

Contents

Foreword from Jeff Kodosky / Father of LabVIEW Introduction

This book is written so that people who want to expand their hobbies with programming and who want to start physical computing and prototyping using Arduino can learn LabVIEW from scratch. We have prepared example programs that will get you interested. We tried to write simple sentences that even middle school students could enjoy.



Part 1 Getting Started with LabVIEW

Programming will help you sort out the problems at hand, try them out, and think further

Chapter 1 Programming with LabVIEW

Looking back on the history of computer usage and explaining the positioning of LabVIEW

- 1.1 Computer and Computer Program . . . 1
- 1.2 Text-Based Language and Graphical Language . . . 3
- 1.3 Physical Computing and LabVIEW . . . 4
- 1.4 The Best Use Cases of LabVIEW . . . 6

<Article 1 LabVIEW Heads Towards NXG>

Chapter 2 Using LabVIEW Community Edition

Features of LabVIEW, structure of this document and installation of LabVIEW Community Edition

- 2.1 Features of LabVIEW and LabVIEW NXG . . . 9
- 2.2 Structure of this Document . . . 11
- 2.3 Installing LabVIEW Community Edition . . . 12

<Article 2 Install LabVIEW NXG Community Edition>

Part 2 Getting Started with LabVIEW Programming

Learn the Basics of LabVIEW Programming

Chapter 3 First Exposure to Graphical Programming

LabVIEW-specific programming methods such as icons, wires, and data flows

- 3.1 Investigating the LED Properties in LabVIEW** . . . 22
 - 3.2 Observing the LabVIEW Program** . . . 24
 - 3.3 Creating a Simple LabVIEW Program** . . . 26
 - 3.4 Making the Program Run Repeatedly** . . . 34
- <Article 3 Programming with LabVIEW NXG>

Chapter 4 Making Your Own Application

How to make a practical application that can record and playback

- 4.1 LabVIEW Programming for Your Hobby** . . . 43
 - 4.2 Operate the “SoundVIEW” Program** . . . 45
 - 4.3 Record and Playback Example Program** . . . 52
 - 4.4 Waveform Data and Array** . . . 55
 - 4.5 For Loop, Shift Register and Array** . . . 58
 - 4.6 Build Waveform Data and SubVI** . . . 64
 - 4.7 Record and Playback Program** . . . 68
- <Article 4 LabVIEW NXG Web affinity>

Part 3 Electronic Projects with LabVIEW and Arduino

Please prepare Arduino UNO, breadboard, tact switch, fan, LED, fixed resistance (100Ω), variable resistance ($10k\Omega$), 6 wires

Chapter 5 LabVIEW and Arduino

Start physical computing with Arduino

| | |
|---|-----------------|
| 5.1 Installation of Arduino IDE and Blink | • • • 79 |
| 5.2 Arduino Input and Output | • • • 82 |
| 5.3 Control your Arduino with LabVIEW | • • • 83 |
| 5.4 Make a Switch Counter | • • • 86 |
| 5.5 Make a Fan Controller | • • • 90 |
| 5.6 Change the Operation of the Switch | • • • 95 |
| <Article 5 LabVIEW NXG and Hardware> | |

Chapter 6 Investigating LED Properties

Examine the LED properties

| | |
|--|------------------|
| 6.1 Assembling the Experimental Circuit for LED Voltage-Current Properties | • • • 99 |
| 6.2 Measuring LED Voltage and Current | • • • 100 |
| 6.3 The Program to Display LED V-I Property Curve | • • • 104 |
| 6.4 Regression Analysis of LED V-I Property Data | • • • 105 |
| 6.Appendix Additional Note on Variable Resistors and the Experimental Circuit | • • • 110 |
| <Article 6 Data Analysis with LabVIEW NXG> | |

Chapter 7 Using the Latest Semiconductor Sensors

Sensors used in smartphones and automobiles are sold as modules that can be easily connected to Arduino, so we will introduce an example of how to use them.

| | |
|--|------------------|
| 7.1 Semiconductor Sensors Used in Smartphones and Automobiles | • • • 115 |
| 7.2 Sensor to Measure Heart Rate | • • • 116 |
| 7.3 Operate with Sample Program for Arduino | • • • 117 |
| 7.4 Get the Datasheet | • • • 119 |
| 7.5 Creating a LabVIEW Serial Receive Program | • • • 121 |
| 7.6 Create Heart Rate Measurement Program | • • • 128 |
| <Article 7 What LabVIEW NXG Aims for> | |

List of Example VIs

Afterword