

## APPLICATION OF ARDUINO UNO AS AN AUTOMATIC CURTAIN OPENING AND CLOSING SYSTEM CONTROLLER

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### ABSTRACT

This research was carried out with the aim of simplifying the programming design of making an automatic curtain system based on Arduino Uno by creating a programming language that will be used. From this research, an Arduino Uno programming language was obtained to control the automatic curtain opening and closing operating system. Software design stages in the Arduino Uno programming language using C language and registers from Arduino. As the main program in this system, the C language is used to design functions on Arduino which play a major role in managing the functions of the system.

**Keywords:** Arduino Uno, Programming Language, C Language.

### I. INTRODUCTION

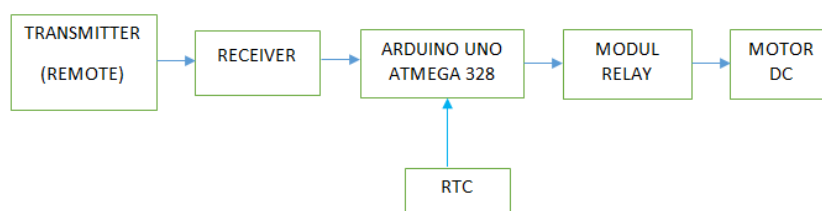
This research uses an RTC module which functions as a time and date reminder system which uses a battery energy source to keep the system running. Apart from that, this module can also update the date and time periodically. This design uses an adapter with a voltage of 12 volts to input the Arduino and also as a source for the motor. The adapter used has a principle like a full wave rectifier with a bridge system. This system is designed in two conditions, namely manual (Remote) and automatic (RTC). Arduino is not just a development tool, but a combination of hardware between a programming language and a developing Integrated Development Environment (IDE). IDE is a software that has a big role in writing programs, combining them regularly into a binary code language and uploading them into a microcontroller memory. (Fezari & Al Dahoud, 2018). In designing the tool, there is hardware and software that will be used, namely:

1. Hardware > in/out board (Input(I)/Output(O))
2. Software > Arduino software is an IDE that functions to write programs and to supply connections to computers. For example, it can be seen from programs and storage for program development.

Arduino Uno is a microcontroller board based on the ATmega328 datasheet (Fathulrohman & Saepulloh, 2019). In this project, Arduino Uno is used as input in the form of a remote control and output in the form of a DC motor, where if the Remote Control interface gives a command to the Arduino then the Arduino executes the command. into the output in the form of a voltage, which voltage is used to activate an electronic relay that is connected to control the left or right rotation of the load (motor).

### II. METHODOLOGY

The block diagram of the working method of this program is as follows:



**Figure 1:** Block diagram of curtain control design with remote and RTC

The design of opening and closing curtains automatically and manually is deliberately designed to facilitate activities related to percentages with two setting positions, namely automatic and manual. The automatic driver is Arduino, RTC and electronic relay, while the manual is Remote Control.

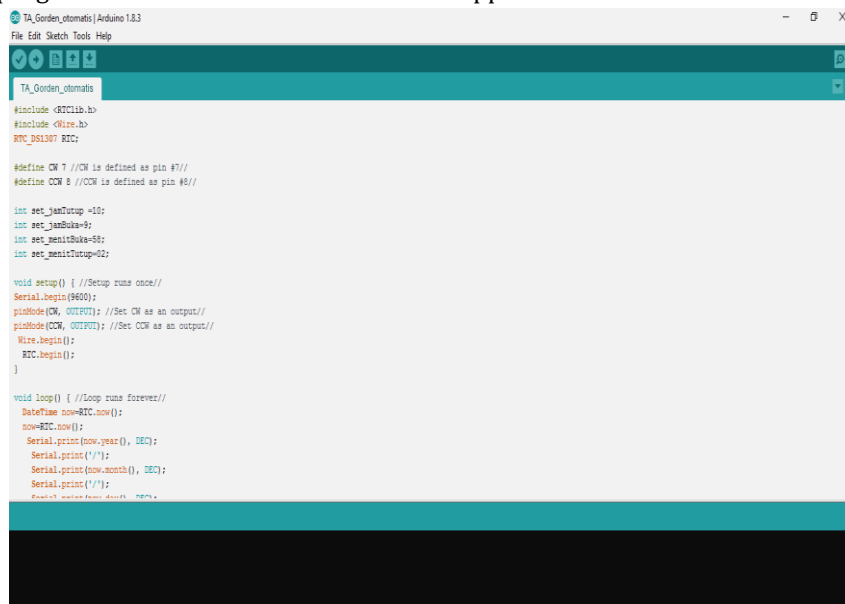
The main parts of the system consist of:

1. Arduino Uno ATmega 328

2. Electronic Relay
3. Remote and Receiver
4. RTC (Real Time Clock)
5. DC motors
6. MCB

The software design stages on Arduino use C language and registers from Arduino. As the main program in this system, C language is used to design functions on Arduino which play a big role in regulating the function of the system. In determining the safety rating required in the final project. Make coding on the Arduino Uno

1. Open the Arduino software (application), until it appears like the picture.
2. Then create a program that we will use in the Arduino Application.



```
TA_Garden_automatis | Arduino 1.8.3
File Edit Sketch Tools Help

TA_Garden_automatis

#include <RTClib.h>
#include <Wire.h>
RTC_DS1307 RTC;

#define CW 7 //CW is defined as pin #7//
#define COW 8 //COW is defined as pin #8//

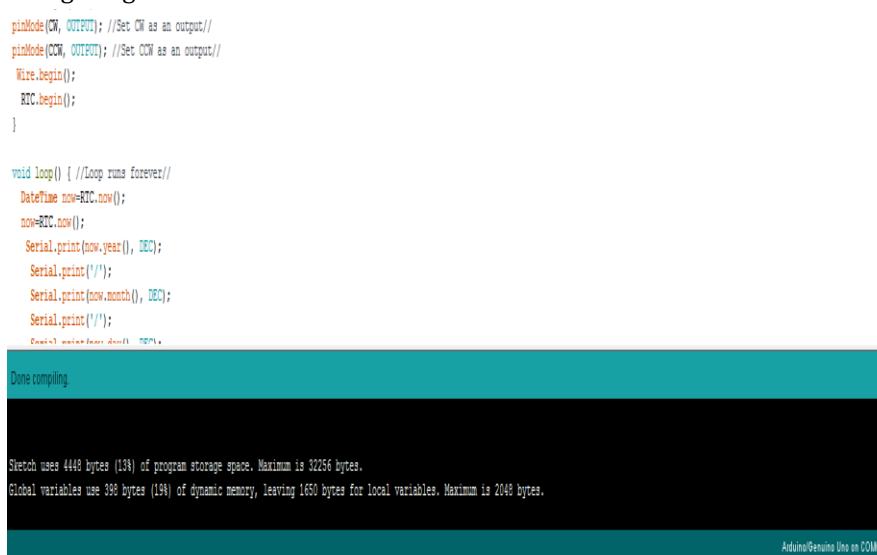
int set_garTutup=10;
int set_garBuka=9;
int set_menisBuka=55;
int set_menisTutup=62;

void setup() { //Setup runs once//
  Serial.begin(9600);
  pinMode(CW, OUTPUT); //Set CW as an output//
  pinMode(COW, OUTPUT); //Set COW as an output//
  Wire.begin();
  RTC.begin();
}

void loop() { //Loop runs forever//
  DateTime now=RTC.now();
  now=RTC.now();
  Serial.print(now.year(), DEC);
  Serial.print("/");
  Serial.print(now.month(), DEC);
  Serial.print("/");
  Serial.print(now.day(), DEC);
  Serial.print(" ");
  Serial.print(now.hour(), DEC);
  Serial.print(":");
  Serial.print(now.minute(), DEC);
  Serial.print(":");
  Serial.print(now.second(), DEC);
  Serial.println();
}
```

**Picture 1.** Listing Program on Arduino

3. Compile coding on the Arduino Uno, the aim is to check whether the program that has been filled in is correct or not. And then click the check mark/verify in the Arduino Uno software.
4. After clicking the button, wait a few moments until the checking process is complete, then Done compiling will appear which indicates the checking process has been completed, if the program is correct it will appear as shown in the following image:



```
pinMode(CW, OUTPUT); //Set CW as an output//
pinMode(COW, OUTPUT); //Set COW as an output//
Wire.begin();
RTC.begin();
}

void loop() { //Loop runs forever//
  DateTime now=RTC.now();
  now=RTC.now();
  Serial.print(now.year(), DEC);
  Serial.print("/");
  Serial.print(now.month(), DEC);
  Serial.print("/");
  Serial.print(now.day(), DEC);
  Serial.print(" ");
  Serial.print(now.hour(), DEC);
  Serial.print(":");
  Serial.print(now.minute(), DEC);
  Serial.print(":");
  Serial.print(now.second(), DEC);
  Serial.println();
}
```

Done compiling

Sketch uses 4448 bytes (13%) of program storage space. Maximum is 32256 bytes.  
Global variables use 398 bytes (1%) of dynamic memory, leaving 1650 bytes for local variables. Maximum is 2048 bytes.

Arduino/Genuino Uno on COM4

**Picture 2.** The display has finished compiling the program

5. The program is ready to be uploaded to Arduino Uno. Then upload the coding to Arduino with prepare the Arduino to be programmed; insert the Arduino USB port into the computer; Click the upload icon to upload the program to Arduino.
6. Arduino is ready to use.

### III. RESULTS AND DISCUSSION

From this research, test results were obtained in the form of data in the form of curtain travel time when testing closing and opening the curtains. The following are the measurement results of the data obtained:

**Table 1.** Manual Testing of Opening and Closing Curtains

MANUAL (REMOTE)				
REMOTE	RELAY		CONDITION	RESPON REMOTE
	1	2		
A	OFF	ON	CLOSED	DELAY 1,5 s
B	ON	OFF	OPEN	DELAY 1,5 s
C	-	OFF	CLOSED	DELAY 1,5 s
D	OFF	-	OPENI	DELAY 1,5 s

The table above is the test results from the manual remote control that we carried out. When button A is pressed, relay 1 will work and when button C is pressed it will work.

**Table 2.** Automatic Testing of Opening and Closing Curtains

OTOMATIS (RTC)	
SET WAKTU	KONDISI
PUKUL 07.00 WIB	MEMBUKA
PUKUL 17.00 WIB	MENUTUP

In the table 2 are the results of the RTC testing that we carried out, we made a predetermined time setting, namely at 17.00 WIB the curtains will close automatically and at 07.00 WIB the curtains will open automatically.

### IV. CONCLUSION

After completion of this research, the following conclusions can be drawn:

1. In a manual system, opening and closing the curtains always has a delay of around 1.5 seconds.
2. This curtain cover book can be applied in areas that are high and hard to reach, making things easier for people and making things more efficient and easier.

### V. REFERENCES

- [1] Fezari, M., & Al Dahoud, A. (2018). Integrated development environment "IDE" for Arduino. WSN applications, 1-12.
- [2] Fathulrohman, Y. N. I., & Saepulloh, A. (2019). Temperature and humidity monitoring tool using Arduino Uno. Journal of Management and Information Engineering (JUMANTAKA), 2(1).
- [3] Haryanto, D., & Mulyani, S. (2022). Closing and Opening Curtains Automatically With Arduino Based Timing and Bluetooth Activation. JOURNAL OF INFORMATICS MANAGEMENT (JUMIKA), 9(1).
- [4] Nasir, J., & Difo, C. (2018). Application of Arduino Uno Based Color Blindness Test Tool. Symmetric: Journal of Mechanical Engineering, Electrical and Computer Science, 9(2), 925-934.