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Learning with LabVIEW

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The Learning with LabVIEW textbook, written by Dr. Robert Bishop from the University of Texas at Austin, includes LabVIEW programming basics and helps students relate those programming concepts to real applications in industry and academia. Each chapter of the Learning with LabVIEW textbook consists of the following:

- A brief table of contents and a short preview of what to expect in the chapter
- A chapter goals list to help focus the chapter discussions
- Margin icons that call attention to helpful hints or cautionary notes
- An end-of-chapter summary and key terms list
- Sections called "Building Blocks" for continuous modification of VIs
- Worked examples
- A section on how engineers and scientists are using LabVIEW to solve real-world problems
- Exercises and problems that reinforce main chapter topics

A hallmark of this book is its extensive number of pictures from LabVIEW that make it easy for students to reproduce the procedures from the book on their personal computers. This makes the book ideal for both classroom instruction and self-study for undergraduate and graduate students.

Ordering Information

Visit the Prentice Hall Web site for information on obtaining your copy of Learning with LabVIEW: LabVIEW Student Edition Textbook Bundle (textbook and CD) ISBN 0-13-199918-4.

Companion Web Site

Visit the Learning with LabVIEW companion web site to download the Learning Directory of VIs used throughout the text.

New Features in This Edition

- New chapter on MathScript
- New building block that spans the entire book, building on each chapter topic
- Major upgrade to worked examples and additional homework problems
- Coverage of new features including MathScript, Matrix data type, Advanced Analysis Library, Simulated Data Acquisition, and more

Table of Contents

Chapter 1
LabVIEW Basics
This chapter introduces the LabVIEW environment and helps orient students when they open a VI. Bishop discusses concepts such as windows, toolbars, menus, and palettes.

Chapter 2
Virtual Instruments
Virtual instrument components -- front panel, block diagram, and icon/connector -- are introduced in this chapter, as well as the concept of using VIs in other VIs or subVIs. This chapter also illustrates the concept of controls (inputs) and indicators (outputs) and how to wire objects together in the block diagram.

Chapter 3
MathScript
This chapter introduces the new interactive MathScript environment, which combines intuitive graphical dataflow programming with a mathematics-oriented textual programming environment. Bishop covers both the interactive MathScript environment for command line computation and programming in addition to the MathScript Node for integrating textual scripts within the LabVIEW block diagram.

Chapter 4
Editing and Debugging Virtual Instruments
Resizing, coloring, and labeling objects are just some of the editing techniques introduced in this chapter. Students can find errors using execution highlighting, probes, single-stepping, breakpoints, and other debugging tools.

Chapter 5
SubVIs
This chapter emphasizes the importance of reusing code and illustrates how to create a VI icon/connector. It also shows parallels between LabVIEW and text-based programming languages.

Chapter 6
Structures
This chapter presents loops, case structures, and sequence structures governing the execution flow in a VI. The Formula Node is introduced as a way to implement complex mathematical equations.

Chapter 7
Arrays and Clusters
This chapter shows students how they can group data, either with elements of the same type (arrays) or elements of a different type (clusters). This chapter illustrates how to create and manipulate arrays and clusters on the front panel as well as on the block diagram.

Chapter 8
Charts and Graphs
This chapter shows how to display and customize the appearance of single and multiple charts and graphs. Bishop also covers the annotation and exportation of chart and graph images for use in other writing reports.

Chapter 9
Data Acquisition
Bishop discusses basic analog and digital signal characteristics, as well as the factors students need to consider when acquiring and generating digital signals. This chapter introduces students to Measurement & Automation Explorer (MAX), simulated data acquisition, and the USB DAQ student kits. All examples use DAQ Assistant.

Chapter 10
Strings and File I/O
This chapter depicts how to create and manipulate strings on the front panel and block diagram and how to write data to and read data from ASCII, spreadsheet, and binary files.

Chapter 11
Analysis
Students can use LabVIEW in a variety of ways to support signal and system analysis. Bishop discusses several important analysis topics in this chapter, including how to use LabVIEW for signal generation, signal processing, linear algebra, curve fitting, formula display on the front panel, differential equations, finding roots (zero finder), and integration and differentiation.

Chapter 12
Other LabVIEW Applications
The concluding chapter briefly discusses other LabVIEW features, such as Sound Card I/O, simulation and control design in LabVIEW, and the new shared variable.

Appendix A
Instrument Control
Bishop presents instrument control system components using a GPIB or serial interface in this chapter. Students are introduced to instrument drivers, as well as the use of MAX to detect and install instrument drivers and the use of Instrument I/O Assistant to communicate with traditional instruments.

Assistance and Contact


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