

Unlock the Power of Automation: A Comprehensive Guide to Developing PLC and HMI Programs

In the modern era of industrial automation, programmable logic controllers (PLCs) and human-machine interfaces (HMIs) play a pivotal role in enhancing productivity, efficiency, and safety. To harness the full potential of these systems, it is essential to possess a comprehensive understanding of how to develop PLC and HMI programs using standardized methods and structured approaches. This article serves as an in-depth guide, providing readers with a thorough exploration of the principles, techniques, and best practices involved in PLC and HMI programming.

Chapter 1: Understanding the Basics

This chapter lays the groundwork by introducing the fundamental concepts of PLC and HMI systems. It covers the different types of PLCs, their hardware and software components, and the various communication protocols used in industrial automation. Additionally, it provides an overview of HMI devices, their functions, and the different HMI development platforms available.



PLC and HMI Development with Siemens TIA Portal: Develop PLC and HMI programs using standard methods and structured approaches with TIA Portal

V17 by Liam Bee

★★★★★ 5 out of 5

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Screen Reader : Supported

Enhanced typesetting: Enabled

Print length : 436 pages

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Chapter 2: PLC Programming Fundamentals

Chapter 2 dives into the core principles of PLC programming. It starts with an introduction to ladder logic, the widely used graphical programming language for PLCs. Readers will learn about the different ladder elements, their functions, and how to create and edit ladder diagrams. The chapter also covers programming fundamentals such as input and output addressing, memory types, timers, and counters.

PLC and HMI Development with Siemens TIA Portal

With automation requirements on the rise, Siemens TIA Portal development environment is almost a necessity for any automation engineer. The Totally Integrated Automation (TIA) environment helps seamlessly integrate all things automation, from PLC hardware and software design to HMI development. This book helps you understand the tools available in the TIA toolbox and shows you how to write code effectively.

The book begins by introducing you to the TIA environment, covering the layout and tools available. Once you've got to grips with the environment, you'll find out how to create hardware to write programs against, including adding I/O modules and assigning memory for input and output. Next, you'll develop logic in all of the languages that TIA Portal offers, such as Ladder, Function Block Diagram, and Structured Text (ST) (note that Statement List is not covered as a dedicated language, as well as the newest language, Cause and Effect (CEM)). You'll also discover how to store standard code in libraries, creating a version control system that is easy to manage and aids standard design. Finally, following the PLC design chapters, you'll learn how to develop HMI applications in TIA Portal's latest unified hardware.

By the end of the book, you'll be well equipped to use all of the features that TIA Portal V17 offers.

What you will learn

- Get to grips with the TIA environment
- Create hardware to write programs against
- Develop logic in all of the languages that TIA Portal offers
- Store standard code in libraries
- Create a version control system
- Develop HMI applications in TIA Portal's latest unified hardware

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Chapter 3: HMI Development Techniques

This chapter explores the art of HMI development. It introduces the different types of HMI screens, including static, dynamic, and alarm screens. Readers will learn how to create and customize HMI screens using various software development tools. The chapter also covers the principles of HMI navigation, data handling, and user interaction.

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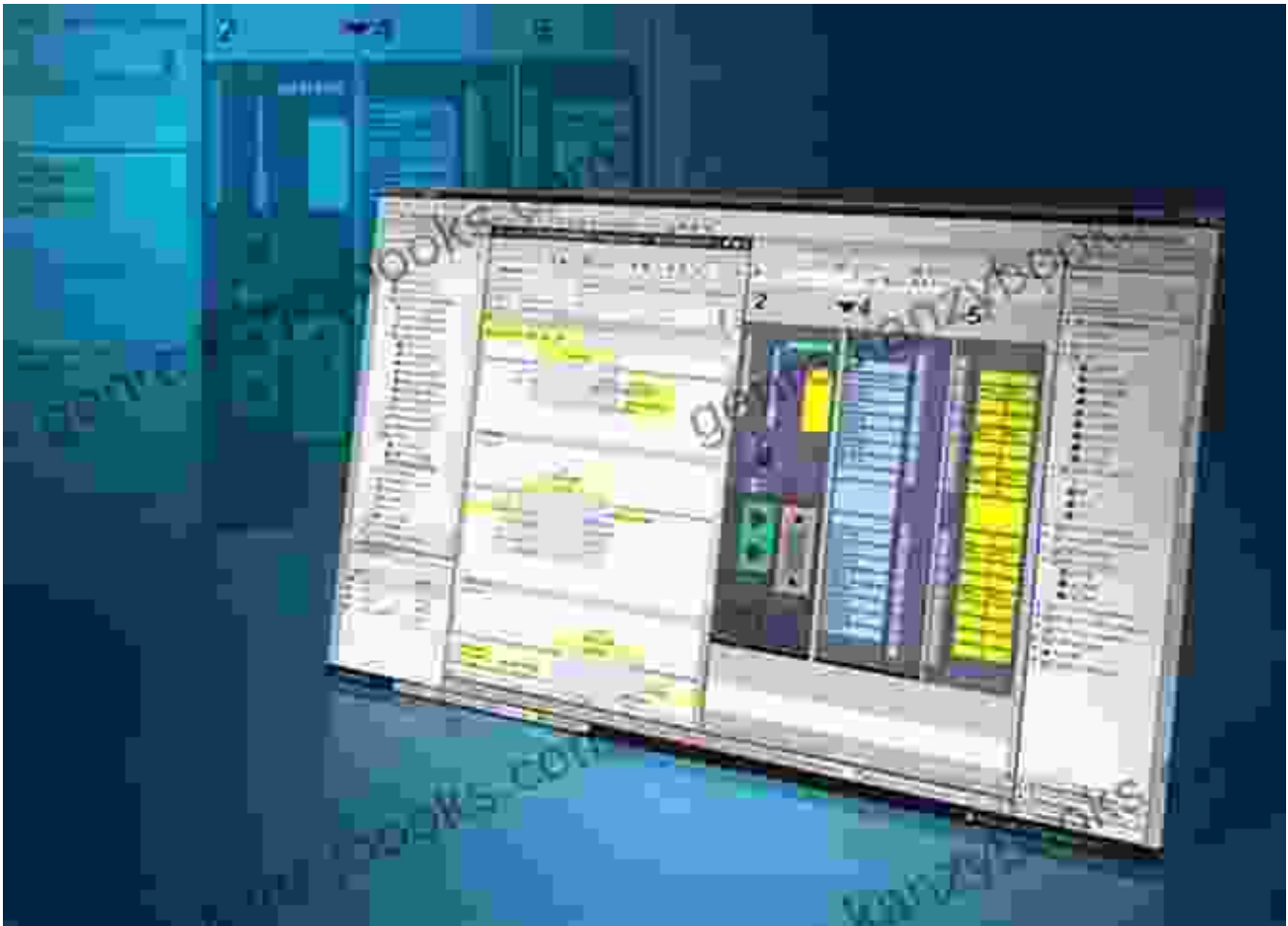
Liam See



Chapter 4: Structured PLC Programming

Chapter 4 emphasizes the importance of structured programming techniques in PLC development. It covers the sequential function chart (SFC) programming language, which provides a structured and modular approach to PLC programming. Readers will learn how to create and

manage SFCs, and how to use them to develop complex PLC programs in a systematic and organized manner.



Chapter 5: Standard Communication Protocols

This chapter explores the different communication protocols used in industrial automation. It covers the RS-232, RS-485, and EtherCAT protocols, and provides a detailed explanation of their physical layers, data formats, and error-handling mechanisms. Readers will learn how to configure and use these protocols to establish communication between PLCs, HMIs, and other devices in an industrial network.

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By the end of the book, you'll be well equipped to use all of the features that TIA Portal V17 offers.

What you will learn

- Get to grips with the TIA Portal development environment
- Create hardware configurations
- Develop logic in all of the languages that TIA Portal offers
- Store standard code in libraries
- Create a version control system
- Develop HMI applications

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Chapter 6: Troubleshooting PLC and HMI Programs

Chapter 6 focuses on troubleshooting techniques for PLC and HMI programs. It covers common errors that can occur during program development and operation. Readers will learn how to use diagnostics and error messages to identify and resolve issues in PLC and HMI systems.

The chapter also provides guidance on preventive maintenance practices to minimize system downtime and ensure reliable operation.



Chapter 7: Advanced PLC and HMI Applications

This chapter introduces advanced topics in PLC and HMI programming. It covers the use of function blocks and user-defined functions to create reusable code modules. Readers will also learn about motion control applications using PLCs, and how to integrate HMI devices with supervisory control and data acquisition (SCADA) systems.



"Develop PLC and HMI Programs Using Standard Methods and Structured Approaches" is an essential resource for anyone seeking a comprehensive understanding of PLC and HMI programming. With its in-depth coverage of fundamental concepts, structured programming techniques, and advanced applications, this book empowers readers to develop robust and efficient PLC and HMI programs that drive productivity and enhance safety in industrial automation environments.

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