LabVIEW 7.1 Tutorial.

Measurement Lab. MECH262-MECH261

Imran Haider Malik

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Outline

- Introduction
- LabVIEW Introduction
- Data Acquisition (DAQ)
- Features of LabVIEW
- Example
- LabVIEW Interface
- Lab. Equipment
- Goals of the Lab. Work
- List of Experiments.
- Introduction to TAs and Lab. Technicians.
- Conclusions.

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LabVIEW 7.1

- Product of National Instruments (NI)
- Software for Virtual Instrumentation
- Data Acquisition (DAQ)
- Graphical Programming
- Data Storage and Analysis for wide Range of Applications

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Data Acquisition (DAQ)

Time dependant Signal Recording (Acquisition)

Components of DAQ:

- Sensor (Active or Passive)
- Signal Conditioner (nowadays built-in with DAQ card)
- DAQ Card
- DAQ Software (LabVIEW)

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Features of LabVIEW 7.1

- **Design**
  - Signal and Image Processing
  - Embedded System Programming
    - (PC, DSP, FPGA, Microcontroller)
  - Simulation and Prototyping
  - And more…
- **Control**
  - Automatic Controls and Dynamic Systems
  - Mechatronics and Robotics
  - And more…
- **Measurements**
  - Circuits and Electronics
  - Measurements and Instrumentation
  - And more…

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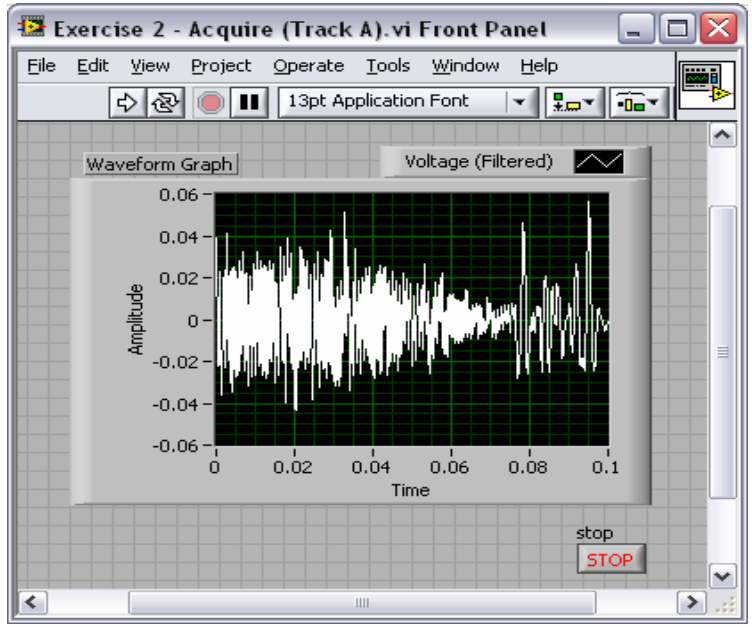
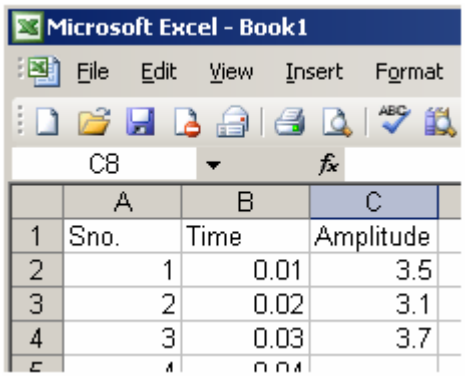
Example

Sound Signal Acquisition





	A	B	C
1	Sno.	Time	Amplitude
2	1	0.01	3.5
3	2	0.02	3.1
4	3	0.03	3.7

This can help Design a Tuning Device for Musical Instruments.

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LabVIEW Interface

Each Virtual Instrument (VI) has 2 Windows

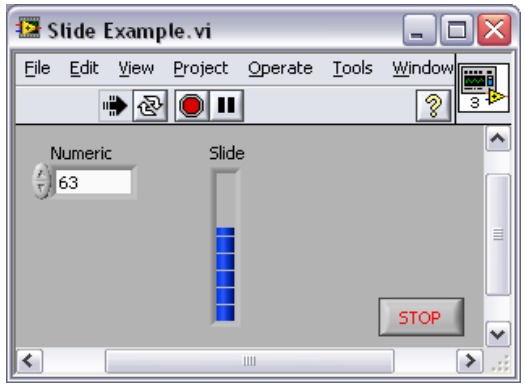
Front Panel

- User Interface (UI)
  - Controls = Inputs
  - Indicators = Outputs

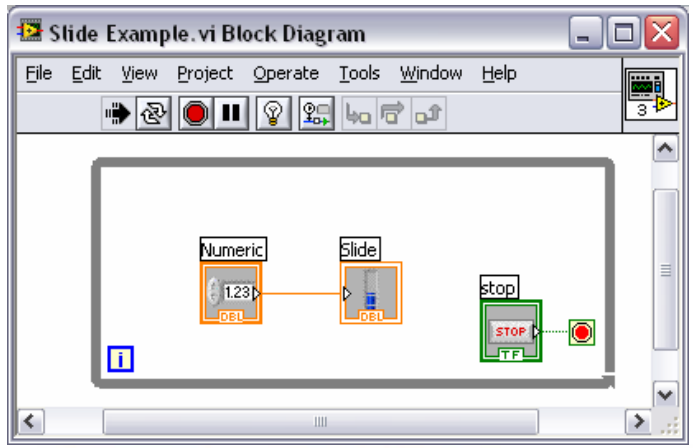
Block Diagram

- Graphical Code
  - Data travels on wires from controls through functions to indicators
  - Blocks execute by Dataflow

Front Panel



Block Diagram



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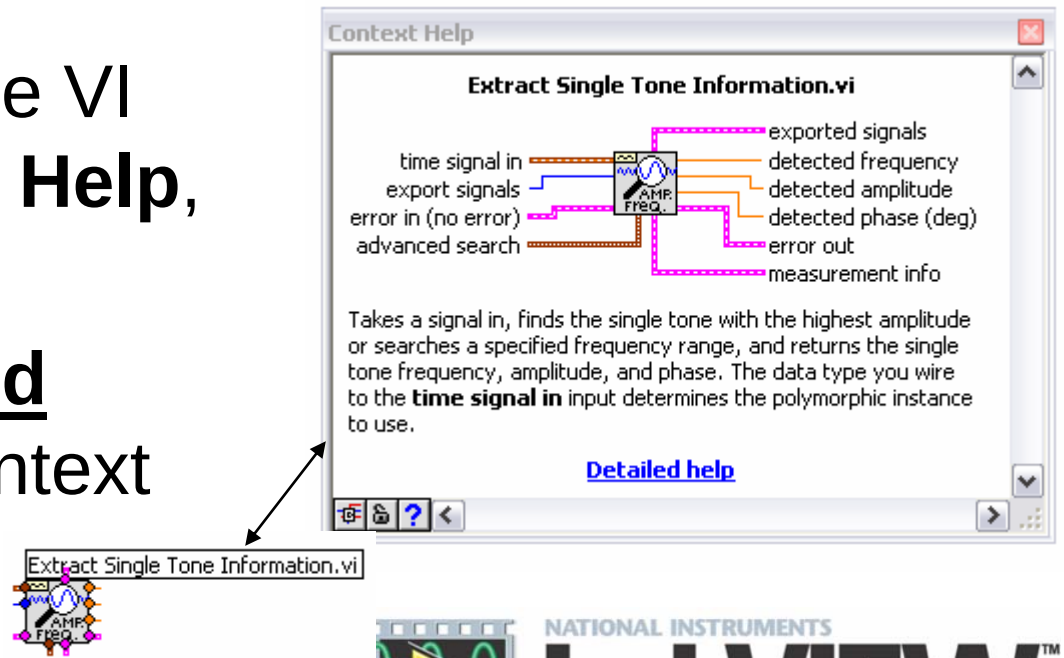
LabVIEW Interface (Contd)

- **Help»Show Context Help**, press the <Ctrl+H> keys
- Hover cursor over object to update window

Additional Help

- Right-Click on the VI icon and choose **Help**, or
- Choose "**Detailed Help**." on the context help window



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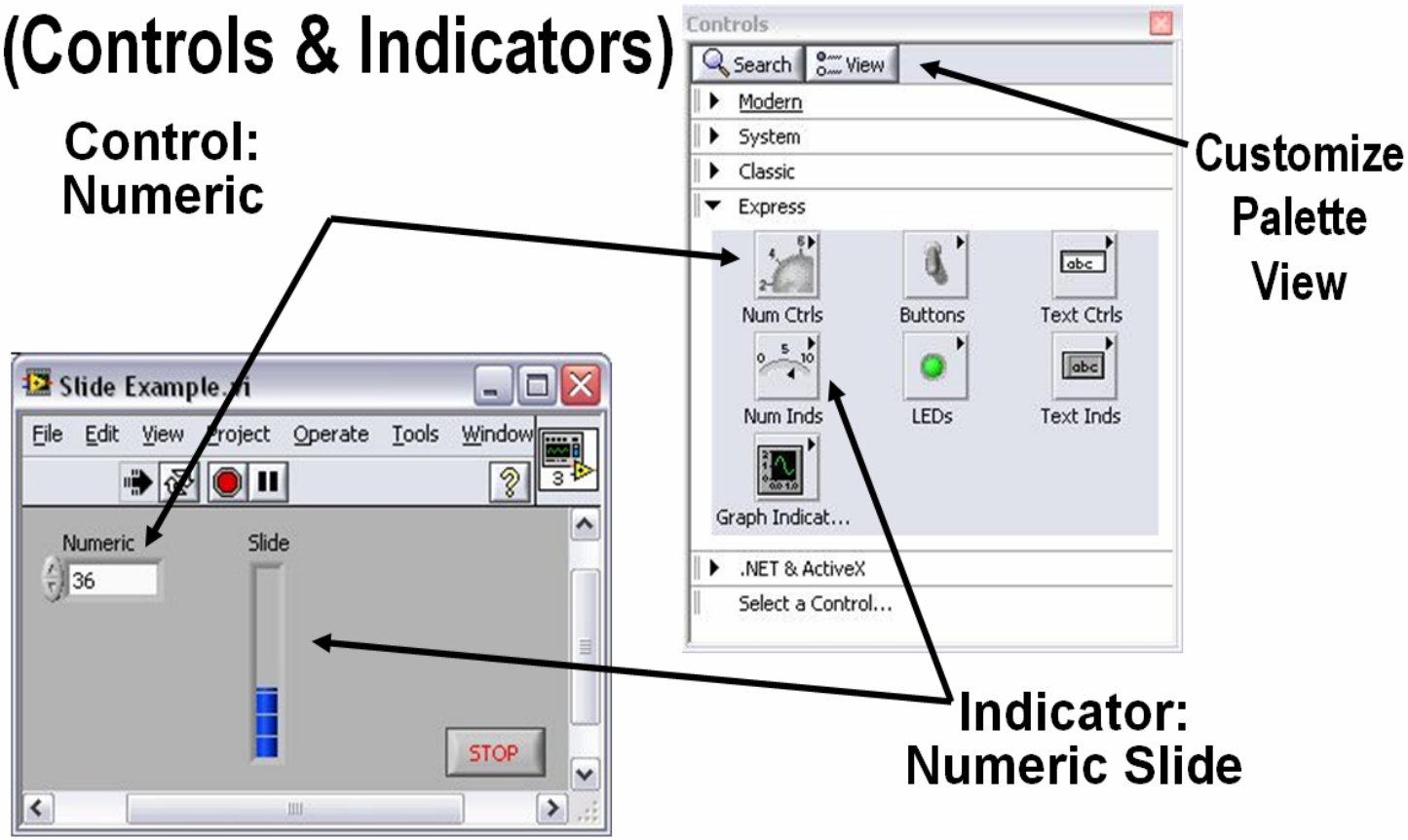
LabVIEW Interface (Contd)

Controls Palette (Controls & Indicators) (Place items on the Front Panel Window)



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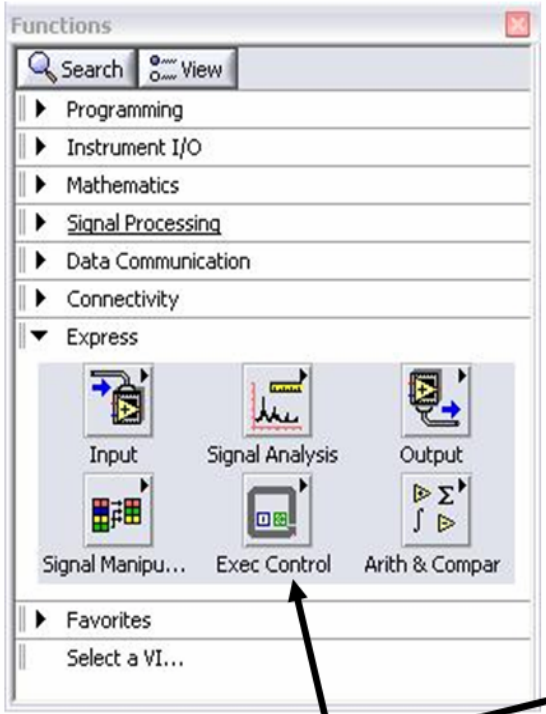
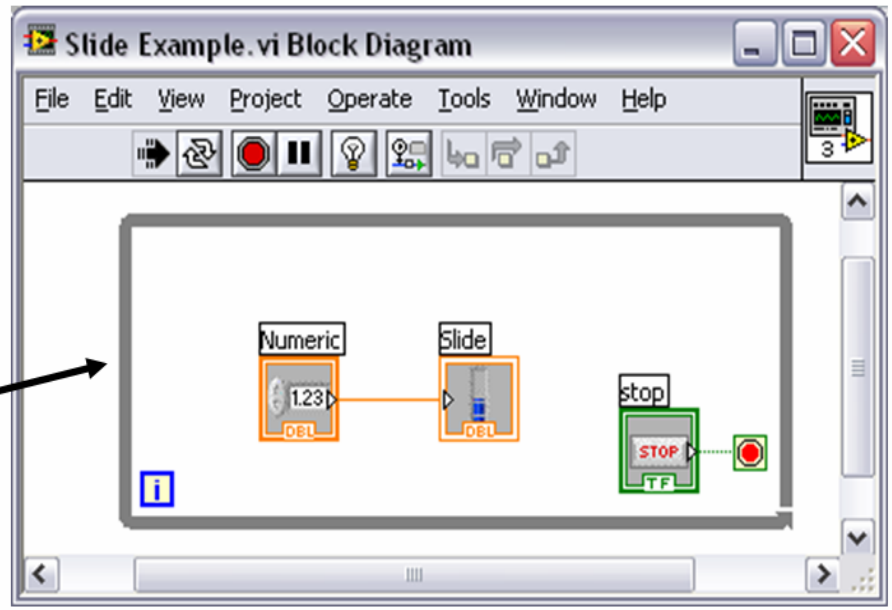
LabVIEW Interface (Contd)

Functions (and Structures) Palette



(Place items on the Block Diagram Window)



Structure: While Loop

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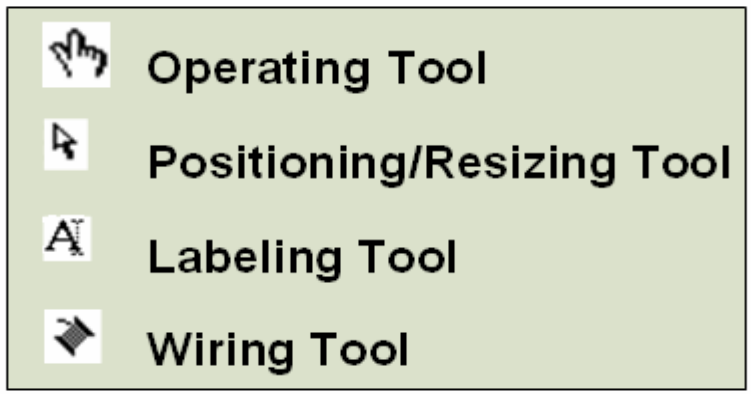
LabVIEW Interface (Contd)

Tools Palette

- Recommended: Automatic Selection Tool
- Tools to operate and modify both front panel and block diagram objects

Automatically chooses among the following tools:



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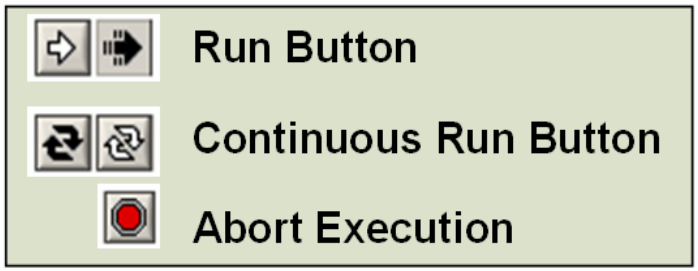
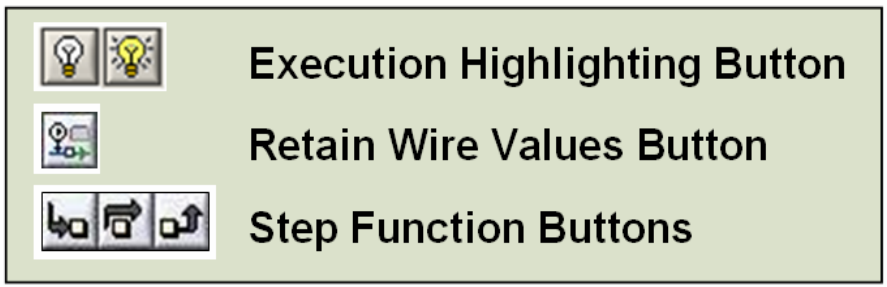
LabVIEW Interface (Contd)

Status Toolbar



Additional Buttons on the Diagram Toolbar



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Lab. Equipment

- Oscilloscope

Universal Measuring Instruments

- Function Generator

Signal Generator

- Digital Voltmeter (DVM)

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Goals of the Lab. Work

- Introduce LabVIEW
- DAQ
- Introduce different Sensors and their comparison
- Use of Electronic instruments:

  Oscilloscope, Function Generator

  Digital Volt-meter (DVM).

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List of Experiments.

1. Instrumentation Overview.
2. Introduction to LabVIEW.
3. Data Sampling.
4. Time Constant.
5. Stress and Strain.
6. Transducer Sensitivity (Part 1)
7. Transducer Sensitivity (Part 2) and Linearity
8. Pressure Transducer Calibration and Jet Profile
9. Thermocouples: Calibration and Manufacturing

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What you should know being Engineer

- Selection of DAQ system for an application
- Selection of sensors
- Limitations of the System
- Alternative Solutions

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TA Contact.

Sairam Prabhakar
sairam.prabhakar@mail.mcgill.ca

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References

- www.ni.com
- Using the oscilloscope http://www.doctronics.co.uk/scope.htm

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