

SWEN.5136_Software for Robotics Final Project Exam

Student Info

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Practices

Part 1 (60 points)

- (30 Points)

We want to control robotics motor movement speed through serial port. We will control an R/C servo motor speed 10 levels, namely from 0-9. The maximum speed is defined as level 9. The slowest is level 0, which represents stop. Please write the C/C++ code to control the servo motor speed through serial port. The command, speed level from 0 to 9 is given through serial port.

```
int motorPin = 9;
int val = 0;          // variable to store the data from the serial port

void setup() {
  pinMode(Motorpin, OUTPUT);    // declare the motor's pin as output
  Serial.begin(19200);           // connect to the serial port
  Serial.println("Welcome to SerialMotorSpeed!");
  Serial.println("Enter speed number 0-9:");
}

void loop () {
  val = Serial.val ();           // read the serial port
  if (val >= '0' && val <= '9' ) {
    val = val - '0';             // convert from character to number
    val = 28 * val;              // convert from 0-9 to 0-255 (almost)
    Serial.print("Setting speed to ");
    Serial.println(val);
    analogWrite(Motorpin, val);
    Serial.println("Enter speed number 0-9:");
  }
}
```

- (30 Points)

Now we want to use a piezo buzzer as a force sensor to trigger a robotics control motor. Please write the C/C++ code to control the servo motor movement through serial port.

```
int ledPin = 13;
int motorPin = 9;
int piezoPin = 2;

int THRESHOLD = 100; // set minimum value that indicates a knock

int val = 0;          // variable to store the value coming from the sensor
int t = 0;            // the "time" measured for how long the knock lasts

void setup() {
  pinMode(ledPin, OUTPUT);
  Serial.begin(19200);
  Serial.println("ready"); // indicate we're waiting
}

void loop() {
  digitalWrite(ledPin, LOW); // indicate we're waiting

  val = analogRead(PiezoPin); // read piezo
  if( val > THRESHOLD ) {      // is it bigger than our minimum?
    digitalWrite(PiezoPin, HIGH); // tell the world
    t = 0;
    while(analogRead(PiezoPin) > THRESHOLD) {
      t++;
    } // wait for it to go LOW (with a little hysteresis)
    if(t!=0) {
      Serial.print("knock! ");
      Serial.println(t);
      analogWrite(MotorPin, 100);
      delay(1000);
      analogWrite(MotorPin, 0);
    }
  }
}
```

Part 2. Innovative Application of Robotics Systems (40 points)

3. (40 Points)

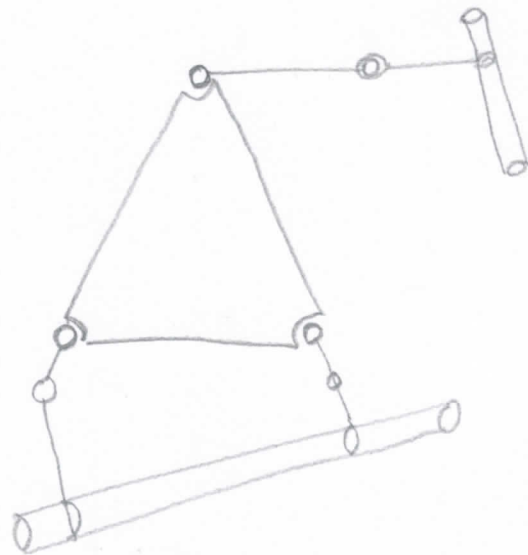
Please design a robotic Chameleon that can change its skin color based on environment color. Here we only focus on its artificial skin design which can change color according to environment. We can use Red, Blue and Green LED as output, color sensor that read RGB value as input. The color sensor symbols: Rs, Gs, Bs,

- Draw the scheme (draw on paper and take a snap shot will be ok)
- Design the source code

using
Java Code

```

Public void run() {
    Color robot colour = new color ((float) math.random(), (float) math.random(), (float)
                                     math.random());
    Set colors (robot color);
    do
    {
        turn RadanRight Radians ();
    }
    while (true);
    }
    Public void domovement()
    {
        if (nowEnemy.distance > 250)
        {
            movement.roam (this, nowenemy);
        }
        else
        {
            movement.roam2 (this, nowEnemy);
        }
    }
}
    
```



Scheme