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MECHATRONICS SYSTEM INTEGRATION

EXPERIMENT 6: DAQ USING PLX

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Abstract

This lab activity explores a basic Data Acquisition (DAQ) system using Arduino as the DAQ hardware and a potentiometer as the analog input sensor. The system demonstrates how physical parameters can be converted into electrical signals, processed, and analyzed in real time. Data is captured by the Arduino and transmitted to a computer where it is logged and visualized using Parallax Data Acquisition (PLX-DAQ), a Microsoft Excel add-in. The aim is to showcase the integration of sensor-based measurements with computer-based data analysis in a cost-effective and accessible environment. The use of PLX-DAQ streamlines data logging and simplifies the visualization and interpretation of analog inputs, facilitating a better understanding of DAQ systems and sensor behavior.

Introduction

Data Acquisition (DAQ) systems are essential tools in engineering and scientific applications, enabling the measurement and analysis of physical phenomena such as temperature, pressure, position, and voltage. A typical DAQ system includes three fundamental components: sensors, a DAQ device, and a computer. Sensors serve as the interface to the physical world, converting measurable parameters into electrical signals. The DAQ device, such as a microcontroller or dedicated hardware, digitizes these signals and transmits them to a computer for analysis and storage.

In this lab activity, Arduino is employed as the DAQ device due to its simplicity, flexibility, and compatibility with various sensors. A potentiometer acts as the analog sensor, providing variable voltage output based on its position. The Arduino reads this voltage through its analog input pin, converts it into a digital signal, and transmits it to a computer via a serial connection. Data logging and visualization are handled using PLX-DAQ, an Excel-based tool that facilitates real-time data collection in spreadsheet format.

The objective of this setup is to provide a clear, hands-on understanding of how a DAQ system functions, from sensing physical changes to recording and analyzing them on a computer. This approach is particularly valuable in educational and prototyping environments where accessibility and ease of use are key.

Materials and Equipment

1. PLX‑DAQ
2. Arduino Board
3. LDR
4. LM35
5. Jumper Wires
6. Resistor
7. Breadboard

Experimental Set-up

1) Connect the Arduino board to the LDR and LM35, using the jumper wires and 10kohm resistor
2) Install the PLX-DAQ software
3) Connect the Arduino to the PLX-DAQ software, using the correct com port

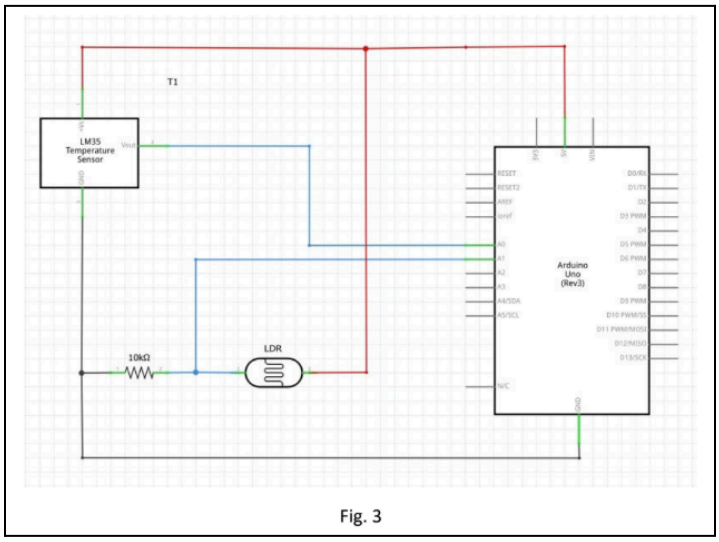

Fig. 3

Methodology

1) Write a code to interface the Arduino with PLX-DAQ
2) Once they're connected, select the correct com port for the Arduino to transmit data
3) PLX-DAQ will then start recording the data it receives from the Arduino in a table

Results

There are no results to be displayed as the software kept crashing to its incompatibility with the 64-bit version of Excel.

Discussion

This experiment failed to be successful, as PLX-DAQ kept crashing, preventing data from being collected and recorded. This was due to the software being incompatible with the current version of Excel, due to it being unsuitable for 64-bit software.

However, theoretically, the PLX-DAQ was supposed to extract and display data collected by an LDR (light-dependent resistor) and LM35 (temperature sensor), creating separate tables for both sets of data. The data would show the digitized version of the analogous values collected by the LDR and LM35.

All of this would have been done, in order to understand and appreciate DAQ systems, as well as understand the crucial role they play in many aspects of data collection.

Conclusion

This lab activity failed to demonstrate how data acquisition works, as the software kept crashing. This was due to it being unsuitable for the 64-bit version of Excel. Hence, there was no data that could be collected.

Recommendation

1) Upgrade the PLX-DAQ software to make it compatible with 64-bit software.

Student Declaration Form

STUDENT'S DECLARATION

Certificate of Originality and Authenticity

This is to certify that we are responsible for the work submitted in this report, that **the original work** is our own except as specified in the references and acknowledgement, and that the original work contained herein have not been untaken or done by unspecified sources or persons.

We hereby certify that this report has **not been done by only one individual** and **all of us have contributed to the report**. The length of contribution to the reports by each individual is noted within this certificate.

We also hereby certify that we have **read** and **understand** the content of the total report and that no further improvement on the reports is needed from any of the individual contributors to the report.

We therefore, agree unanimously that this report shall be submitted for **marking** and this **final printed report** has been **verified by us**.

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