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AUTOMATIC DOOR SIMULATOR DESIGN BASED ON ARDUINO UNO USING PROTEUS SOFTWARE

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ABSTRACT

In this pandemic era, doors in public places are one of the objects that can be an intermediary for the transmissionof the Covid-19 virus. That's why various kinds of developments in the field of technology are designed to provide an alternative in avoiding the transmission of the Covid-19 virus through doors in public places.The purpose of this study is to design an Arduino Uno-based automatic door simulator using Proteus software. The sensor used in this system is a PIR (Passive Infra Red) sensor. The way the system works is that when the PIR sensor detects someone's movement, the Data OUT Pin will be HIGH. Because this pin is connected to the Arduino, it will detect this HIGH Signal and detect that someone is approaching the door and will provide input to the DC motor, then the DC motor will move to the right or left to pull the door. From the simulation results, the delay between sensor readings and the movement of the DC motor is about 5 3 to 5 seconds.

Keyword: *automatic doors, arduino uno, proteus software*

I. INTRODUCTION

Today, technology is developing very quickly and increasingly sophisticated. The development of this technology is surely closely related to the development of electronics engineering science. Where electronic engineering is a supporter and driver of advances in information technology and even the development of this technology has become a necessity in everyday life (Ostadz, et al 2021).

In the Covid-19 pandemic situation, one of the protocols imposed by the government for people who are active in public spaces or open facilities is 5M, one of which limits mobility and interaction, including using objects together (Rindi, 2020).

Doors in public places are one of the objects that can be an intermediary for the transmission of the Covid-19 virus. Therefore, this study aims to design an Arduino-Based Automatic Door Simulator using Proteus Software.

In addition to developing an automation system, this article also aims to develop a virtual laboratory system using Proteus software as one of the student practicum steps during the pandemic situation.

Proteus software can simulate electronic circuits that are equipped with various types of electronic components by supporting the architecture so that it can also include programs (Putra, 2016).

II. LITERATURE REVIEW

2.1. Arduino Uno

Arduino Uno R3 is a microcontroller development board based on the ATmega328P chip (Edo Agung, 2021).

Arduino Uno has 14 digital input / output pins (or commonly written I / O, of which 6 pins can be used as PWM outputs), 6 analog input pins, using a 16 MHz crystal, an USB connection, a power jack, an ICSP header and a reset button (Reza, 2021). In figure 2.1 shows the schematic of Arduino Uno.

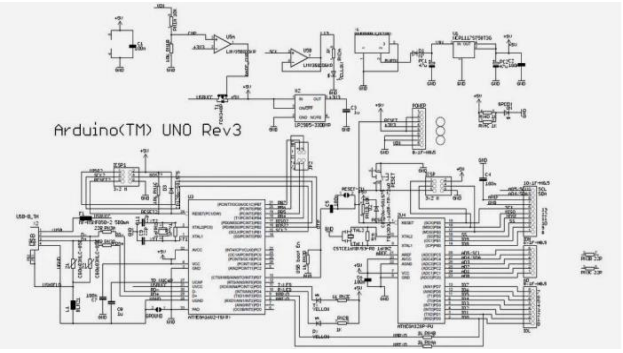

Figure 2.1. The schematic of Arduino Uno (Ostadz, 2021)

2.2. Sensor PIR (Passive Infra Red)

Sensor PIR is a sensor used for security sensorsthat will place in a place or point that ispassed by the object to detect the object quickly (Pristisal Wibowo, 2017).

Passive Infrared Receiver sensor (PIR) is an electronic sensor that measures infrared light emitting from objects around it (F.Tang, 2019).

Therefore, a device is designed that can control the lights by using movements detected by the PIR sensor and processed using a computer (Lestari, 2019)

The PIR sensor is a sensor that captures the infrared signal emitted by the human body. The PIR sensor can respond to changes in the infrared signal emitted by the human body.

The PIR sensor is made of crystal material which will cause an electrical load when exposed to heat and infrared signal emission. Changes in the intensity of the beam from the infrared signal also cause changes in the electrical load on the sensor (Haribu, 2015). The physical form of the PIR sensor can be seen in Figure 2.2

Figure 2.2. Sensor PIR (Passive Infra Red) (Ostadz, 2021)

2.3. Simulation

Designing a simulation canfuction to interpret initial data to help analyze and develop a technique or product in which it uses a combination of several approaches or concepts to model the behavior of a particular product with a few additions or changes to the concepts applied (Pratama, 2017).

One of the software that can be used to create tool simulators is Proteus 8 Professional software. Proteus 8 Professional software is a program used to create electronic circuit schematics and/or simulations. This program is supported by various features such as the ability to simulate digital and analog designs and has many virtual instruments such as voltmeters, ammeters, and many other features that facilitate the process of making simulators for beginners and making design schemes that are close to real conditions (Tarizman, 2021).

III. METHODOLOGY

3.1. Research Methodology

In this study, the methods used are literature study methods, experimental methods, and simulation methods. The flow chart of the research method is shown in Figure 3.1.

Study literature, design the initial design of the simulator, create a simulation circuit, program the control system, simulation test, retrieve the data, analyze the data, finish.

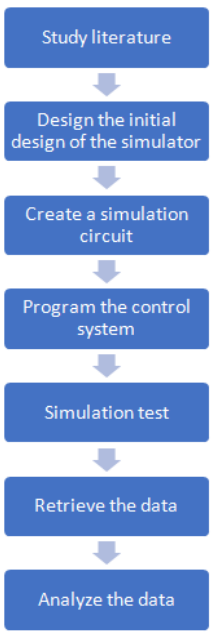

Figure 3.1. Research Methodology

IV. RESULT AND DISCUSSION

4.1. Design System

In this study using Proteus software, the first step is to design the simulator design. The design of the simulator on Proteus is shown in Figure 4.1.

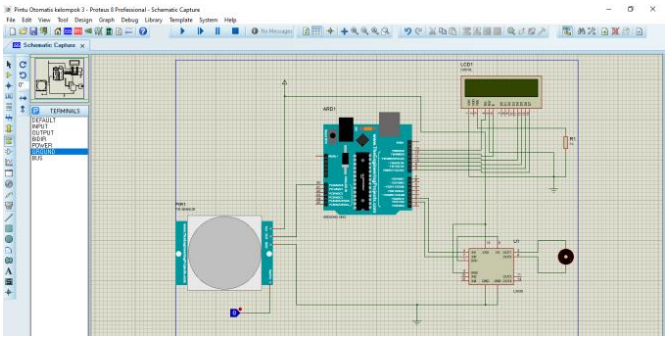

Figure 4.1. Design simulator on proteus.

After making the design, the next step is to write a program on the Arduino Uno through the Arduino IDE software. The program code is shown in Figure 4.2.

```
sketch_jul20b
#include <LiquidCrystal.h>
LiquidCrystal lcd(13, 12, 11, 10, 9, 8);
#define PIR_sensor 14
#define m11 0
#define m12 1

void setup() {
  // put your setup code here, to run once:
    lcd.begin(16, 2);
    pinMode(m11, OUTPUT);
    pinMode(m12, OUTPUT);
    pinMode(PIR_sensor, INPUT);
    lcd.print(" Automatic ");
    lcd.setCursor(0,1);
    lcd.print(" Door Opener ");
    delay(3000);
    lcd.clear();
    lcd.print("CIRCUIT DEGEST ");
    delay( 2000 );
}
bool i;

void loop()
{
  // put your main code here, to run repeatedly:
       if(digitalRead(PIR_sensor) && i)
      {
        lcd.clear();
```

Figure 4.2. Automatic Door Simulator Program Code

4.2. Result of the Simulation

The way the Automatic Door Opening System works using Arduino and PIR Sensor is very simple. When the PIR Sensor detects someone's movement, its' Data OUT Pin will go HIGH. Since this pin is connected to Arduino, it will detect this HIGH Signal and read that someone is approaching the door.

The PIR sensor used has three terminals, namely Vcc, GND and out. Out is connected directly to pin number 14 (A0) of the Arduino Uno. Here a 16×2 LCD is used to display the status of the PIR

Sensor, if it is too complicated then we can just use a serial monitor.

The RS pin and the E LCD pin are connected to pins 13 and 12 of Arduino. While the data pin (D0-D7) is connected to digital pins 11, 10, 9, 8, then RW is connected to Ground. L293D motor driver is connected to pin 0 and pin 1 to control the dc motor to open and close the door (the motor can rotate from right to left).

Figure 4.3 shows when an object is approaching and Figure 4.4 shows a state when an object is not approaching.

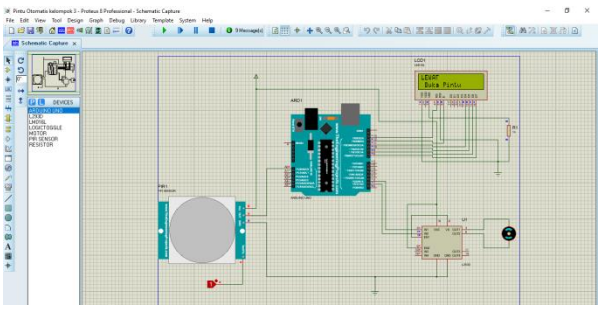

Figure 4.3. Simulation on proteus when object is approaching

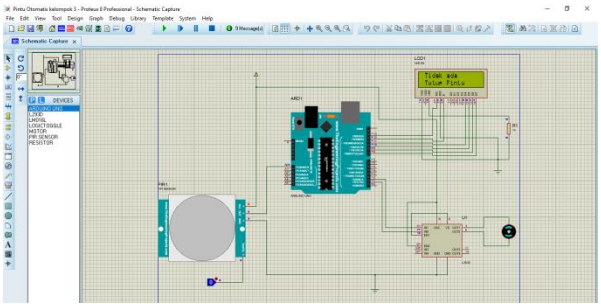

Figure 4.4. Simulation on proteus when object is not approaching

V. CONCLUSION AND RECOMENDATION

5.1. Conclusion

The development of an automatic door system simulator design using the Arduino Uno-based Proteus software has been successfully designed as expected.

The way the system works is that when the PIR sensor detects someone's movement, the Data OUT Pin will be HIGH. Because this pin is connected to the Arduino, it will detect this HIGH Signal and read that someone is approaching the door and will provide input to the DC motor, then the DC motor will move to the right or left to pull the door. From the simulation results, the delay between the sensor readings and the movement of the DC motor is about 5 3 to 5 seconds.

The Proteus 8 Software Simulator can be used as a virtual practicum learning medium, as well as component requirements and testing that can be carried out before hardware manufacture, so that it becomes more effective and efficient in terms of time, effort, and cost.

5.2. Recomendation

The design of this automatic door system can still be developed further, such as adding marker components to the door if it is implemented directly.

Things that need to be considered if this series is implemented directly, it is better to pay attention to the specifications of each component so that the results obtained can be maximized and reduce human error (human error).

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