

SMARTDOOR PROTOTYPE USING ARDUINO AND AMR VOICE

Ari Permana Launuru
Department of Electrical engineering
Ambon State Polytechnic
Indonesia
rinamanuhutu@gmail.com

Rina L. Mauhutu¹; Lenora Leuhery²
1. Department of Electrical engineering
2. Department of civil engineering
Ambon State Polytechnic
Indonesia
rinamanuhutu@gmail.com

Abstract

Since it was announced by the President of the Republic of Indonesia on March 2, 2020, regarding the discovery of Covid 19 or corona cases in Indonesia, cases of corona sufferers have increased and spread to all corners of Indonesia. One of the characteristics of the Corona Virus is that it survives on the surface of objects held by the exposed person. Therefore, avoiding contact with objects that are shared is one way to prevent the spread of this virus. The gate and front door of the house are the most vulnerable objects as a place for the Corona virus to spread. This is because the gate and front door of the house are located outside the house and are in direct contact with many people passing by.

Microcontroller technology combined with a sound sensor via Bluetooth connection can function as an automatic door opening and closing lock that can prevent users from touching when they have to open the door. The microcontroller technology combined with a sound sensor via a Bluetooth connection can function as an automatic opening and closing key that prevents users from touching when they have to open the door.

The purpose of this research is to make automatic gates and doors using a microcontroller-based sound sensor.

The final result of this research is that the gate and door of the house can be controlled automatically using the Arduino Uno microcontroller device using Bluetooth input with the AMR_Voice interface supported by the Google Voice application.

Keywords : Smartdoor, Arduino Uno, AMR Voice

I. INTRODUCTION

Since it was announced by the President of the Republic of Indonesia in a press conference on March 2, 2020 regarding the discovery of Covid 19 or corona cases in Indonesia ^[1], cases of corona sufferers have increased and spread to all corners of Indonesia. It was recorded that on

July 14, 2020, the number of residents exposed to this virus had reached 78,572 people. In Maluku 900 people and specifically the city of Ambon who are positive for Corona as many as 216 people ^[2]

One of the characteristics of the Corona Virus is that it survives on the surface of objects held by the exposed person. Therefore, avoiding contact with objects that are shared is one way to prevent the spread of this virus ^[3].

The gate and front door of the house are the most vulnerable objects as a place for the Corona virus to spread. This is because the gate and front door of the house are located outside the house and are in direct contact with many people passing by. Opening the gate or front door directly by hand will put you at risk of being exposed to the corona virus. Researchers from Germany, Kampf, Günter et al in their research stated that the corona virus can survive on surfaces such as door handles for 9 days ^[4]. This has led researchers of the Center for the Innovation of Medical Equipment and Devices (CIMEDs) Gadjah Mada University in Indonesia to create a door handle to prevent the spread of corona to minimize the spread of the corona virus [5]

Advances in technology in the field of microcontrollers can be made automatic gates and front doors so that they can be opened and closed without having direct contact. Microcontroller technology combined with a sound sensor via an android Bluetooth connection can function as an automatic door opening and closing key that can prevent users from touching when they have to open the door. ^[6,7,8]

From the background described above, in this study the problem to be resolved is how to make the gate and front door of the house automatically using sound sensors and microcontrollers so that it can help users not need to come into contact with the door when opening and closing the door and reducing the risk. contracting the Corona virus.

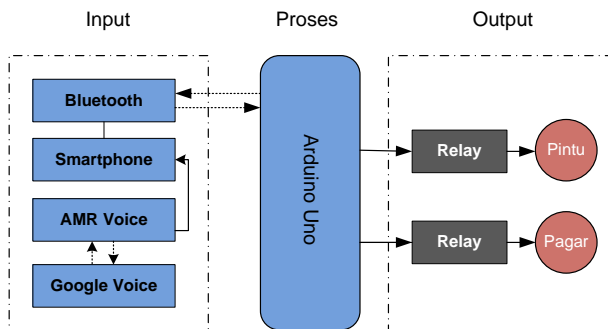
Research about automatic doors has been carried out by Yogie R. et al. with research entitled prototype of automatic door mover based on Arduino uno ATMEGA 328P with

fingerprint sensor. Sinta Ariyanti et al in her research entitled human voice-based door opening system have conducted research using the Easy VR module for human voice recognition. Likewise, Indo Intan et al. Have conducted research on automatic door locking systems using an Android-based microcontroller-based voice. The microcontroller used is ATMEGA 8535 which is an AVR microcontroller. Likewise, Yan Detha Sandy et al. In their research have developed an automatic door lock system using SMS gateway media. The title of this research is the implementation of an automatic door lock system for smart homes using an SMS gateway.

II. METHOD

A. Design of Tool

Design of the control device is designed as in the block diagram in Picture 1. The input section consists of Bluetooth CH05 as an interface that connects voice instructions via AMR_Voice which is already installed in the smartphone application with Google Voice. The Arduino Uno microcontroller is in the process section for processing instructions from the input to control the output. The output section consists of a relay that works on the command of the microcontroller. This relay is connected directly to the device to be controlled, namely the door of the house and the fence.



Picture 1. Block diagram of the system design tool

B. Design of Software

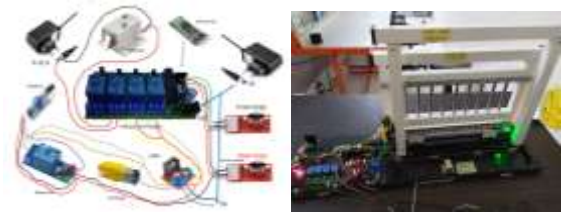
Applications used in this study are:

1. AMR (Android Meets Robots) application. This application can be downloaded via the Play store on Smartphone devices.
2. Arduino Ide application as a medium for programming the Arduino Uno Microcontroller.

III. ACTIVITY RESULT

A. Results of tool design

The results of the study can be described in Pictures below.



Picture 2: Results of tools design

B. Software Design

Results The simulation results of the software state that there is no error from the program that has been made. This program has been downloaded to Arduino and tested.



Picture 3: Results of Arduino software design

The simulation results of the software design show that there are no errors in the program created so that it can be downloaded to the Arduino Uno device.

C. Final Results

Tests were carried out on the design results of tools and software. The test results can be seen in the following table

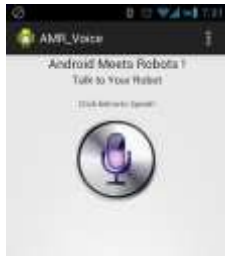
Table 1 and 2. Testing device identification with voice commands

No	Pintu	Hasil Uji coba	
		Ya	tidak
1	Fence	√	
2	House door	√	

No	Kata kunci	Identifikasi	
		Ya	tidak
1	buka pagar	√	
2	tutup pagar	√	
3	kunci pagar	√	
4	buka kunci pagar	√	
5	buka kunci rumah	√	
6	kunci pintu rumah	√	

C. Discussion

This microcontroller-based automatic door control uses Arduino Uno with bluetooth input. Bluetooth identifies the voice via a smartphone interface that has the AMR_Voice (Android Meets Robots) application installed, downloaded from the Google Play Store, as shown in the image below. AMR_Voice will be connected directly to Google Voice which then analyzes and translates the data into serial data which is sent to Arduino Uno via the Bluetooth module.



Picture 3. Initial display AMR_Voice

The command from Bluetooth functions as an Arduino Uno input to be processed or processed and then forwarded to the relay as an output to control the gate and the door of the house. The commands used in the gate control process in this study are

1. Open the fence to open the gate connected to PIN 2 Arduino
2. Close the fence to close the gate connected to PIN 3 Arduino
3. Lock the fence to lock the fence connected to PIN 4 Arduino . LOW
4. Unlock the fence to unlock the turnstile connected to PIN 4 Arduino. HIGH

The commands used in the house door control process are

1. Open the house key to open the house door connected to PIN 5 Arduino. HIGH
2. The house door lock to close the house door is connected to PIN 5 Arduino. LOW

After Arduino gets a command from the input via Bluetooth, Arduino will process the command according to the program that is already stored in Arduino's memory. If the command is appropriate, Arduino will access the relay to activate the device to be controlled according to the command, either open the door or close or lock the gate or house.

The trial results shown in tables 1 and 2 show that the program can run well. The device can identify orders and the gate and door to the house can be controlled as desired, namely opening, closing and locking the gate automatically and opening and closing the door automatically without needing to be touched.

IV. CONCLUSION AND RECOMENDATION

A. Conclusion

The gate and house door can be controlled automatically using the Arduino Uno microcontroller using Bluetooth input with the AMR_Voice interface supported by the Google Voice application.

B. Recommendation

Some things that should be done in further research regarding automatic gates and doors are:

- It is better to use a PIR (Passive Infrared) sensor on the gate so that the detection range of the sensor is wider to prevent the door from remaining actively closed or open if there are animals through.
- Use of pistons or motors for house doors so that the doors open and close without the need to be pushed.

REFERENCES

- [1]. <https://www.cnnindonesia.com/nasional/20200302111534-20-479660/jokowi-umumkan-dua-wni-positif-corona-di-indonesia>
- [2]. <https://covid19.go.id/>
- [3]. Wang Zhou,MD. 2020. *The coronavirus prevention handbook*. Chief Physician of Wuhan Center For Disease Control and Prevention
- [4]. Kampf, Günter & Todt, D. & Pfaender, S. & Steinmann, Eike. (2020). Corrigendum to "Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents" [J Hosp Infect 104 (2020) 246–251]. *Journal of Hospital Infection*. 10.1016/j.jhin.2020.06.001.
- [5]. Suyitno dkk. 2020. *pendorong dan penarik pintu dengan lengan dan siku lengan, pendorong dan penarik pintu dengan telapak kaki, pemutar gagang pintu dengan lengan dan siku lengan, serta pemutar gagang pintu dengan telapak kaki*. Paten. CIMEDs.UGM
- [6]. Sinta Ariyanti, dkk. *Sistem buka tutup pintu berbasis suara manusia*. 2018. Yogyakarta. *Jurnal Elinvo (Electronics, Informatics and Vocational Education)*
- [7]. Yan Detha sandy, dkk. *Implementasi sistem kunci pintu otomatis untuk smart home menggunakan SMS gateway*. 2015. e-Proceeding of Engineering.
- [8]. Yogie R, dkk. 2015, *Prototype penggerak pintu otomatis berbasis arduino uno ATMEGA 328P dengan sesnsor sidik jari*. Lampung. *Electrician – Jurnal Rekayasa dan Teknologi Elektro*.
- [9]. Iswanto. 2015. *Buku Diktat Mikrokontroler*. Universitas Muhamadiyah Yogyakarta.
- [10]. Barrett, Steven. 2011. *Arduino Microcontroller: Processing for Everyone*. New Jersey: Third.

- [11]. McRoberts, Michael. 2013. Beginner Arduino. Second Edition. Ajax: Apress Publisher. New York.
- [12]. Casey Reas, dkk. <https://www.arduino.cc> Di Akses Pada 23 Juli 2020