

## Data Acquisition

**Acknowledgements:** Developed by Jesus Casas, Faculty Austin Community College, Austin, Texas

**Time Required:** 3 hour

### **Equipment & Tools**

- Computer with Internet Connection
- Standard browsing (web surfing) capabilities

**Team or Individual:** This is team activity.

### **Learning Objectives**

1. Use the Internet to research one aspect of data acquisition.
2. Organize, prepare, and present an oral presentation based on information gathered from Internet research.

### **Introduction:**

A data acquisition system (DAQ) is a collection of electronic devices including a computer that is used to acquire signals from a variety of sources. These signals can be analog or digital in nature. A typical analog signal is acquired by a sensor, whose purpose is to convert an environmental change into an electrical one. From there the signal is conditioned and then converted to a digital signal (data). The data is then analyzed and processed by a microprocessor which runs DAQ software which analyzes and processes the signal, and ultimately displays the desired information on the computer screen. Or alternatively, it may be printed out or otherwise recorded for convenient use.

In this drill down, you will be asked to work with other team members to research one component or area of a data acquisition system. After you have completed your research, you will present your information to the other class members in an oral report.



## **Performance and Task Procedures:**

Research one of the topics below as assigned by your instructor. Use the tables on the following pages to organize your information. Use the tables to fill in the information on the other four topics during the oral presentations.

### **Topic One: Sensors**

There are many different categories such as liquid, thermal, pressure, optical, sound, and radiation. Identify at least three products for each of the six categories. Provide a brief description of each.

### **Topic Two: Signal Conditioning**

Provide definitions for the following as they apply to signal conditioning in data acquisition systems: amplification, attenuation, buffering, excitation, filtering, isolation, and linearization. Identify several chips for each of the categories.

### **Topic Three: A/D Conversion**

Research A/D Conversion as it applies to data acquisition systems. Provide definitions for resolution and conversion times. Identify several A/D chips that are currently used in DAQ boards. Determine their resolution and conversion times from specification sheets.

### **Topic Four: Data Processing**

Research data processing as it applies to data acquisition systems. Identify different mathematical operations that are traditionally performed. Identify an application where each is used.

### **Topic Five: DAQ Cards/Modules**

Research cards and modules from several different manufacturers and provide a brief technical description and application for each. Provide examples for the following interfaces: USB, RS-232, and proprietary.

### **Deliverables:**

Each team should prepare an oral presentation of their findings to the class. The use of handouts and Microsoft PowerPoint is highly encouraged.

### **Scoring or Grading Criteria:**

The criteria for grading is left to the discretion of the instructor.



**Sensors**

	<b>Product</b>	<b>Description</b>
<b>Liquid</b>		
<b>Thermal</b>		
<b>Pressure</b>		
<b>Optical</b>		
<b>Sound</b>		
<b>Radiation</b>		



**Signal Conditioning**

	<b>Definitions</b>	<b>Chip Part Numbers</b>
<b>Amplification</b>		
<b>Attenuation</b>		
<b>Buffering</b>		
<b>Excitation</b>		
<b>Filtering</b>		
<b>Isolation</b>		
<b>Linearization</b>		



**A/D Conversion**

	<b>Definition</b>
<b>Resolution</b>	
<b>Conversion Time</b>	

	<b>Manufacturer and Part Number</b>	<b>Resolution (bits)</b>	<b>Conversion Time</b>
<b>Chip #1</b>			
<b>Chip #2</b>			
<b>Chip #3</b>			



**Data Processing**

<b>Math Operation</b>	<b>Application</b>



**DAQ Cards/Modules**

	<b>Manufacturer and Part Number</b>	<b>Technical Description</b>	<b>Application</b>
<b>USB</b>			
<b>RS-232</b>			
<b>Proprietary</b>			