhile, when the server provides data that the card is not registered, the NodeMCU will not move the servo and turn on the red LED. In this test, all outputs are in accordance with the design and purpose of making this prototype

IV. CONCLUSION

From the prototype of this tool it can be concluded that the electronic gate can be operated using an RFID sensor and a microcontroller, in this case using a NodeMCU. This prototype is not only used to open electronic gates, but is also used to improve the security system in a housing. Everyone who passes through this gate can be monitored with the help of an identification system connected to the server. In its use, this prototype can be applied to apartment, residential, and office parking lots. Any data recorded in the database can be accessed easily when needed.

According to the test results of the tools that have been obtained in chapter 4, it can be concluded that the NodeMCU and RFID-Based Automatic Gate Prototype was successfully used as per its function..

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Matias Kristian Kelviandy. "Automatic Door Gate Prototype Based On Nodemcu and Database Using Rfid." *International Journal of Engineering and Science*, vol. 12, no. 3, 2022, pp. 34-37.