

Design of Automatic Door Opening Prototype using Recognition Voice

Winarno Fadjar Bastari

Department of Electrical Engineering
University of PGRI Adi Buana Surabaya
winarnofbastari@unipasby.ac.id

Anugerah Prasetyo Wibowo

Department of Electrical Engineering
University of PGRI Adi Buana Surabaya
Anugerah.pw@gmail.com

Abstract — Security at the door is very important for everyone, because the door acts as access to enter or exit a private room. Therefore, the key as a door security plays an important role in implementing the security system. With the frequent occurrence of key loss and also the rise of increasingly sophisticated crime rates in breaking into or destroying conventional keys, it becomes a thought for the author to develop a security system that is more private in nature. That is by using an application that is expected to be a security in the form of a password which will certainly be more profitable. The design of this tool is made with Arduino as a processing center and a servo motor to function to move the doorlock. The next stage Arduino will give a command to the servo to open the door. Only certain people who have access passwords can open doors in rooms that use voice recognition. Meanwhile, those who do not have an access password will not be able to unlock the door in the server room. So that the design of a smart door lock tool that uses Arduino-based voice recognition will provide a more computerized level of security and access

Keywords: *Doorlock , Arduino , Servo , voice recognition*

I. INTRODUCTION

The rapid development of technology will further facilitate human work, so that some activities can be done more easily and shorten the time. Therefore, it is designed an electronic device that can increase the efficiency of time in opening and closing the door of the house.

Based on previous research conducted by Ashar Seppiawan N, Nurussa'adah, entitled Automatic gate security system using voice recognition. So the difference between previous studies and this research is the addition of a solenoid doorlock component to lock the door. In previous studies, only using a servo motor as a door opener which is still not perfect, because it only opens the door without using a security system to lock the door. Therefore, with the

renewal of this tool, it is hoped that it can facilitate human work.

Doors are the main access to enter a room, and automatic doors will be needed by humans to facilitate work when someone is carrying a lot of goods or other activities that do not allow him to reach or hold the doorknob. With an automatic door design like this, it will make it easier for someone to enter a room when carrying a lot of goods and will also be useful for people with physical disabilities who have difficulty opening, closing, pushing, and sliding doors. In addition, with the increasing number of thefts around us, we need a security system (automatic doors) with a higher level of security.

Seeing a situation like this, a tool was designed that can help and facilitate access to the entrance, but uses advanced technology and has a higher use value. This tool is made with the Arduino system which functions as the center for controlling the door opening and closing system. As input to open the door, it uses a voice recognition system by the application which will then be translated by Arduino to run commands as a driver for opening and closing the room door

II. RESEARCH METHODS

At this stage of research, starting from the design of the tool, the manufacture of the tool, to the testing of the tool, which is described through the research flow chart as shown in Figure 1.1 as follows :



Figure 1.1 Research Stages

In the early stages of the research, a design for an automatic door opening device was made using voice recognition. The next stage is the manufacture of the tool which is carried out according to the design, and then the testing of

the tool can be carried out after the tool is realized.

To make it easier to understand the workflow of the designed system, a Flowchart is made that describes how the product works. The system flowchart can be seen in Figure 1.2 below:

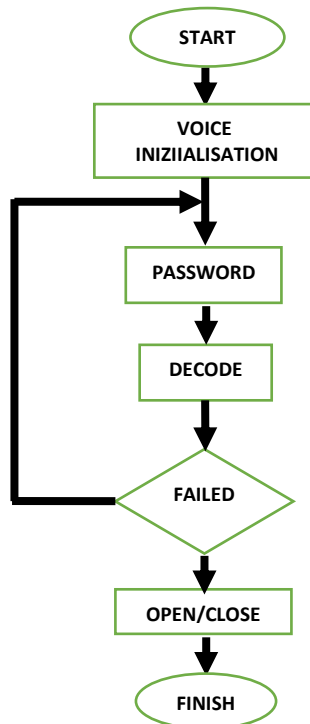


Figure 1.2 - Flowchart System

a. Working of the System

How the system works is described through a Flowchart in Figure 1.2. The control system is designed to make it easier for the user to open or lock the door, which is no longer using a manual key but with voice. The user says the word "Open" then the voice recognition application will capture the voice. Arduino receives sound and processes it according to program commands. Then Arduino outputs the received input. The output is an active motor that will unlock the door. The block diagram circuit is as follows:



Figure 1.3 Diagram Block

b. System Test

How the product works This control system is designed to make it easier for the user to open or lock the door, which is no longer using a manual key but with voice. When the user says the word "Open", the voice recognition application captures the sound. Arduino receives sound and processes it according to program commands. Then Arduino outputs the received input. The output is an active motor which will then unlock the door.

The next research is to calculate the sound capture distance, the accuracy of the sound capture on the voice recognition application module and the servo motor driving the door opener. When the servo motor is given a voltage, the servo motor will rotate to a predetermined degree level (the door will open), then if there is no voltage, the servo motor does not rotate (the door remains locked).

The data collection method used in this research is the method of observation and documentation, namely by observing the results of trials and studying references related to the design of the tool. Meanwhile, as a method of data analysis is a descriptive analysis method that describes the results of trials which include:

- HC-05 bluetooth module as a command catcher from voice recognition applications.
- Arduino Uno microcontroller as a tool that will send the next command when it receives a voice command from the application.
- Servo motor as output to open the door.

III. RESULT AND DISSCUSION

In this section, we will discuss testing tools and the results of system design to determine the level of accuracy for each component used and to find out the percentage of errors generated. The following is a test of the accuracy of each component used in this study

Table 1. Test data results

No	Name	Gender	No. of test	Voice Pick up Distance	Status
1	Hasan	Man	1	50 cm	Succeed
			2	500 cm	Succeed
			3	3 meter	Succeed
2	Roy	Man	1	50 cm	Succeed
			2	500 cm	Fail
			3	3 meter	Succeed
3	Nanda	Woman	1	50 cm	Succeed
			2	500 cm	Succeed
			3	3 m	Succeed
4	Sheila	Woman	1	50 cm	Fail
			2	500 cm	Fail
			3	3 m	Berhasil
5	Handika	Man	1	50 cm	Berhasil
			2	500 cm	Fail I
			3	3 m	Berhasil
6	Thoyib	Man	1	50 cm	Berhasil
			2	500 cm	Berhasil
			3	3 m	Fail
7	Fauzi	Man	1	50 Cm	Succeed
			2	500 Cm	Succeed
			3	3 m	Succeed
8	Bintoro	Man	1	50 Cm	Succeed
			2	500 Cm	Succeed
			3	3 m	Succeed
9	Bella	Woman	1	50 Cm	Succeed
			2	500 Cm	Succeed
			3	3 m	Fail
10	Eko	Man	1	50 Cm	Succeed
			2	500 Cm	Succeed
			3	3 m	Succeed
11	Yusril	Man	1	50 Cm	Succeed
			2	500 Cm	Succeed
			3	3 m	Succeed
12	Ramzani	Man	1	50 Cm	Succeed
			2	500 Cm	Succeed
			3	3 m	Succeed
Precision					95%

Arduino Uno will give a command and the servo motor after receiving a command from the application, will close or open the door.

All components that are assembled are in accordance with the design made as a whole, which will then be known about the function and performance of the tool. Based on the measurement of research tools that have been designed, it can be concluded as follows:

- The application can serve as a command to open or close the door.
- The tool is able to work properly according to program commands.

The information system testing data in the simulation experiment are as follows:

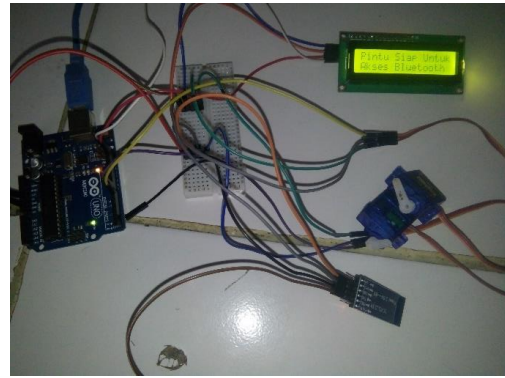


Figure 3.1 - The whole set of tools

Data analysis in this study was obtained by simulating the use of the system that has been made to determine the level of success. As shown in the data/test results above, it can be seen that a door opener using voice recognition will get a precision of 95%. The test shows how accurate the sound capture is when the experiment is repeated. Based on the experiment, it can be said that the tool has good reception, meaning that the tool can receive orders stably when used and has a 95% success rate. This value is not perfect considering that there have been several experiments where the device will be disturbed if there is another bluetooth on. The success rate indicates that the tool made can function properly.

IV. CONCLUSION

From the tests that have been carried out, the results of this study can be concluded that:

This prototype has a success rate in the ability to receive good voice commands located at a distance of 50 cm to 500 cm. The ideal distance for giving voice commands is a distance that is not too close or not too far away. The results of the Sampling Test have been carried out, it is found that the voice recognition application has a voice reception success rate of 95% for receiving voice commands from different people.

ACKNOWLEDGEMENT

Acknowledgments to the Dean of the Faculty of Engineering, University of PGRI Adi Buana Surabaya and Electrical Engineering Department which has provided assistance, facilities and support to carry out this research activity.

REFERENCE

- [1] Adan, Russ, 1990, *Sourcebook of Automatic Identification and Data Collection*, Van Nostrand Reinhold, New York.
- [2] Akhmad Wahyu Dani, Andi Adriansyah, Dodi Hermawan, 2016, Perancangan Aplikasi Voice Command Recognition Berbasis Android Dan Arduino, Vol.7 No.1 Januari 2016, Jurnal Teknologi Elektro, Universitas Mercu Buana
- [3] Andriana, Olly, Riyanto S., Ganjar T., Zulkarnain, 2016, Speech Recognition Sebagai Fungsi Mouse Untuk Membantu Pengguna Komputer Dengan Keterbatasan Khusus, Prosiding Semnastek, 2016, Fakultas Teknik, Universitas Muhammadiyah Jakarta.
- [4] B. T. Atmojo, S. R. Sulistyanti, dan E. Nasrullah, 2013, “Model Sistem Kendali Pintu Otomatis Menggunakan Barcode Berbasis PC (Personal Computer) Pada Gerbang Laboratorium Teknik Elektro Unila”.
- [5] Chamdun, Muhammad. Adian, F. Rochim. Eko, D. Widiyanto. Sistem Keamanan Berlapis pada Ruangan menggunakan RFID (Radio Frequency Identification) dan Keypad untuk Membuka Pintu Secara Otomatis”. Universitas Diponegoro. Semarang. Jurnal Teknologi dan Sistem Komputer, 2014, Vol 2, No 3, e-ISSN: 2338-0403
- [6] D. A. Hudhaya, 2012, “Aplikasi Pengenalan Ucapan dengan Jaringan Syaraf tiruan Propagasi Balik untuk Pengendalian Smart Wheelchair”.
- [7] Damai Arbaus, Dwi Arman Prasetya, Anggraini Puspita Sari, 2018, Kecerdasan Buatana Pada Sistem Pintu Otomatis Menggunakan Voice Recognition Berbasis Raspberry Pi, Universitas Wisnuwardhana Malang, Jurnal Ilmu-Ilmu Teknik - Sistem, Vol. 12 No. 3.
- [8] G. Melissa, 2008, Pencocokan Pola Suara (Speech Recognition) dengan Algoritma FFT dan Divide and Conquer. Program Studi Teknik Informatika, Sekolah Teknik Elektro dan Informatika, ITB.
- [9] M.Tri Satria Jaya, Diyah Puspitaningrum, Boko Susilo, 2016. Penerapan Speech Recognition Pada Permainan Teka-Teki Silang Menggunakan Metode Hidden Markov Model (HMM) Berbasis Desktop, Jurnal Rekursif, Vol. 4 No.1 Maret 2016, Program Studi Teknik Informatika, Fakultas Teknik, Universitas Bengkulu.
- [10] Mutohar, 2007, “Voice Recognition,” Bandung.
- [11] Qothrun Nada, Cahya Ridhuandi, Puji Santoso, Dwi Apriyanti, 2019, Speech Recognition dengan Hidden Markov Model untuk Pengenalan dan Pelafalan Huruf Hijaiyah, Jurnal AI Azhar Indonesia, Vol. 5, No.1, 2019.
- [12] Rochman, Sagita, and Mochamad Taufiq Irvan Efendy. "Arduino Based Design of Horizontal Wind Power Generator for Coastal Road Lighting." *BEST: Journal of Applied Electrical, Science, & Technology* 3.1 (2021): 30-33.
- [13] Rochman, Sagita, and Roib Mukodah. "AUTOMATIC FISH GRILLER BASED ON TEMPERATURE CONTROLLER." *BEST: Journal of Applied Electrical, Science, & Technology* 2.2 (2020): 33-36.
- [14] S. Sharma, 2015, Speech Recognition with Hidden Markov Model: A Review, International Journal of Scientific & Engineering Research, Volume 6, Issue 11, November, 2015