Lecture

Comparison between Data Acquisition (DAQ) and Embedded systems

MEC100x-Lectures 12

Energy, Power and Intelligent Control
School of Electronics, Electrical Engineering and Computer Science
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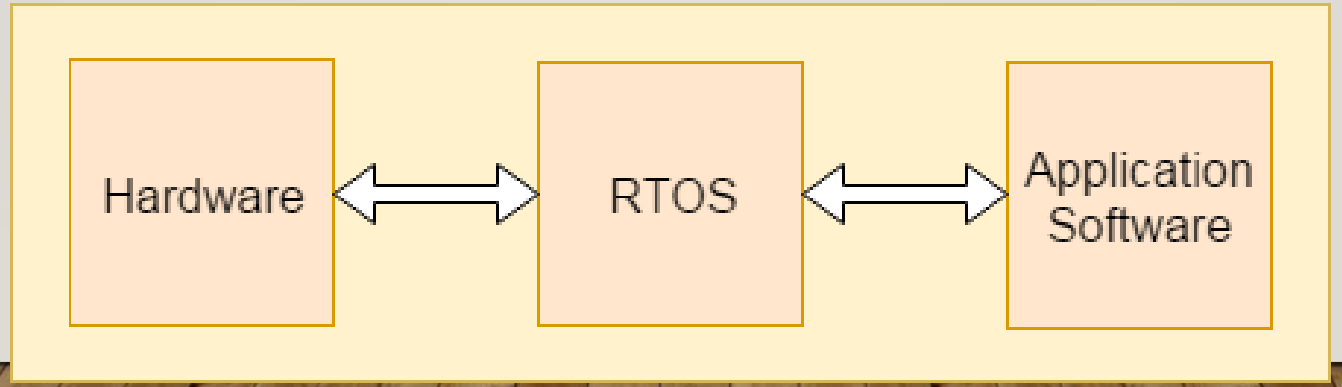
Aims

1. Embedded system hardware
2. Embedded system software
3. DAQ Hardware
4. DAQ Software

An embedded system has three components:

- An **Embedded System** is a system that has software embedded into computer-hardware, which makes a system dedicated for a variety of application or specific part of an application or product or part of a larger system.
- It has hardware.
- It has application software.
- It has Real Time Operating system (RTOS) that supervises the application software and provide mechanism to let the processor run a process as per scheduling by following a plan to control the latencies.



https://www.javatpoint.com/embedded-system-tutorial

Advantages

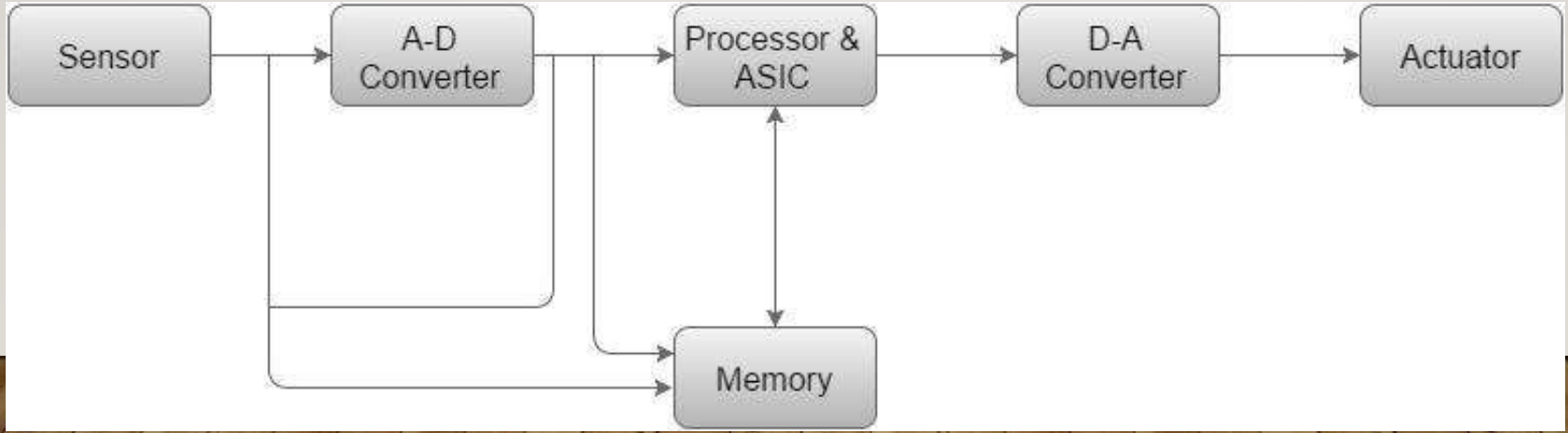
- Easily Customizable
- Low power consumption
- Low cost
- Enhanced performance

Disadvantages

- High development effort
- Larger time to market

Basic Structure of an Embedded System

The following illustration shows the basic structure of an embedded system:



https://www.tutorialspoint.com/embedded_systems/es_overview.htm

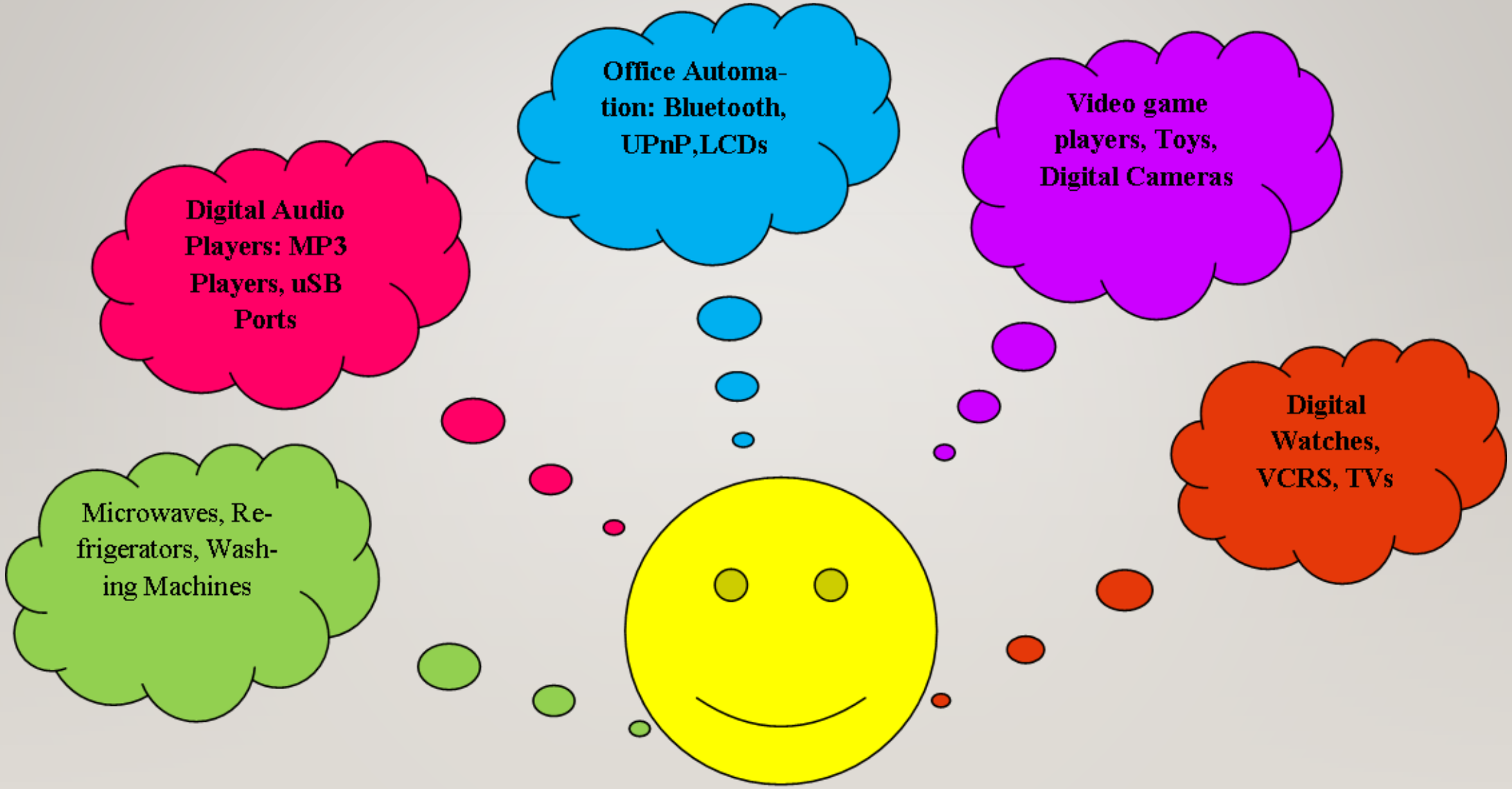
EMBEDDED SYSTEM COMPRISES

A single chip microcontroller such as:

- ARM, Cortex
- FPGAs
- Microprocessors
- ASICs
- DSPs

Applications of embedded systems

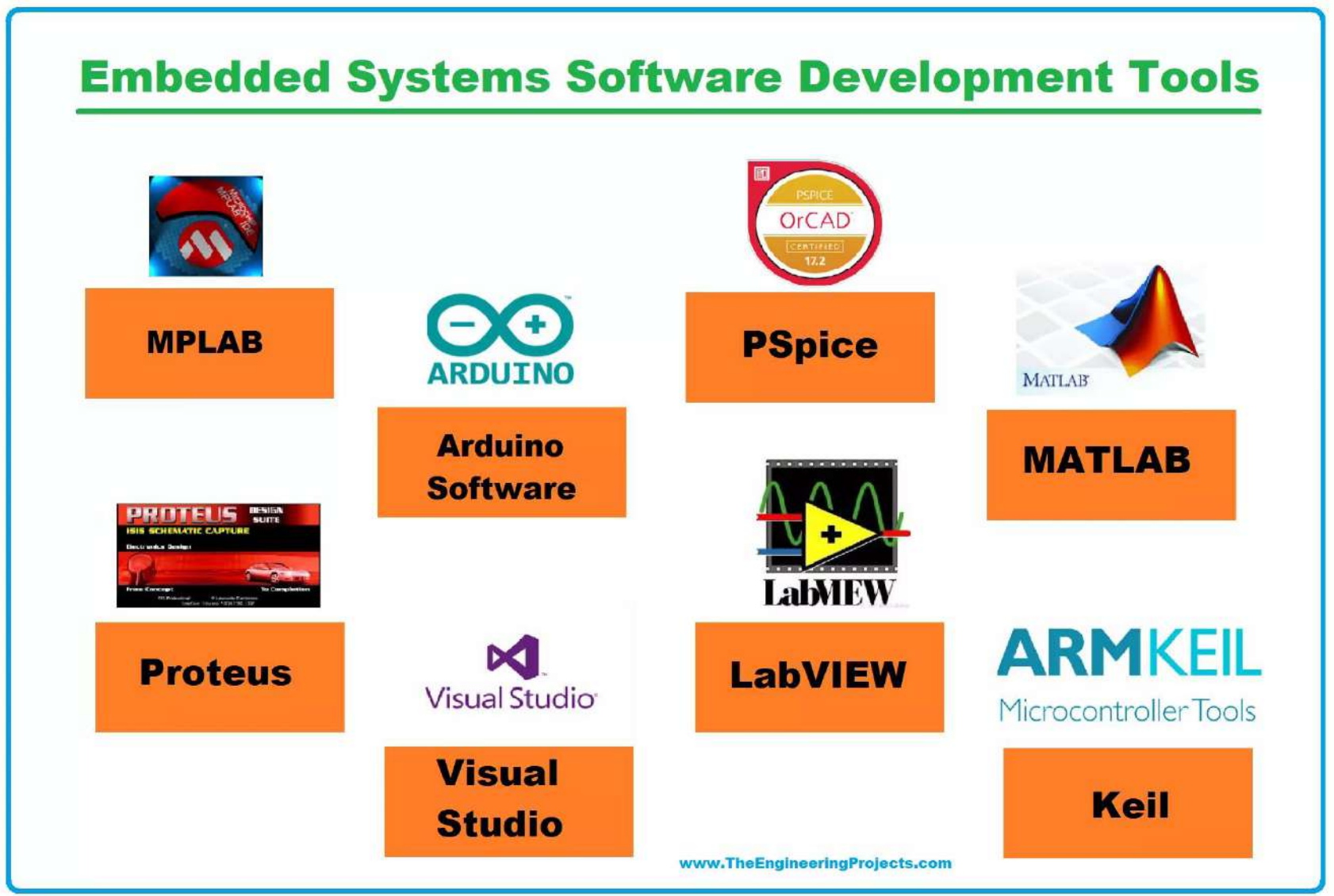
Applications of embedded systems



Consumer Electronics

Embedded Systems Software Development Tools

The software is often written in low-level programming languages such as **Python, C or assembly language, and VB, … .**



Data Acquisition (DAQ)

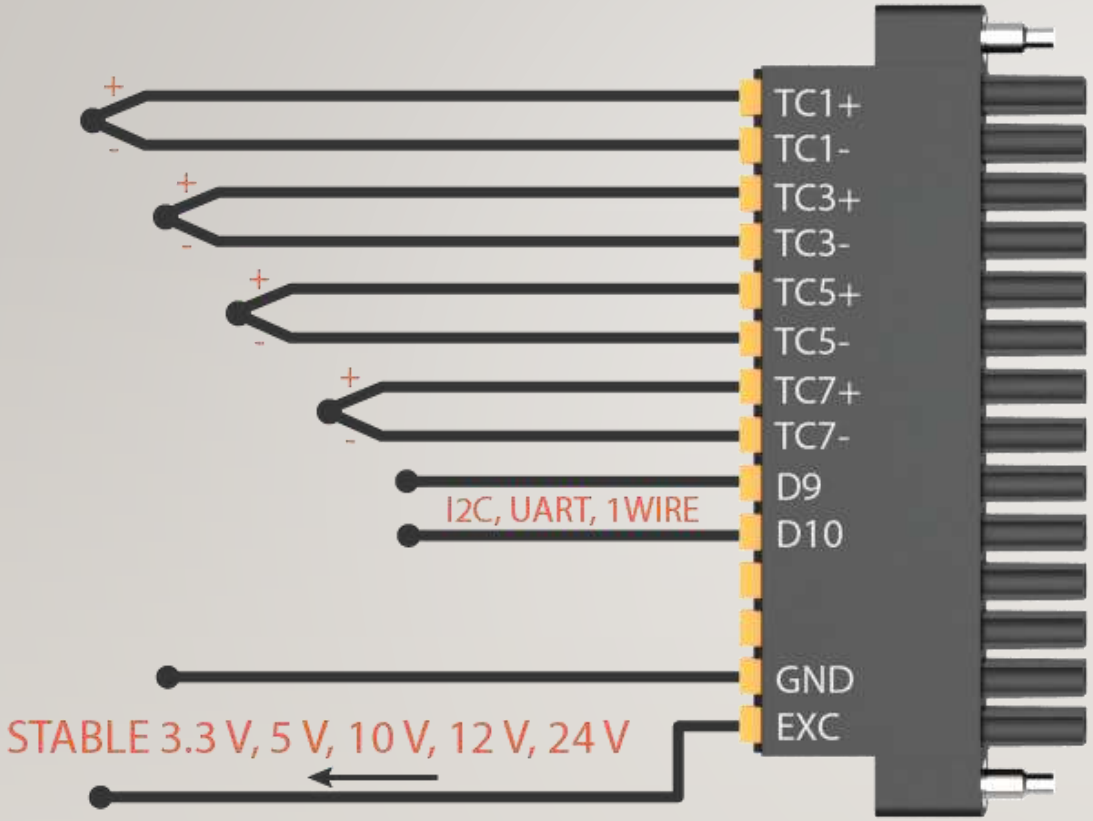
Data acquisition (DAQ) is the process of measuring an electrical or physical phenomenon, such as voltage, current, temperature, pressure, or sound.

Measurement Types :

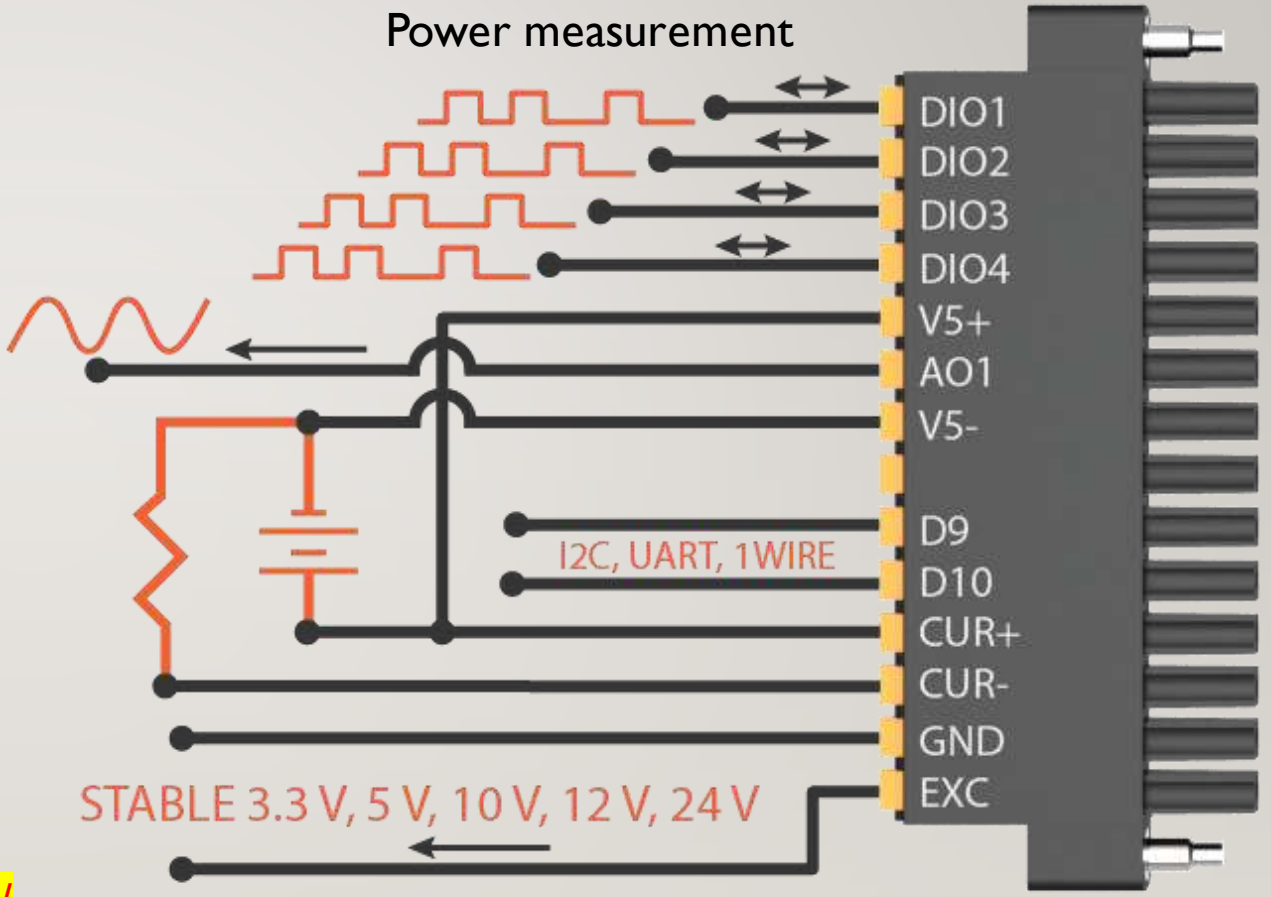
- Voltage
- Current
- Temperature
- Sound and Vibration
- Strain, Pressure, and Force

Data Acquisition (DAQ)

4 thermocouple inputs



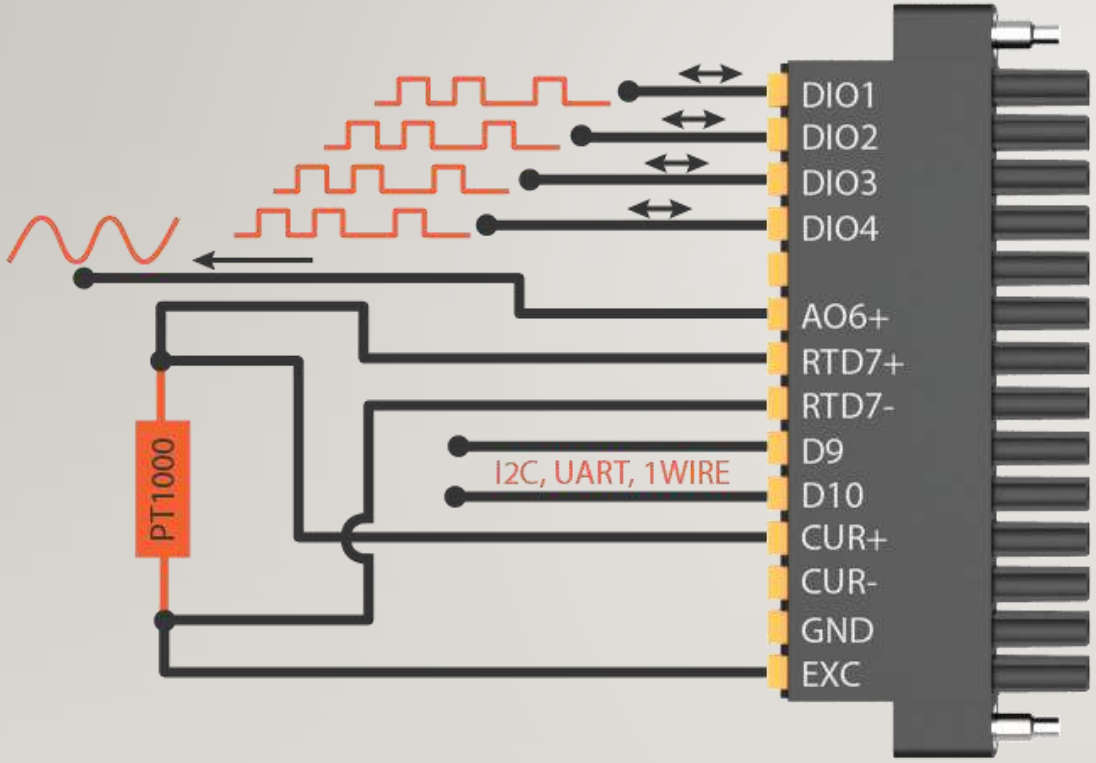
Power measurement



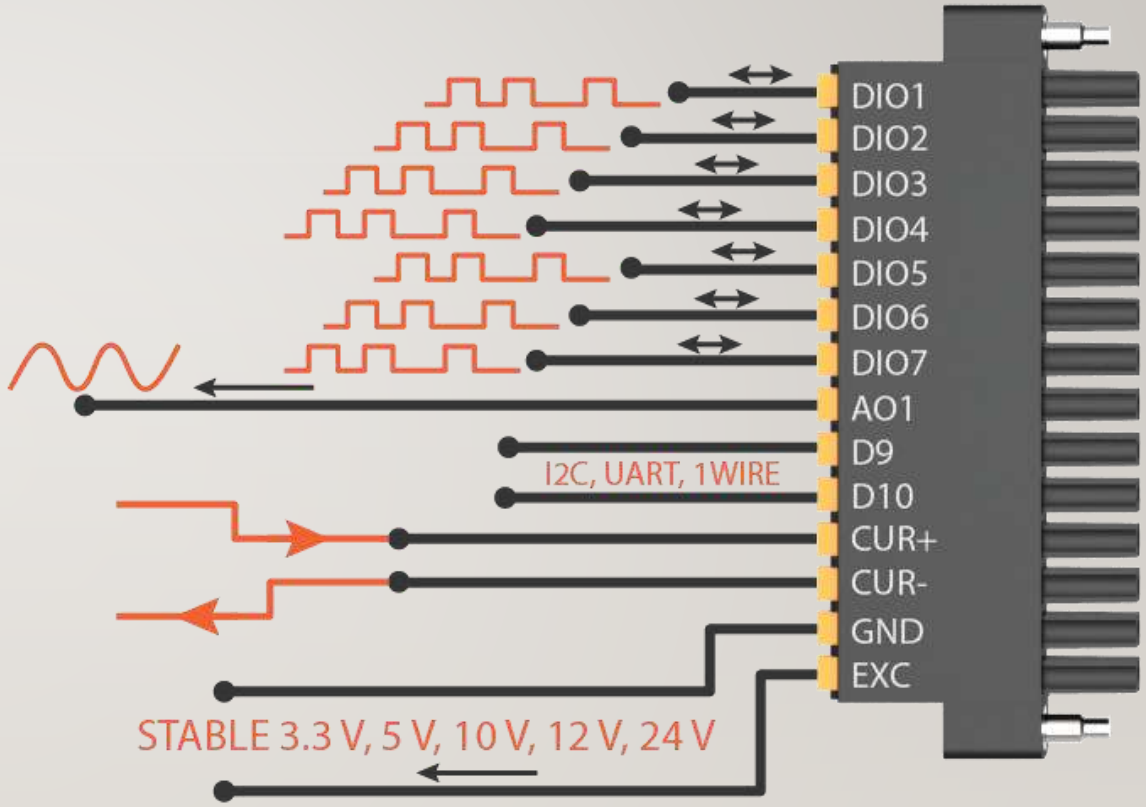
https://www.monodaq.com/usb-daq/multifunctional/

Data Acquisition (DAQ)

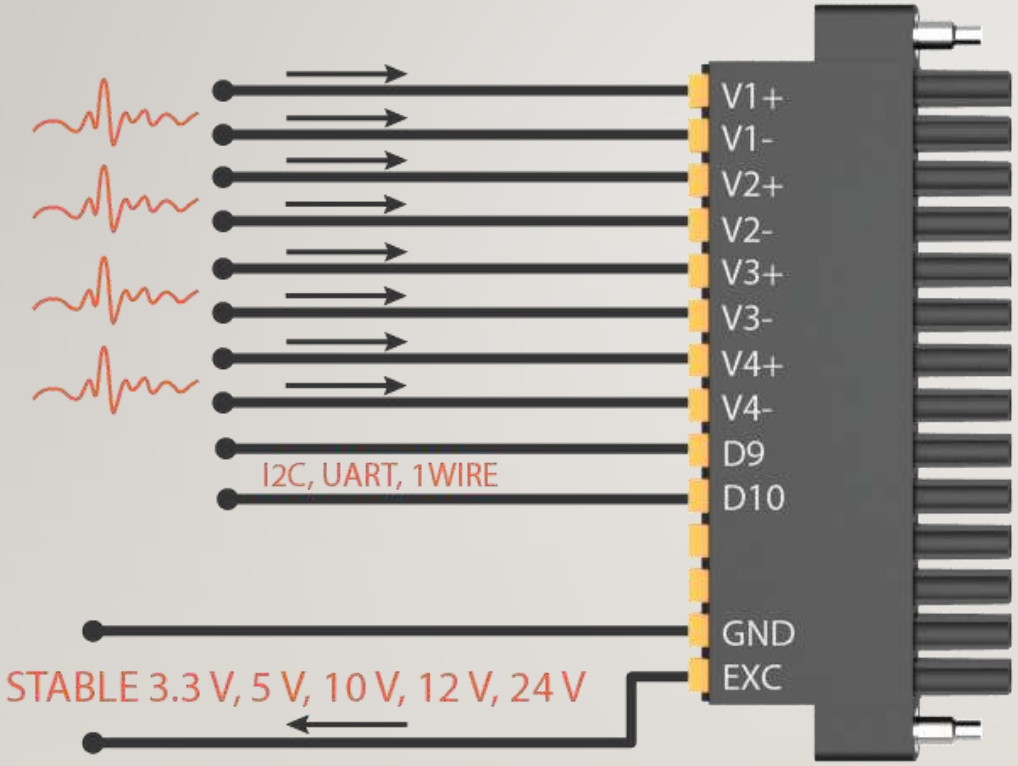
RTD interface



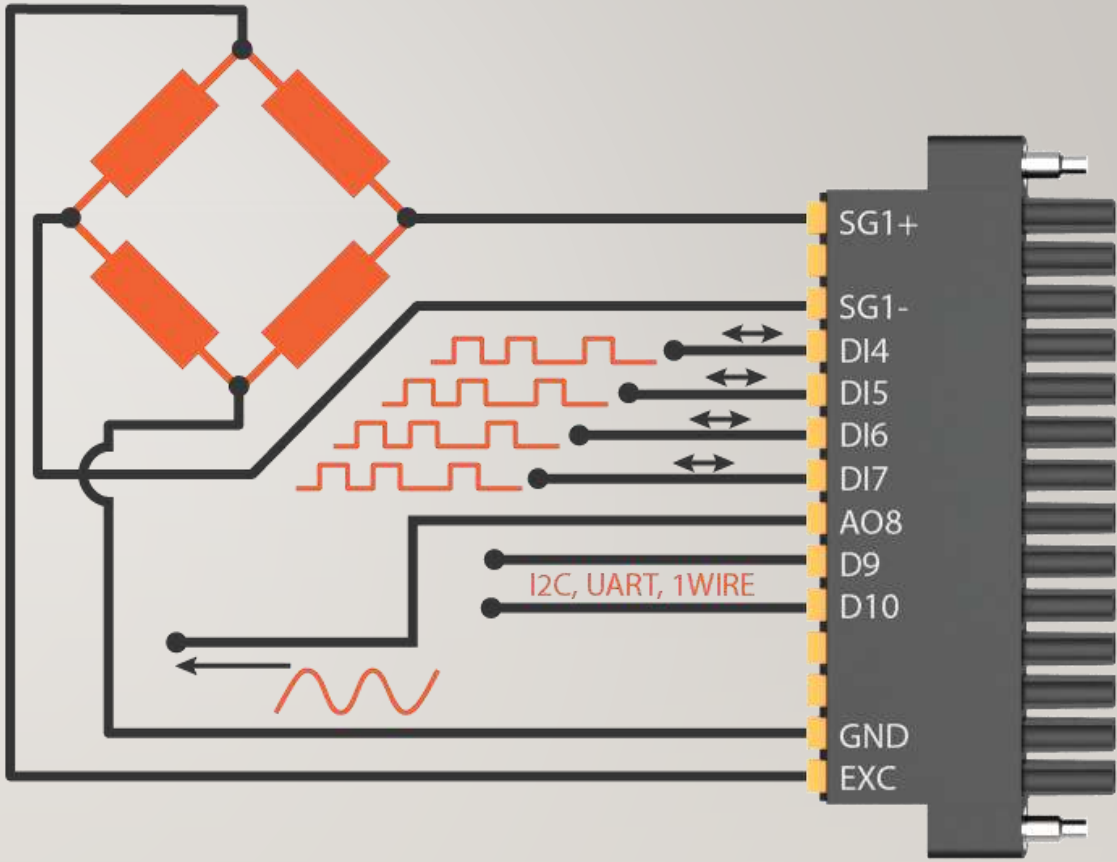
Floating current measurement



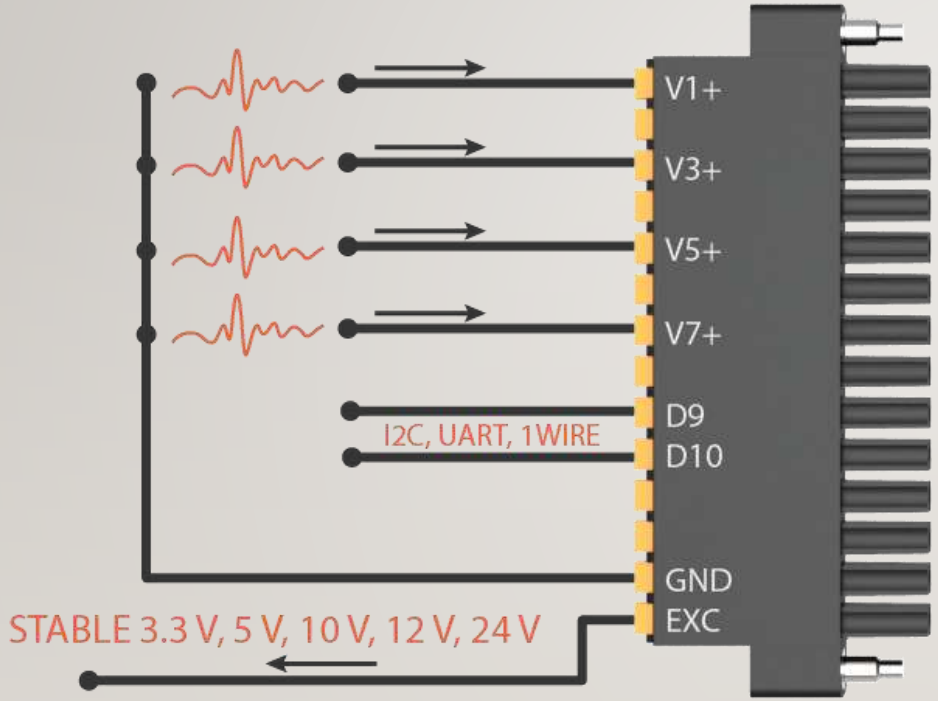
4 differential voltage inputs



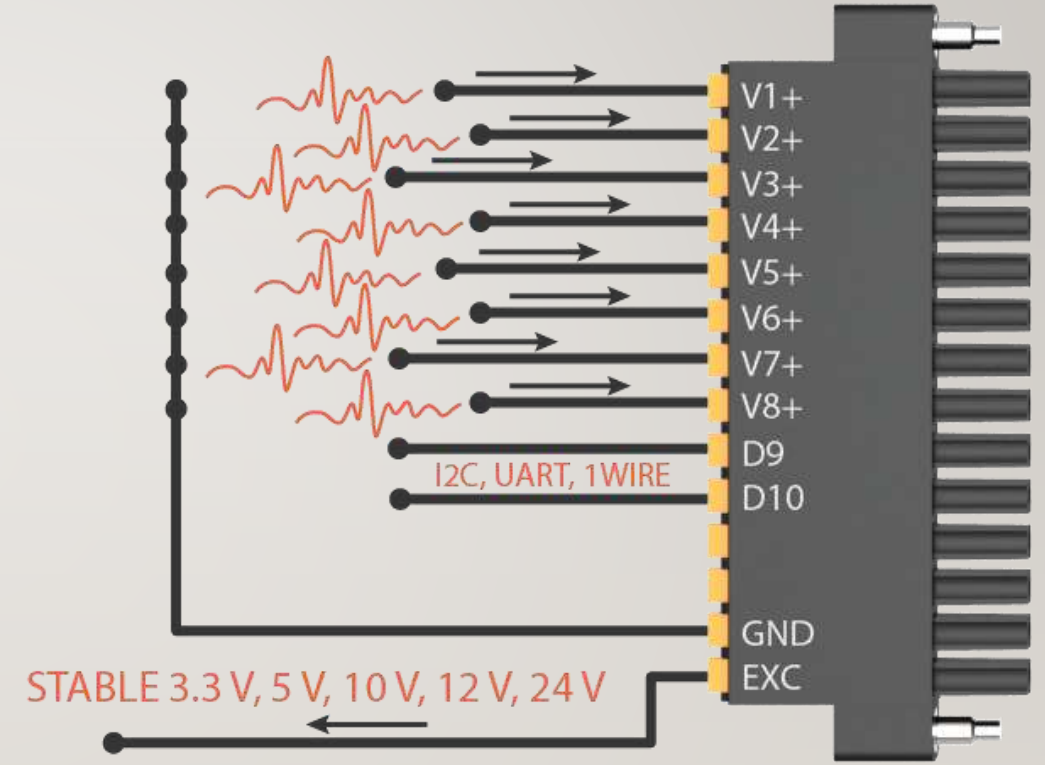
Full bridge strain gauge amplifier



4 single ended voltage inputs



8 single ended voltage inputs



Data Acquisition (DAQ)

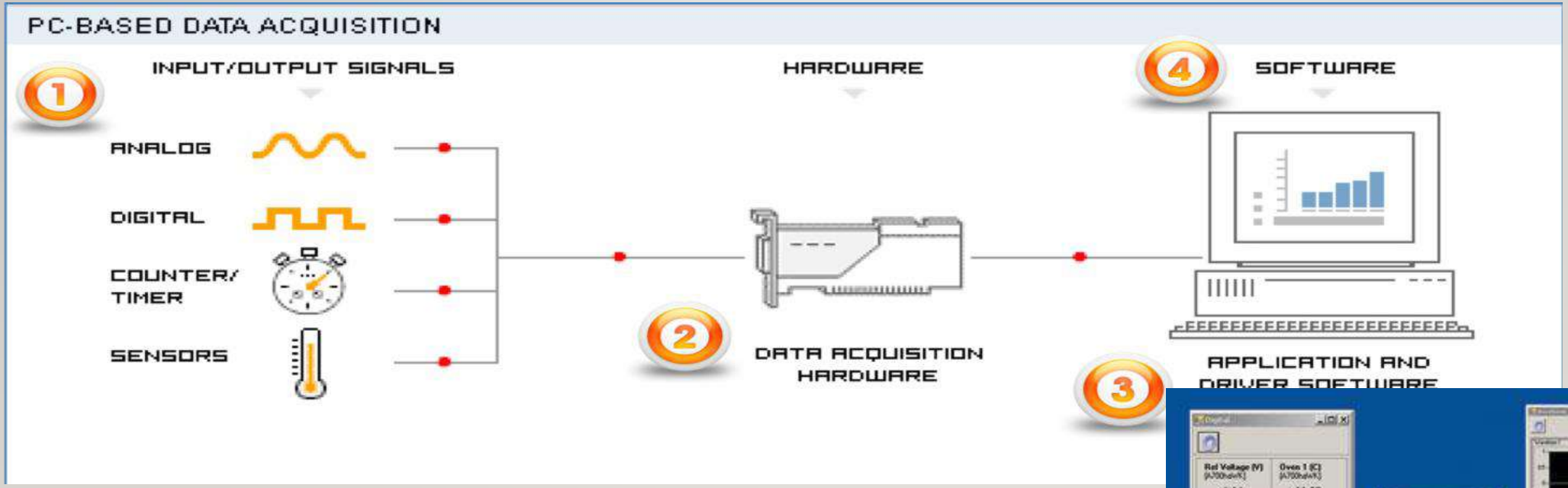
- **The Purposes of Data Acquisition:**

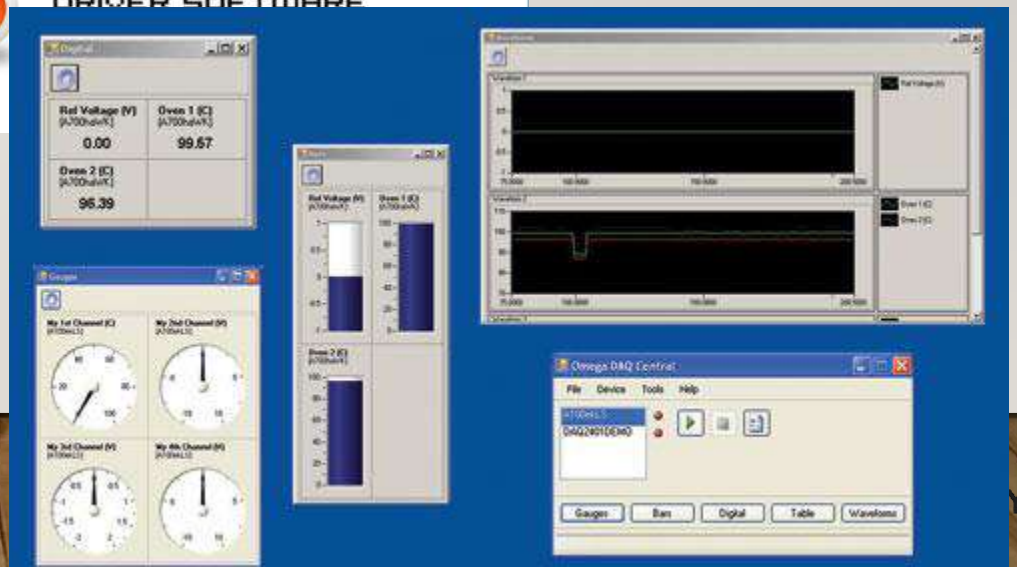
- Data recording
- Data storing
- Real-time data visualization
- Post-recording data review
- Data analysis using various mathematical and statistical calculations
- Report generation

DAQ Software's

Advantech DAQ offers a wide range of data acquisition and signal condition devices with various interfaces: PCI and PCIE cards, USB and iDAQ modules.

1- LabVIEW

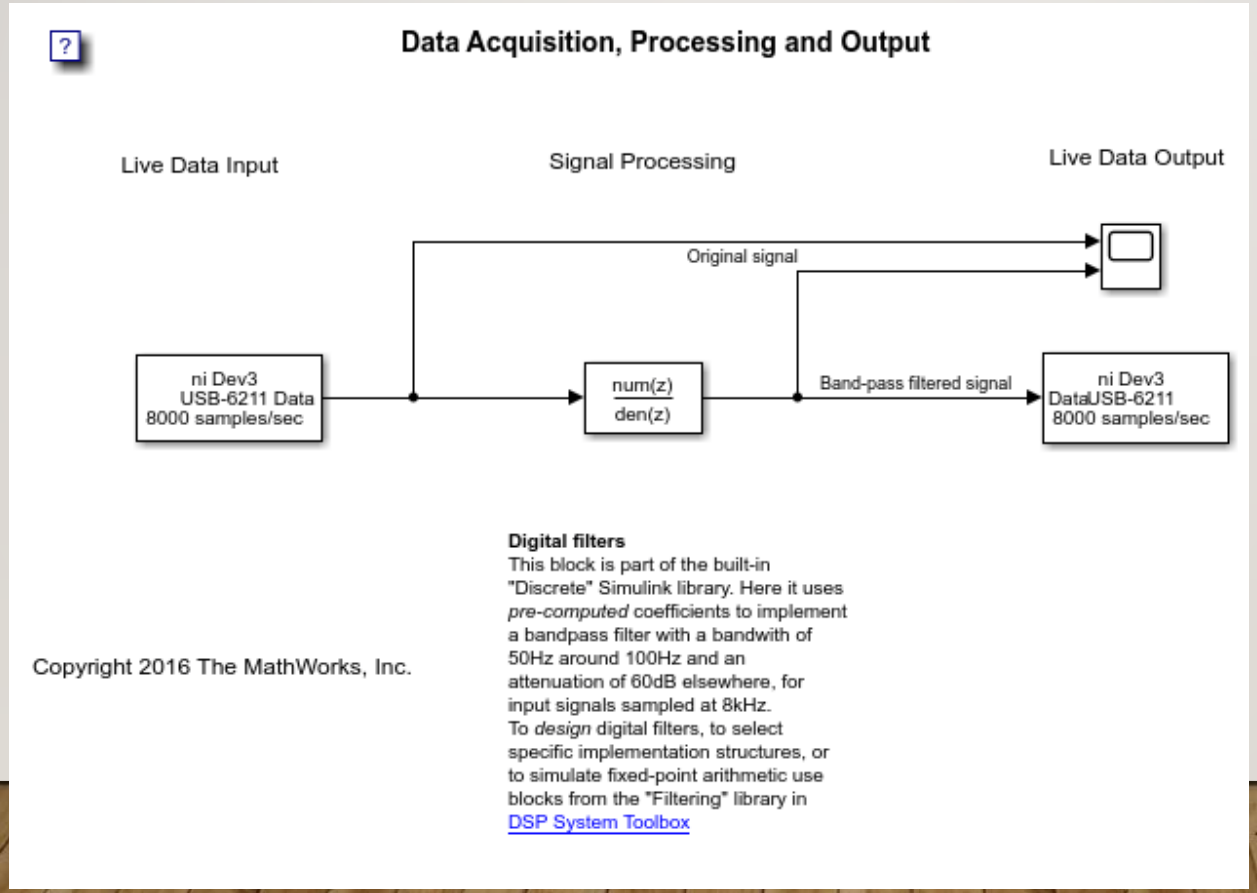




DAQ Software's

Advantech DAQ offers a wide range of data acquisition and signal condition devices with various interfaces: PCI and PCIE cards, USB and iDAQ modules.

2- MATLAB for research works



Thank You For Your Attention!

Any Question?

DAQ Software's

Advantech offers serial / USB converters, isolators, repeaters, surge suppressors, data taps /splitter, USB hubs, and industrial communication cards.

Data Acquisition Solutions Overview

Advantech DAQ offers a wide range of data acquisition and signal condition devices with various interfaces: PCI and PCIE cards, USB and iDAQ modules.