LABORATORY REPORT

MECHATRONICS SYSTEM INTEGRATION

MCTA 3203

SEMESTER 2 2023/2024

WEEK 6

LAB: DAQ-MC INTERFACING

SUBMISSION DATE:

GROUP: 6

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ABSTRACT

In this project, we show how to utilize an Arduino board as a data acquisition (DAQ) device to gather sensor data and use the PLX-DAQ software to transmit the data to a Microsoft Excel spreadsheet. We created a circuit using an LM35 temperature sensor and an LDR, wired them to an Arduino board, and programmed the circuit to take analogue sensor signals, convert the data to digital values, and send the data serially to the computer. The sensor data was then recorded in an Excel spreadsheet using the PLX-DAQ software, which enables additional analysis and visualization.

INTRODUCTION

Data acquisition systems, or DAQs, are essential instruments for quantifying and examining physical processes. Usually, they are made up of sensors, a computer for data processing and analysis, and a DAQ device. In this experiment, the data is transferred to a computer via the PLX-DAQ software, which facilitates integration with Microsoft Excel, and sensors are interfaced with using an Arduino board that serves as the data acquisition device.

MATERIALS AND EQUIPMENT

1. Arduino board
2. LDR (light-dependent resistor)
3. LM35 temperature sensor
4. Resistors
5. Breadboard
6. Jumper wires
7. PLX-DAQ software

METHODOLOGY

1. Assemble the circuit seen in Figure 3, which links the Arduino board to the LDR and LM35 sensor.
2. Program the Arduino board to read analogue signals from the LDR and LM35, transform them into digital values, and send the information to the computer in a serial fashion.
3. Open the PLX-DAQ application and confirm that the appropriate baud rate and COM port are chosen.
4. To begin recording the sensor data in the Excel spreadsheet, click the "Connect" button on the PLX-DAQ interface.
5. Watch as the spreadsheet logs the sensor data and provides insightful graphs and insights.

```
void setup() {
  Serial.begin(9600);
}

void loop() {
  int ldr_value = analogRead(A0); // Read the analog value from the LDR sensor
  float ldr_percent = (ldr_value / 1023.0) * 100; // Convert the analog value to a percentage

  int temp_pin = analogRead(A1); // Read the analog value from the LM35 temperature sensor
  float temp = (temp_pin * 5.0 / 1023.0 - 0.5) * 100; // Convert the analog value to a temperature
in Celsius

  Serial.print("DATA,MILLIS,");
  Serial.print(millis());
  Serial.print(",");
  Serial.print(temp);
  Serial.print(",");
  Serial.print(ldr_percent);
  Serial.println();

  delay(1000);
}
```

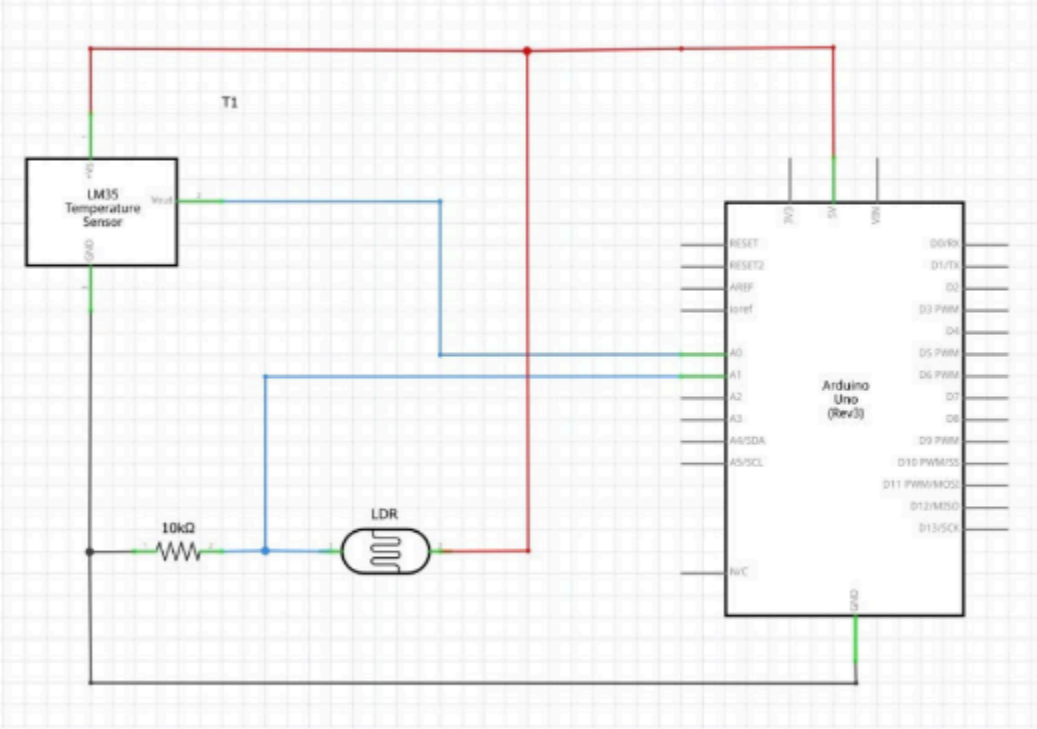
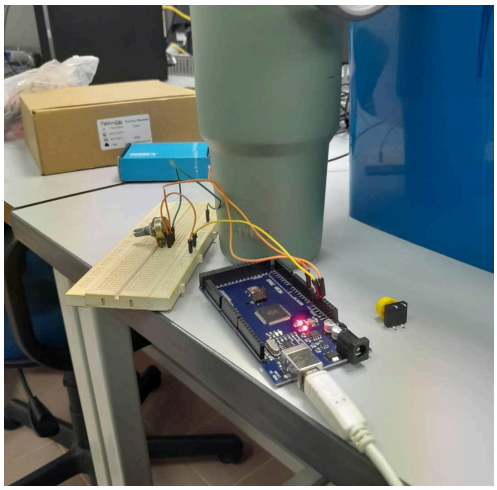
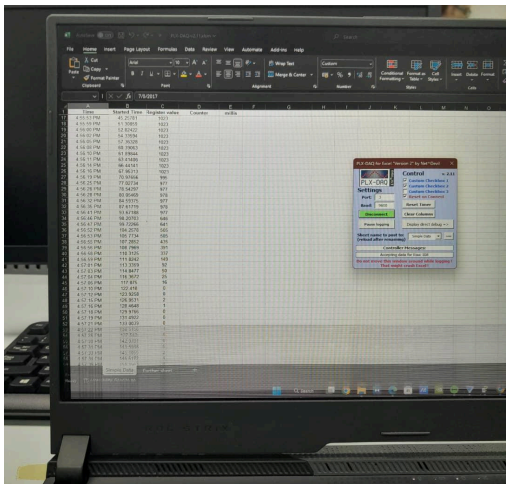


Fig. 3

RESULTS





DISCUSSION

The experiment shows how to use the PLX-DAQ software with an Arduino DAQ device to record and examine sensor data in a Microsoft Excel setting. The Arduino code was built to take the analogue signals, convert them to digital values, and send the data serially to the computer. The LDR and LM35 sensors were used to monitor temperature and light intensity, respectively.

The sensor data may be easily captured in an Excel spreadsheet with the help of the PLX-DAQ software, enabling additional analysis and visualization. Depending on the application, the data can be utilized to investigate the link between temperature, light intensity, and other environmental parameters.

CONCLUSION

This experiment demonstrates the usefulness of the PLX-DAQ software in integrating sensor data with Microsoft Excel and the adaptability of Arduino as a DAQ device. Researchers and engineers can obtain important insights from their measurements and the data analysis process is made simpler by the ease with which sensor data can be transferred to a familiar spreadsheet environment.

RECOMMENDATIONS

1. Increase the number of sensors on the Arduino (eg, humidity sensors, etc)
2. Take advantage of software like MATLAB to visualize the data.

ACKNOWLEDGEMENT

A special thanks goes out to Dr Wahju Sediono, Dr Ali Sophian, Dr Zulkifli Bin Zainal Abidin, our teaching assistants and our peers for their invaluable help and support in finishing this report. Their advice and guidance have greatly improved the quality and understanding of the project. Their commitments are greatly appreciated.

STUDENT DECLARATION

We, hereby declare that this project is entirely our work except for the documents that were given as references. Any external sources utilized for reference or inspiration have been properly cited and credited.

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