Automatic control MTE324 Voltage controlled system

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To

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I. Introduction:

Automatic control is a field of engineering that deals with the design and implementation of systems that can operate without human intervention. These systems can be found in a wide range of applications, from industrial processes to aerospace and defense systems.

The main goal of automatic control is to design systems that can maintain a desired behavior or performance, even in the presence of disturbances or uncertainties. Which is achieved through the use of feedback loops, where the output of a system is measured and compared to the desired value .Once the difference is measured the controller gives signal to the actuators to take action according to the difference detected.

One of the key components of automatic control is the controller, which is responsible for generating the input signal that drives the system.
Another important aspect of automatic control is system identification, which involves the process of modeling a system in order to predict its behavior under different operating conditions. This involves the use of mathematical models and simulation tools and can be used to optimize system performance and minimize the impact of disturbances.

In this project we have made a coupled Dc motor with a potentiometer which control a potentiometer by the rotation of the Dc motor which is controlled by the microcontroller that according to the required voltage it acts.The comparing is done via the microcontroller and the controller send the voltage required to set the voltage to the required value.A feedback to the microcontroller is used to calculate the required voltage.

The benefit of a coupled motor with feedback is increased reliability. By using a feedback system to monitor the system and make adjustments as necessary, the system is able to adapt to changing conditions and maintain a consistent level of performance over time. Coupled motor with feedback systems can be found in a wide range of applications, from industrial processes to transportation systems. Some common examples include conveyor systems, robotic arms, and automotive drivetrains.

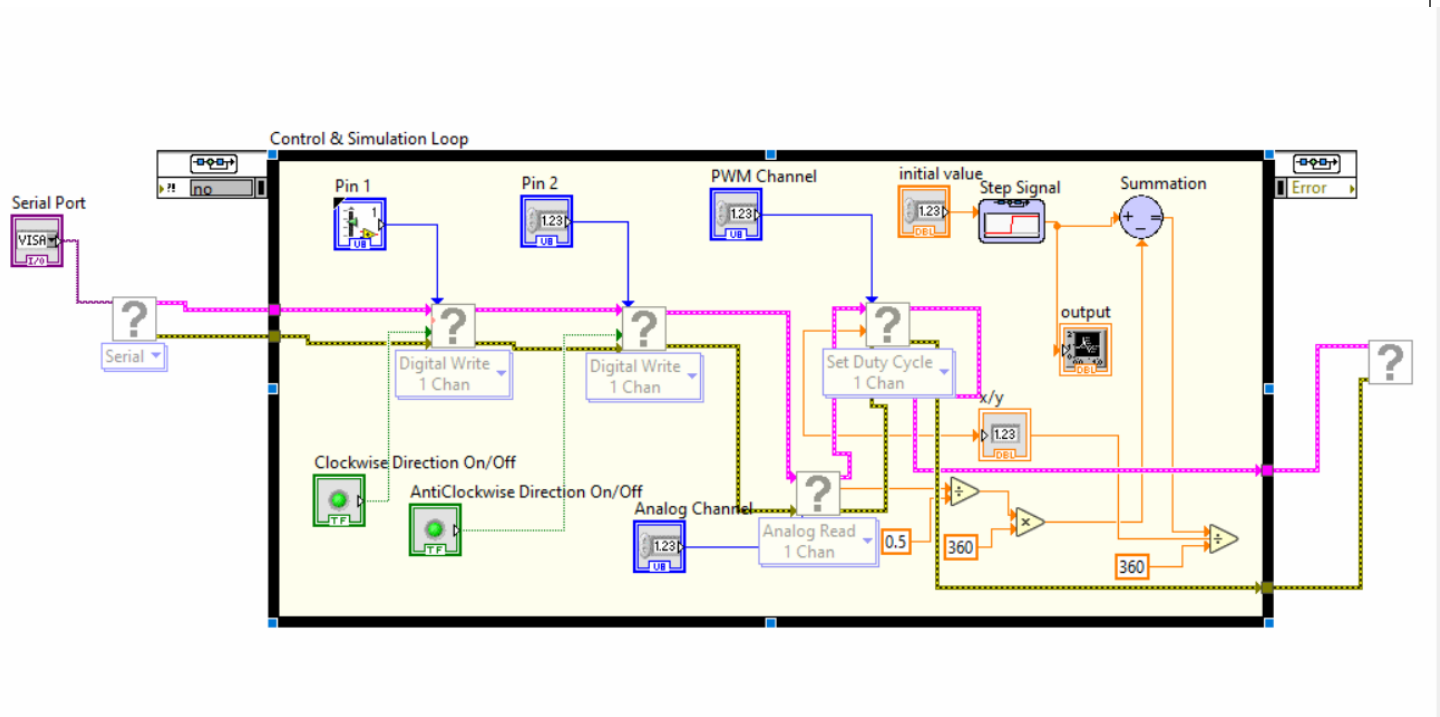
One of the key advantages of coupled motor systems with feedback is their ability to handle complex and dynamic loads. By using multiple motors and a feedback system to monitor and adjust the system, these systems can adapt to changing conditions and maintain a consistent level of performance over time.

Another advantage of coupled motor systems is their ability to provide redundancy in critical applications. By using multiple motors, these systems can continue to operate even if one or more motors fail, reducing the risk of downtime or system failure.

Coupled motor systems with feedback are widely used in a variety of industrial applications, including conveyor systems, robotic arms, and manufacturing processes. In these applications, the system must be able to operate reliably and efficiently over long periods of time, often in harsh or demanding environments.

In conclusion, coupled motor systems with feedback are a powerful technology that enables multiple motors to work together to achieve a common goal. By using a feedback system to monitor and adjust the system, these systems can provide improved performance, efficiency, and reliability in a wide range of industrial applications. As technology continues to advance, we can expect to see even more sophisticated and capable coupled motor systems with feedback in the future.

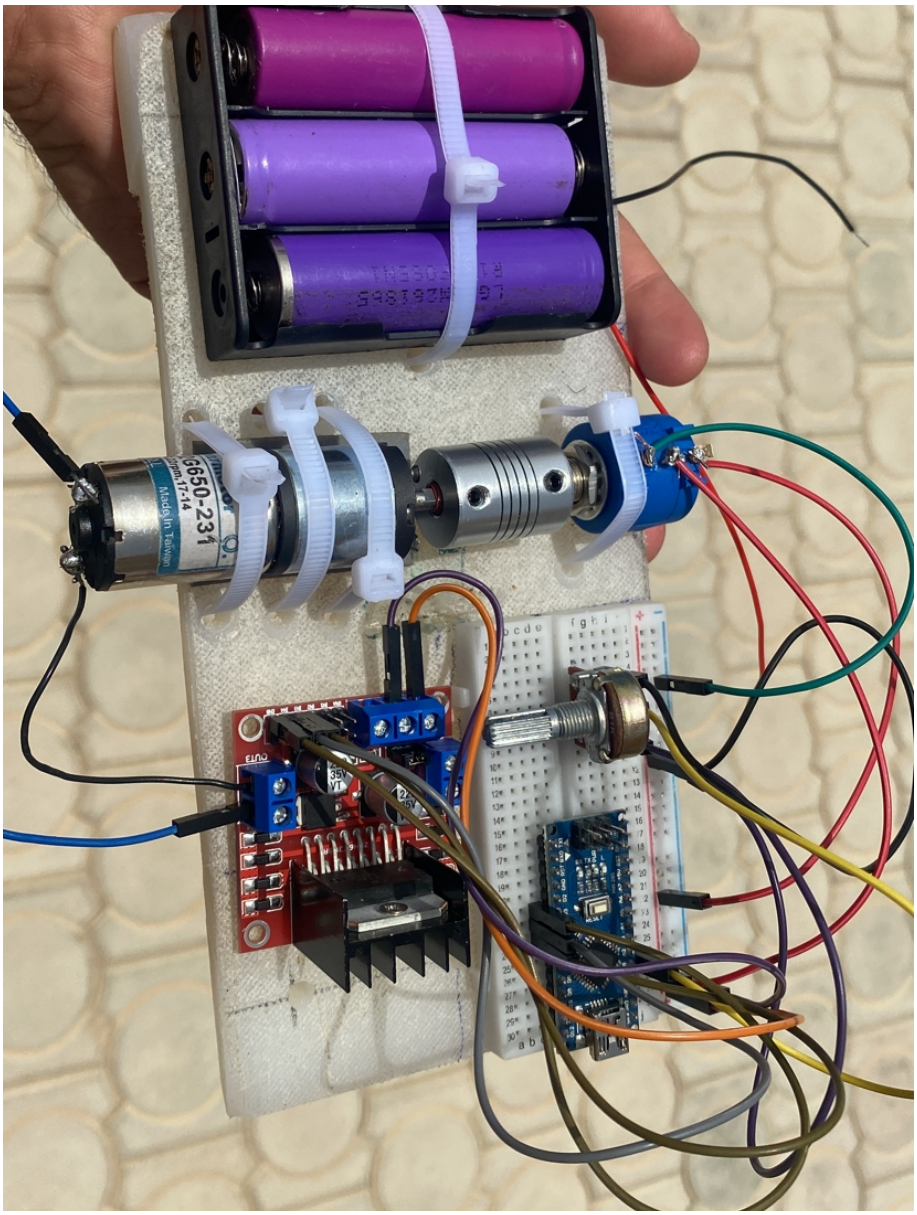
II. Labview:



III. Required Components:

- 1 x Arduino Nano with USB Type-C
- 1 x DC Motor
- 2 x potentiometer
- 1 x Coupler
- 1 x Breadboard
- Connecting Wires
- 12V Power Supply

IV. Circuit



V. Arduino code :

```
int motor1 = 4;
int motor2 = 5;
int analogPWM = 3;
int potentio1 = A1;
int potentio2 = A0;
int reading1 = 0;
int reading2 = 0;
void setup() {
  // put your setup code here, to run once:
Serial.begin(1200);
```

```
pinMode(motor1,OUTPUT);
pinMode(motor2,OUTPUT);
pinMode(analogPWM,OUTPUT);
digitalWrite(motor1,LOW);
digitalWrite(motor2,LOW);
}

void loop() {
  // put your main code here, to run repeatedly:
reading1 = analogRead(potentio1);
reading1= map(reading1,0,1023,0,100);
Serial.print("reading1 = " );
Serial.println(reading1);
reading2 = analogRead(potentio2);
reading2 = map(reading2,0,1023,0,100);
Serial.print("reading2 = ");
Serial.println(reading2);

if (reading1>reading2){
analogWrite(analogPWM,75);
digitalWrite(motor2,HIGH);
digitalWrite(motor1,LOW);
delay(1000);
}
else if (reading1<reading2){
analogWrite(analogPWM,75);
digitalWrite(motor1,HIGH);
digitalWrite(motor2,LOW);
delay(1000);
}
else if (reading1==reading2){
digitalWrite(motor1,LOW);
digitalWrite(motor2,LOW);
}
}
```

VI. Working on the Project:

In this project we have made a closed loop system where a feedback loop is sent To a comparator to compare between the desired value and the output .In our project the sensor is simply the nano Arduino where the voltage from the feedback is measured by the Arduino nano and according to the feedback voltage the nano output voltage that will make DC motor rotate the coupled potentiometer either anticlockwise or clockwise to adjust the resistance of the potentiometer. The resistance change the output voltage .The desired voltage is determined using A potentiometer .

VII. Advantages:

- The project implements a closed loop type control system for automatically adjusting the voltage .
- A closed loop type control system is more efficient than an open loop system as the output is continuously monitored as feedb