
Design of Automatic Door Prototype With Intelligent Control Method Using Sensor GY 906 Temperature Based on Arduino Uno

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ABSTRACT

In the current era of globalization, there have been many developments, especially in the realm of technology. Technological advances are expected to facilitate human work. One example is the development of doors, where now there are many doors that operate automatically. Automatic door is a door that will open automatically when someone approaches the door without opening or pushing the door manually. Nowadays automatic doors have been widely used in various places. to facilitate access to a place, the authors conducted research to design automatic doors based on body temperature. This tool is designed using a GY 906 temperature sensor combined with the Arduino uno program.

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1. INTRODUCTION

Along with advances in technology in the modern era as it is today, demand man for everything practical in operate all activity a day day. The reality is that in existing technological advances, there are still many people which uses the doorknob to open and close the door. To facilitate activities and mobility along with the development of technology, many have used automatic doors. Where this door can open automatically if someone approaches. The working principle of this tool is that it can detect the temperature of the human body. So if there is a human temperature approaching this sensor, the door will be able to open automatically. This manual process of opening and closing doors will certainly be ineffective if the place has large doors, for example in mall lobbies and hotel lobbies. For the application of this door, it has been widely applied in public places such as malls. Based on the problems mentioned above, it is necessary to have a tool which is able to facilitate human activities in opening the door automatically. The device will be connected with a system and a microcontroller system.

A. Arduino

Arduino uno is a microcontroller based on Atmega328. Microcontroller is a circuit that works as a controller of an electronic circuit. This microcontroller controls the work processes that exist in the electronic circuit so that it can be adjusted as needed. The Arduino UNO has 14 digital input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz Crystal oscillator, a USB connection, a power jack,

an ICSP header, and a reset button. Arduino UNO contains everything needed to support a microcontroller, easily connects to a computer with a USB cable. Arduino uno board as shown in the following picture:



Figure 1. Arduino UNO

The configuration of the Arduino Uno section is as described below.

1. Digital input/output pins (0-13 . label)
In general, these I / O pins are digital pins, namely pins that work at digital voltage levels (0V to 5V) for either input or output. 3,5,6,9,10 and 11, in addition to pins 0 and 1 also have a special function as serial communication pins.
2. Analog input pins (labels A0 – A5)
These pins can accept analog input voltages between 0V to 5V, this voltage will be represented as a number 0 - 1023 in the program.
3. Pins for voltage sources This group of pins is a collection of pins related to the power source, for example 5V output, 3.3V output, GND (2 pins) and Vref (reference voltage for internal ADC readings)
4. IC ATmega328 S
This IC acts as a data processing control center.
5. IC ATmega16U
This IC is programmed to handle data communication with PC via USB port.
6. USB jack
Is a USB type B socket as a serial data connection with a PC.
7. Jack Power
Is a socket for external power supply between 9V and 12V DC.
8. ICSP (In-Circuit Serial Programming) port
This port is used to program Arduino without bootloader.
9. Reset Button
Used to reset the Arduino microcontroller board to start the program from scratch.

B. GY 906 . sensor

GY-906 . Sensors is touchless temperature sensor. It means to measure the temperature of a the sensor object does not need to be in direct contact with the object study, only enough director sensors to object which be read temperature by absorbing infrared rays *from* the object being measured. Infrared radiation from this sensor emits wavelengths of 0.7-14 microns which is useful for temperature measurement. This matter because an object emits infrared energy intensity which is directly proportional to the temperature. picture Sensor Gy 906 as in the image below.



Figure 2. GY 906 . sensor

The GY 906 sensor specifications are shown in the table below.

Table 1. GY 906 . sensor specifications

Regarding	Description
Range Temperature	-40 ... + 125
Accuracy Measurement	0.5 _ in range 0 up to 50
Resolution	0.02 _
Source Voltage	3V...5V
Etc	Version area single and double, SMBus interface digital which compatible and PWM output which could changeable for continuity reading. Distance measurement 20-30cm

C. Servo Motor

Servo motor is an electromechanical device designed to use a closed loop type control system (servo) as a driver in a circuit that produces torque and speed based on electric current and applied voltage. These motors are applied to a wide range of equipment, from the simplest such as electronic toys to the complex ones such as industrial machines. Servo motors are types of electric motors that use a closed loop type system. This system is used to control the speed and acceleration of electric motors using a fairly high level of accuracy. In addition, these motors are commonly used to convert electrical energy into mechanical energy by the interaction of two permanent magnetic fields . The motor can also be defined as a rotary actuator or similarly called a motor, which is designed using a closed loop type control system (servo). Thus, it can be set to determine and confirm the angular position of the output shaft. The image of the severti motro servo is shown in the following figure.



Figure 3. Servo motor construction

D. LCD

LCD or *Liquid Crystal Display* is a type of display media that uses liquid crystals to produce a visible image .

LCD or Liquid Crystal Display parts include :

- Polarized Layer 1 (Polarizing Film 1)
- Positive Electrode
- Liquid Crystal Layer
- Negative Electrode
- Polarized Layer 2 (Polarizing film 2)
- Backlight or Mirror (Backlight or Mirror)

The working principle of the LCD is that it emits light such as: white light is light consisting of hundreds of different colored lights. Hundreds of colors of light will be seen when white light reflects or changes the direction of the light. That is, if the angle of reflection differs , the color of the light produced will be different. The white LCD backlight will provide lighting on the Liquid Crystal or Liquid Crystal. The liquid crystal will filter the backlight it receives and reflect it at the desired angle so as to produce the required color. Liquid Crystal Angle will change when given a voltage with a certain value. Because by changing the angle and filtering the backlight on the liquid crystal , the backlight that was previously white can change into various colors. If you want to produce white color, then the liquid crystal will be opened as wide as possible so that the white backlight can be fully displayed. On the other hand, if you want to display black, the liquid crystal must be tightly closed so that no backlight can penetrate. And if you want other colors, it is necessary to adjust the reflection angle of the liquid crystal in question. The LCD is used as in the picture below.



Figure 4. LCD

2. RESEARCH METHOD

Based on the study to be studied , the *flowchart* of this research is as shown in the following figure.

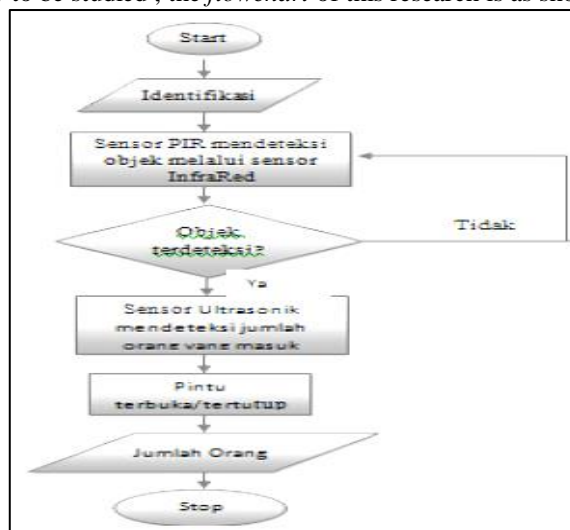


Figure 5. Research flowchart

3. RESULTS AND DISCUSSIONS

A. One-line circuit diagram

The wiring diagram of the automatic door using the GY 906 sensor is shown in the image below.

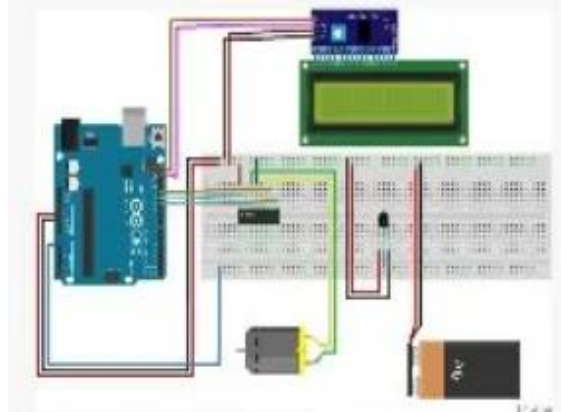


Figure 6. One line circuit diagram

The results of the measurement of the automatic door prototype using the GY 906 temperature sensor were carried out several tests as follows. The response of the GY 906 temperature sensor to the detected distance reading is as shown in the following table.

Table 1. Sensor reading results

No	Distance	GY 906 . Sensor Results
1	1 cm	Can be detected
2	2 cm	Can be detected
3	3 cm	Can be detected
4	4 cm	Cannot be detected

From the measurement results it was found that the sensor can work a maximum of 3 cm from the object. So that if detected , it will command the servo motor to open the door automatically.

4. CONCLUSION

This study discusses the design of automatic doors based on body temperature. The results of this study can be concluded as follows: At a distance of 1 cm the sensor can detect body temperature so that it can command the servo motor to open the door. At a distance of 2 cm the sensor can detect body temperature so that it can command the servo motor to open the door. At a distance of 3 cm the sensor cannot detect body temperature so it cannot command the servo motor to open the door. At a distance of 4 cm the sensor cannot detect body temperature so it cannot command the servo motor to open the door

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REFERENCES

- S. Hendra, HR Ngemba, and B. Mulyono, "Prototype Design of RFID Technology and 4x4 Keypad for Double Security at Home Doors,
- Lestari, Novi. December 2017. Rangan Builds Automatic Doors Using Arduino Uno and PIR (Passive Infra Red) Sensors at SMP Negeri Simpang Semambang. *Jusikom: Journal of Musirawas Computer Systems* .
- R. Latuconsina et al., "Utilization of PIR Sensor (Passive Infrared Receiver) and Atmega 16 Microcontroller for Efficiency of Water Use for Wudhu," *J. Inform. J. Pemb. IT*, vol. 02, no. 02, pp. 18–22, 2017
- Jufri, "Design and Implementation of Electronic Door Locks Using Arduino and Android," *STT STIKMA Int.*, vol. 7, no. 1, pp. 40–51, 2016.