



KOLEJ KEMAHIRAN TINGGI MARA KUANTAN, PAHANG

JOB SHEET

PROGRAMME/ CLASS:	DKI		
SESSION:	JANUARY – JUNE 2023	SEMESTER:	4
CODE/ COURSE:	DMR40333 / EMBEDDED SYSTEM	SHEET NO:	DMR40333-JS02
NO OF STUDENTS:	22	WEEK:	10
DURATION:	3 HOURS	VENUE:	LAB EMBEDDED SYSTEM
LECTURER:	SYAHRUL YUSRI BIN ROMLI		
TOPIC:	6.0 APPLICATION OF MICROCONTROLLER – Driving Servo Motor		
SUB-TOPIC:	6.5 Driving DC, Servo and Stepper Motor		
LEARNING OBJECTIVES:	<p>At the end of this lab, students should be able to:</p> <ol style="list-style-type: none"> 1. Write programs in Arduino IDE to drive RC Servo motor. 2. Demonstrate RC Servo motor movement in angle. 3. Modify program with adding another RC Servo motor. 		
TOOLS / EQUIPMENTS/ MATERIALS:	<ol style="list-style-type: none"> 1. PC software – Arduino IDE 2. Arduino UNO V3 board 3. RC Servo motor model SG90 (2 pcs) 4. USB cable 5. Jumper wires 		

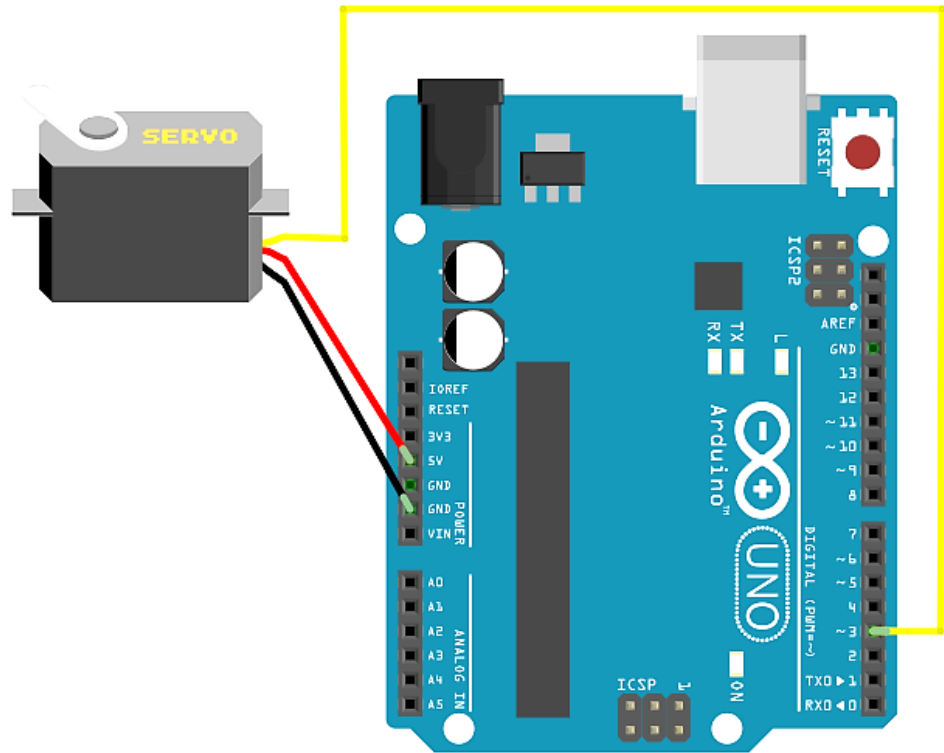
**DRAWING
AND DATA:**

Figure 2.1: RC Servo motor circuit with Arduino UNO

THEORY:

RC Servo motor is one type of servo motor. It consists of DC Geared motor with potentiometer and control circuit as in Figure 2.2. Because of its couple with potentiometer, the movement of this motor is limited from 0° to 180° only. This motor is suitable for angle positioning applications.

To move this motor, it is not the same as a normal DC motor. It requires a pulse time signal wave form to move it for only 0° , 90° and 180° shown in Figure 2.3

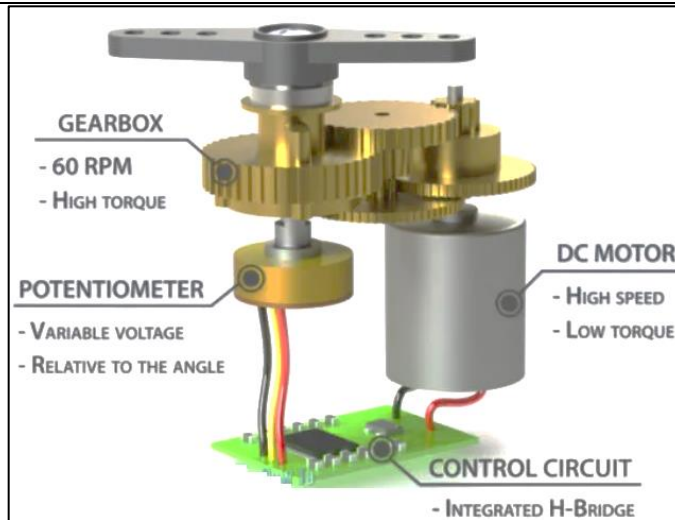


Figure 2.2: RC Servo motor internal circuit

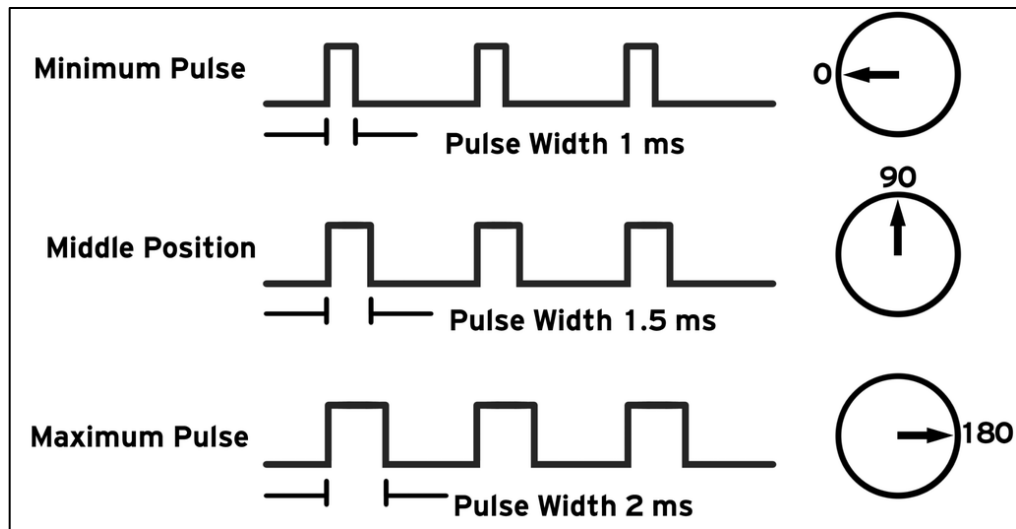


Figure 2.3: RC Servo motor pulse time

PROCEDURES

TASK 1

Circuit Construction

1. Construct circuit as in Figure 2.1.

Program Building

1. Write the following program in Arduino IDE.

```
// Include the Servo library
#include <Servo.h>
// Declare the Servo pin
int servoPin = 3;
// Create a servo object
Servo Servo1;

void setup()
{
    // We need to attach the servo to the used pin number
    Servo1.attach(servoPin);
}

void loop()
{
    // Make servo go to 0 degrees
    Servo1.write(0);
    delay(1000);
    // Make servo go to 90 degrees
    Servo1.write(90);
    delay(1000);
    // Make servo go to 180 degrees
    Servo1.write(180);
    delay(1000);
}
```

2. Upload verified program to Arduino UNO.

Circuit Testing

1. ON Arduino UNO through USB connection.
2. Observe RC Servo motor movement.
3. Verify roughly the angle movement should right as what we write on program.

TASK 2

Circuit Modification

1. Add another RC Servo motor (Servo 2) to circuit in Figure 2.1.
2. Assign any suitable Arduino UNO pin to Servo 2 signal pin.
3. Sketch added Servo 2 to circuit Figure 2.4 in result.

Program Modification

1. Modify program as in Task 1 by following requirements below:
 - a. Declare Servo 2 pin as it adding in new circuit.
 - b. Add sequence of Servo 2 movement same as Servo 1 after Servo 1 complete all its movements.
 - c. The sequence will repeat continuously alternate with both Servos.
2. Upload modified program to Arduino UNO and test its functions.
3. Write the correct modified program above in result.

RESULTS:

TASK 2

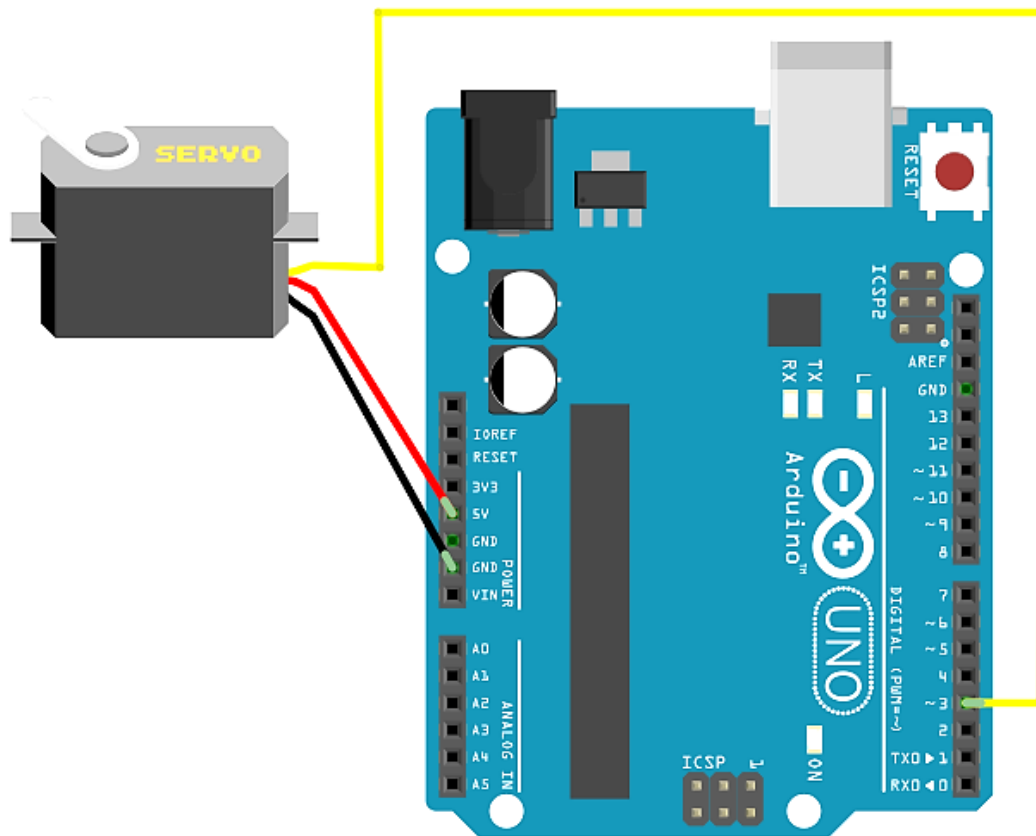


Figure 2.4: Modified circuit

New Modified Program

DISCUSSION

1. Determine the function of *Servo.attach()* in the program.
(2 marks)
2. Write the command to move RC Servo motor from 90° to 0° with delay 1.5s each movement.
(4 marks)
3. Generally, how many RC Servo motor can be used in Arduino UNO board without use Servo driver? State all the possible Arduino pins that can be used for all the RC Servo motors.
(8 marks)
4. Discuss your observation on this experiment and relate your finding to objectives.
(10 marks)

CONCLUSION

Conclude this experiment relate to result obtain.

REFERENCE:

1. Steve Gold, Arduino: Taking the Next Step with Arduino: The Ultimate Beginner's Guide (Arduino 101, Arduino sketches, complete beginners guide, Programming, Raspberry Pi 2, xml, C++, ruby, html, php, robots), CreateSpace Independent Publishing Platform. 2016, ISBN-10: 152999977.
2. Jack Purdum (2015), Beginning C for Arduino, Second Edition: Learn C Programming for the Arduino, ISBN-13 (pbk): 978-1-4842-0941-7.

Prepared by:

Name: SYAHRUL YUSRI BIN ROMLI
Designation: VOCATIONAL TRAINING
OFFICER
Date:

Checked by:

Name: ROFIDAH BINTI ISMAIL
Designation: HEAD OF DEPARTMENT
Date: