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DEPARTMENT OF MECHATRONICS ENGINEERING

Laboratory Manual

MCTE 2101/MCTA1101

Mechatronics Workshop

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Building a simple Data Acquisition (DAQ) System Using Arduino

Measuring Analog Data from Light Dependent Resistor (LDR) Sensor

1. Objectives

- To learn basics of LDR in sensing light intensity
- To set up simple data acquisition system using Arduino for light intensity measurement purpose.
- To do basic calibration for the measuring instruments.
- To design simple interface for measured data such that suitable for analysis.

2. Contents

Follow the hand out and all instruction in power point presentation. Set the values of following resistors as follows:

- R1=4.7kΩ
- R2=4.35kΩ
- R3=4.55kΩ

3. Questions

a) Complete Table 1 and show how the calibration calculation for each LDR is made?
b) Has the precision between the three signals improved after calibration? Suggest a more efficient procedure to calibrate the LDR.

Submit your answer using lab formatting. Document the setup in DETAIL together with necessary picture, video. Include brief explanation on the description, function and operation of the IDE code.

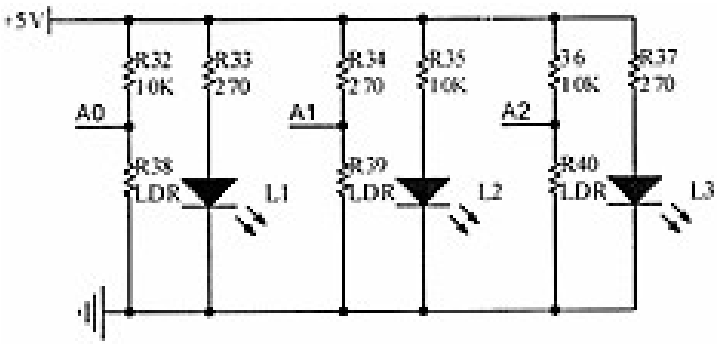
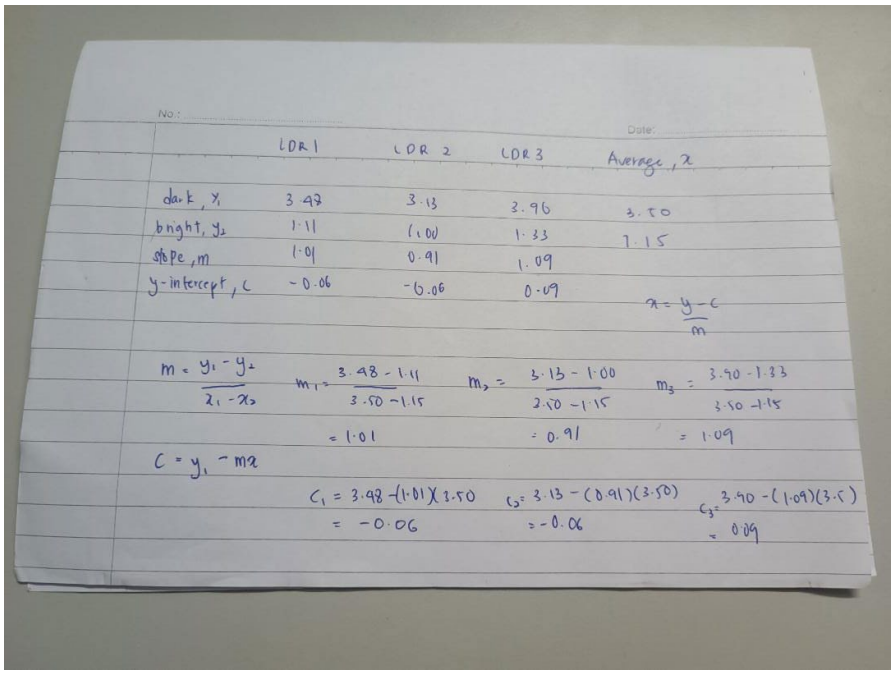


Table 1: Measuring Analog Data from Light Dependent Resistor (LDR) Sensor

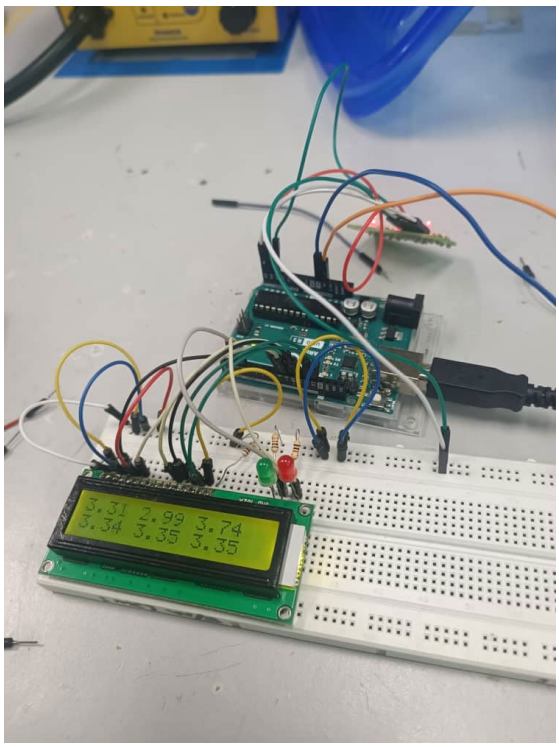
Input	DAQ Point Connection		Data			
	Positive	Negative	Before Calibration		After Calibration	
			Dark	Bright	Dark	Bright
A0 (L1)	A3	GND	3.48	1.11	3.34	1.00
A1 (L2)	A4	GND	3.13	0.91	3.35	0.85
A2 (L3)	A5	GND	3.90	1.33	3.35	1.74

Calibration Calculation:

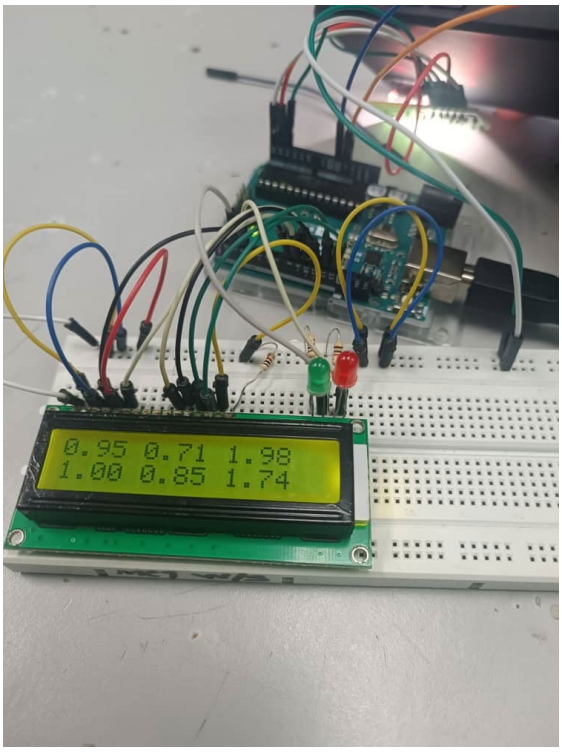


b) Yes the precision between the three signals show values that near to each other and more accurate .For suggestion, we would use stable light source that have same light intensity to get accurate measurement

Detail:



Picture A



Picture B

Picture A show the LDR been test after the calibration without the present of additional light(dark) condition and the Picture B show the LDR been test after the calibration with the present of light source(bright) condition

Code program:

```
// include the library code:
#include <LiquidCrystal.h>

// initialize the library by associating any needed LCD interface
// pin with the arduino pin number it is connected to
const int rs = 8, en = 9, d4 = 10, d5 = 11, d6 = 12, d7 = 13;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
const int LDR_pin1=A3;
const int LDR_pin2=A4;
const int LDR_pin3=A5;
double LDR1=0;
double LDR2=0;
double LDR3=0;
double volt_LDR1=0;
double volt_LDR2=0;
double volt_LDR3=0;
```

```
double volt_LDR1_cal=0;
double volt_LDR2_cal=0;
double volt_LDR3_cal=0;

void setup() {
  // set up the LCD's number of columns and rows:
   lcd.begin(16, 2);
   pinMode(LDR_pin1,INPUT);
   pinMode(LDR_pin2,INPUT);
   pinMode(LDR_pin3,INPUT);
}

void loop() {

LDR1=analogRead(LDR_pin1);
LDR2=analogRead(LDR_pin2);
LDR3=analogRead(LDR_pin3);

volt_LDR1=LDR1/1024*5;
volt_LDR2=LDR2/1024*5;
volt_LDR3=LDR3/1024*5;


lcd.setCursor(0, 0),lcd.print(volt_LDR1);
lcd.setCursor(5, 0),lcd.print(volt_LDR2);
lcd.setCursor(10, 0),lcd.print(volt_LDR3);

// Put your calibration equation here, e.g. volt_LDR1_cal=(volt_LDR1 - c)/m
volt_LDR1_cal=(volt_LDR1 - (-0.06))/1.01;
volt_LDR2_cal=(volt_LDR2 - (-0.06))/0.91;
volt_LDR3_cal=(volt_LDR3 - 0.09)/1.09;


lcd.setCursor(0, 1),lcd.print(volt_LDR1_cal);
lcd.setCursor(5, 1),lcd.print(volt_LDR2_cal);
lcd.setCursor(10, 1),lcd.print(volt_LDR3_cal);


delay(1000);
}
```