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This book constitutes the refereed proceedings of the 11th International Conference on Cooperative Design, Visualization, and Engineering, CDVE 2014, held in Seattle, WA, USA, in September 2014. The 33 full and 10 short papers presented were carefully reviewed and selected from 78 submissions. The papers cover topics such as cloud technology; the use of cloud for manufacturing, re-source selection, service evaluation, and control; methods for processing and visualizing big data created by the social media, such as Twitter and Facebook; real-time data about human interaction; sentiment analysis; trend analysis; location-based crowdsourcing; effective teamwork; cooperative visualization.

**Automatic Solar Tracking Sun Tracking :** This book details Automatic Solar-Tracking, Sun-Tracking-Systems, Solar-Trackers and Sun Tracker Systems. An intelligent automatic solar tracker is a device that orients a payload toward the sun. Such programmable computer based solar tracking device includes principles of solar tracking, solar tracking systems, as well as microcontroller, microprocessor and/or PC based solar tracking control to orientate solar reflectors, solar lenses, photovoltaic panels or other optical configurations towards the sun. Motorized space frames and kinematic systems ensure motion dynamics and employ drive technology and gearing principles to steer optical configurations such as mangin, parabolic, conic, or cassegrain solar energy collectors to face the sun and follow the sun movement contour continuously (seguimiento solar y automatización, automatización seguidor solar, tracking solar e automação, automação seguidor solar, inseguimento solare, inseguitore solare, energia termica, sole seguito, posizionatore motorizzato) In harnessing power from the

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sun through a solar tracker or practical solar tracking system, renewable energy control automation systems require automatic solar tracking software and solar position algorithms to accomplish dynamic motion control with control automation architecture, circuit boards and hardware. On-axis sun tracking system such as the altitude-azimuth dual axis or multi-axis solar tracker systems use a sun tracking algorithm or ray tracing sensors or software to ensure the sun's passage through the sky is traced with high precision in automated solar tracker applications, right through summer solstice, solar equinox and winter solstice. A high precision sun position calculator or sun position algorithm is this an important step in the design and construction of an automatic solar tracking system. The content of the book is also applicable to communication antenna satellite tracking and moon tracking algorithm source code for which links to free download links are provided. From sun tracing software perspective, the sonnet Tracing The Sun has a literal meaning. Within the context of sun track and trace, this book explains that the sun's daily path across the sky is directed by relatively simple principles, and if grasped/understood, then it is relatively easy to trace the sun with sun following software. Sun position computer software for tracing the sun are available as open source code, sources that is listed in this book. The book also describes the use of satellite tracking software and mechanisms in solar tracking applications. Ironically there was even a system called sun chaser, said to have been a solar positioner system known for chasing the sun throughout the day. Using solar equations in an electronic circuit for automatic solar tracking is quite simple, even if you are a novice, but mathematical solar equations are over complicated by academic experts and professors in text-books, journal articles and internet websites. In terms of solar hobbies, scholars, students and Hobbyist's looking at solar tracking electronics

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or PC programs for solar tracking are usually overcome by the sheer volume of scientific material and internet resources, which leaves many developers in frustration when search for simple experimental solar tracking source-code for their on-axis sun-tracking systems. This booklet will simplify the search for the mystical sun tracking formulas for your sun tracker innovation and help you develop your own autonomous solar tracking controller. By directing the solar collector directly into the sun, a solar harvesting means or device can harness sunlight or thermal heat. This is achieved with the help of sun angle formulas, solar angle formulas or solar tracking procedures for the calculation of sun's position in the sky. Automatic sun tracking system software includes algorithms for solar altitude azimuth angle calculations required in following the sun across the sky. In using the longitude, latitude GPS coordinates of the solar tracker location, these sun tracking software tools supports precision solar tracking by determining the solar altitude-azimuth coordinates for the sun trajectory in altitude-azimuth tracking at the tracker location, using certain sun angle formulas in sun vector calculations. Instead of follow the sun software, a sun tracking sensor such as a sun sensor or webcam or video camera with vision based sun following image processing software can also be used to determine the position of the sun optically. Such optical feedback devices are often used in solar panel tracking systems and dish tracking systems. Dynamic sun tracing is also used in solar surveying, DNI analyser and sun surveying systems that build solar infographics maps with solar radiance, irradiance and DNI models for GIS (geographical information system). In this way geospatial methods on solar/environment interaction makes use use of geospatial technologies (GIS, Remote Sensing, and Cartography). Climatic data and weather station or weather center data, as well as queries from sky servers and solar resource database systems

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(i.e. on DB2, Sybase, Oracle, SQL, MySQL) may also be associated with solar GIS maps. In such solar resource modelling systems, a pyranometer or solarimeter is normally used in addition to measure direct and indirect, scattered, dispersed, reflective radiation for a particular geographical location. Sunlight analysis is important in flash photography where photographic lighting are important for photographers. GIS systems are used by architects who add sun shadow applets to study architectural shading or sun shadow analysis, solar flux calculations, optical modelling or to perform weather modelling. Such systems often employ a computer operated telescope type mechanism with ray tracing program software as a solar navigator or sun tracer that determines the solar position and intensity. The purpose of this booklet is to assist developers to track and trace suitable source-code and solar tracking algorithms for their application, whether a hobbyist, scientist, technician or engineer. Many open-source sun following and tracking algorithms and source-code for solar tracking programs and modules are freely available to download on the internet today. Certain proprietary solar tracker kits and solar tracking controllers include a software development kit SDK for its application programming interface API attributes (Pebble). Widget libraries, widget toolkits, GUI toolkit and UX libraries with graphical control elements are also available to construct the graphical user interface (GUI) for your solar tracking or solar power monitoring program. The solar library used by solar position calculators, solar simulation software and solar contour calculators include machine program code for the solar hardware controller which are software programmed into Micro-controllers, Programmable Logic Controllers PLC, programmable gate arrays, Arduino processor or PIC processor. PC based solar tracking is also high in demand using C++, Visual Basic VB, as well as MS Windows, Linux and Apple Mac based operating

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systems for sun path tables on Matlab, Excel. Some books and internet webpages use other terms, such as: sun angle calculator, sun position calculator or solar angle calculator. As said, such software code calculate the solar azimuth angle, solar altitude angle, solar elevation angle or the solar Zenith angle (Zenith solar angle is simply referenced from vertical plane, the mirror of the elevation angle measured from the horizontal or ground plane level). Similar software code is also used in solar calculator apps or the solar power calculator apps for IOS and Android smartphone devices. Most of these smartphone solar mobile apps show the sun path and sun-angles for any location and date over a 24 hour period. Some smartphones include augmented reality features in which you can physically see and look at the solar path through your cell phone camera or mobile phone camera at your phone's specific GPS location. In the computer programming and digital signal processing (DSP) environment, (free/open source) program code are available for VB, .Net, Delphi, Python, C, C+, C++, PHP, Swift, ADM, F, Flash, Basic, QBasic, GBasic, KBasic, SIMPL language, Squirrel, Solaris, Assembly language on operating systems such as MS Windows, Apple Mac, DOS or Linux OS. Software algorithms predicting position of the sun in the sky are commonly available as graphical programming platforms such as Matlab (Mathworks), Simulink models, Java applets, TRNSYS simulations, Scada system apps, Labview module, Beckhoff TwinCAT (Visual Studio), Siemens SPA, mobile and iphone apps, Android or iOS tablet apps, and so forth. At the same time, PLC software code for a range of sun tracking automation technology can follow the profile of sun in sky for Siemens, HP, Panasonic, ABB, Allan Bradley, OMRON, SEW, Festo, Beckhoff, Rockwell, Schneider, Endress Hauser, Fudji electric. Honeywell, Fuchs, Yokonawa, or Muthibishi platforms. Sun path projection software are also available for a range

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of modular IPC embedded PC motherboards, Industrial PC, PLC (Programmable Logic Controller) and PAC (Programmable Automation Controller) such as the Siemens S7-1200 or Siemens Logo, Beckhoff IPC or CX series, OMRON PLC, Ercam PLC, AC500plc ABB, National Instruments NI PXI or NI cRIO, PIC processor, Intel 8051/8085, IBM (Cell, Power, Brain or Truenorth series), FPGA (Xilinx Altera Nios), Intel, Xeon, Atmel megaAVR, MPU, Maple, Teensy, MSP, XMOS, Xbee, ARM, Raspberry Pi, Eagle, Arduino or Arduino AtMega microcontroller, with servo motor, stepper motor, direct current DC pulse width modulation PWM (current driver) or alternating current AC SPS or IPC variable frequency drives VFD motor drives (also termed adjustable-frequency drive, variable-speed drive, AC drive, micro drive or inverter drive) for electrical, mechatronic, pneumatic, or hydraulic solar tracking actuators. The above motion control and robot control systems include analogue or digital interfacing ports on the processors to allow for tracker angle orientation feedback control through one or a combination of angle sensor or angle encoder, shaft encoder, precision encoder, optical encoder, magnetic encoder, direction encoder, rotational encoder, chip encoder, tilt sensor, inclination sensor, or pitch sensor. Note that the tracker's elevation or zenith axis angle may be measured using an altitude angle-, declination angle-, inclination angle-, pitch angle-, or vertical angle-, zenith angle- sensor or inclinometer. Similarly the tracker's azimuth axis angle may be measured with a azimuth angle-, horizontal angle-, or roll angle- sensor. Chip integrated accelerometer magnetometer gyroscope type angle sensors can also be used to calculate displacement. Other options include the use of thermal imaging systems such as a Fluke thermal imager, or robotic or vision based solar tracker systems that employ face tracking, head tracking, hand tracking, eye tracking and car tracking principles in solar tracking.

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With unattended decentralised rural, island, isolated, or autonomous off-grid power installations, remote control, monitoring, data acquisition, digital datalogging and online measurement and verification equipment becomes crucial. It assists the operator with supervisory control to monitor the efficiency of remote renewable energy resources and systems and provide valuable web-based feedback in terms of CO<sub>2</sub> and clean development mechanism (CDM) reporting. A power quality analyser for diagnostics through internet, WiFi and cellular mobile links is most valuable in frontline troubleshooting and predictive maintenance, where quick diagnostic analysis is required to detect and prevent power quality issues. Solar tracker applications cover a wide spectrum of solar applications and solar assisted application, including concentrated solar power generation, solar desalination, solar water purification, solar steam generation, solar electricity generation, solar industrial process heat, solar thermal heat storage, solar food dryers, solar water pumping, hydrogen production from methane or producing hydrogen and oxygen from water (HHO) through electrolysis. Many patented or non-patented solar apparatus include tracking in solar apparatus for solar electric generator, solar desalinator, solar steam engine, solar ice maker, solar water purifier, solar cooling, solar refrigeration, USB solar charger, solar phone charging, portable solar charging tracker, solar coffee brewing, solar cooking or solar drying means. Your project may be the next breakthrough or patent, but your invention is held back by frustration in search for the sun tracker you require for your solar powered appliance, solar generator, solar tracker robot, solar freezer, solar cooker, solar drier, solar pump, solar freezer, or solar dryer project. Whether your solar electronic circuit diagram include a simplified solar controller design in a solar electricity project, solar power kit, solar hobby kit, solar steam generator, solar hot water system, solar

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ice maker, solar desalinator, hobbyist solar panels, hobby robot, or if you are developing professional or hobby electronics for a solar utility or micro scale solar powerplant for your own solar farm or solar farming, this publication may help accelerate the development of your solar tracking innovation. Lately, solar polygeneration, solar trigeneration (solar triple generation), and solar quad generation (adding delivery of steam, liquid/gaseous fuel, or capture food-grade CO<sub>2</sub>) systems have need for automatic solar tracking. These systems are known for significant efficiency increases in energy yield as a result of the integration and re-use of waste or residual heat and are suitable for compact packaged micro solar powerplants that could be manufactured and transported in kit-form and operate on a plug-and play basis. Typical hybrid solar power systems include compact or packaged solar micro combined heat and power (CHP or mCHP) or solar micro combined, cooling, heating and power (CCHP, CHPC, mCCHP, or mCHPC) systems used in distributed power generation. These systems are often combined in concentrated solar CSP and CPV smart microgrid configurations for off-grid rural, island or isolated microgrid, minigrid and distributed power renewable energy systems. Solar tracking algorithms are also used in modelling of trigeneration systems using Matlab Simulink (Modelica or TRNSYS) platform as well as in automation and control of renewable energy systems through intelligent parsing, multi-objective, adaptive learning control and control optimization strategies. Solar tracking algorithms also find application in developing solar models for country or location specific solar studies, for example in terms of measuring or analysis of the fluctuations of the solar radiation (i.e. direct and diffuse radiation) in a particular area. Solar DNI, solar irradiance and atmospheric information and models can thus be integrated into a solar map, solar atlas or geographical information systems (GIS). Such models allows for



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defining local parameters for specific regions that may be valuable in terms of the evaluation of different solar in photovoltaic of CSP systems on simulation and synthesis platforms such as Matlab and Simulink or in linear or multi-objective optimization algorithm platforms such as COMPOSE, EnergyPLAN or DER-CAM. A dual-axis solar tracker and single-axis solar tracker may use a sun tracker program or sun tracker algorithm to position a solar dish, solar panel array, heliostat array, PV panel, solar antenna or infrared solar nantenna. A self-tracking solar concentrator performs automatic solar tracking by computing the solar vector. Solar position algorithms (TwinCAT, SPA, or PSA Algorithms) use an astronomical algorithm to calculate the position of the sun. It uses astronomical software algorithms and equations for solar tracking in the calculation of sun's position in the sky for each location on the earth at any time of day. Like an optical solar telescope, the solar position algorithm pin-points the solar reflector at the sun and locks onto the sun's position to track the sun across the sky as the sun progresses throughout the day. Optical sensors such as photodiodes, light-dependant-resistors (LDR) or photoresistors are used as optical accuracy feedback devices. Lately we also included a section in the book (with links to microprocessor code) on how the PixArt Wii infrared camera in the Wii remote or Wiimote may be used in infrared solar tracking applications. In order to harvest free energy from the sun, some automatic solar positioning systems use an optical means to direct the solar tracking device. These solar tracking strategies use optical tracking techniques, such as a sun sensor means, to direct sun rays onto a silicon or CMOS substrate to determine the X and Y coordinates of the sun's position. In a solar mems sun-sensor device, incident sunlight enters the sun sensor through a small pin-hole in a mask plate where light is exposed to a silicon substrate. In a web-camera or camera image processing sun tracking and

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sun following means, object tracking software performs multi object tracking or moving object tracking methods. In an solar object tracking technique, image processing software performs mathematical processing to box the outline of the apparent solar disc or sun blob within the captured image frame, while sun-localization is performed with an edge detection algorithm to determine the solar vector coordinates. An automated positioning system help maximize the yields of solar power plants through solar tracking control to harness sun's energy. In such renewable energy systems, the solar panel positioning system uses a sun tracking techniques and a solar angle calculator in positioning PV panels in photovoltaic systems and concentrated photovoltaic CPV systems. Automatic on-axis solar tracking in a PV solar tracking system can be dual-axis sun tracking or single-axis sun solar tracking. It is known that a motorized positioning system in a photovoltaic panel tracker increase energy yield and ensures increased power output, even in a single axis solar tracking configuration. Other applications such as robotic solar tracker or robotic solar tracking system uses robotica with artificial intelligence in the control optimization of energy yield in solar harvesting through a robotic tracking system. Automatic positioning systems in solar tracking designs are also used in other free energy generators, such as concentrated solar thermal power CSP and dish Stirling systems. The sun tracking device in a solar collector in a solar concentrator or solar collector Such a performs on-axis solar tracking, a dual axis solar tracker assists to harness energy from the sun through an optical solar collector, which can be a parabolic mirror, parabolic reflector, Fresnel lens or mirror array/matrix. A parabolic dish or reflector is dynamically steered using a transmission system or solar tracking slew drive mean. In steering the dish to face the sun, the power dish actuator and actuation means in a parabolic dish system optically focusses the sun's energy on

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the focal point of a parabolic dish or solar concentrating means. A Stirling engine, solar heat pipe, thermosyphin, solar phase change material PCM receiver, or a fibre optic sunlight receiver means is located at the focal point of the solar concentrator. The dish Stirling engine configuration is referred to as a dish Stirling system or Stirling power generation system. Hybrid solar power systems (used in combination with biogas, biofuel, petrol, ethanol, diesel, natural gas or PNG) use a combination of power sources to harness and store solar energy in a storage medium. Any multitude of energy sources can be combined through the use of controllers and the energy stored in batteries, phase change material, thermal heat storage, and in cogeneration form converted to the required power using thermodynamic cycles (organic Rankin, Brayton cycle, micro turbine, Stirling) with an inverter and charge controller. SIMATIC ist das weltweit etablierte Automatisierungssystem für die Realisierung von Industriesteuerungen für Maschinen, fertigungstechnische Anlagen und verfahrenstechnische Prozesse. Erforderliche Steuerungs- und Regelungsaufgaben werden mit der Programmiersoftware STEP 7 in verschiedenen Programmiersprachen formuliert. In der 7. Auflage wird die Engineeringsoftware STEP 7 (Basissoftware) in der aktuellsten Version der Service Packs vorgestellt. Es beschreibt Elemente und Anwendungen der textorientierten Programmiersprachen AWL (Anweisungsliste) und SCL (Structured Control Language) sowohl für SIMATIC S7-300 als auch für SIMATIC S7-400 inklusive neuer Produkte für dezentrale Peripherie und für Anwendungen mit Profinet und der Kommunikation über Industrial Ethernet. Es wendet sich an alle Anwender von SIMATIC S7-Steuerungen. Anfänger führt es in das Gebiet der speicherprogrammierbaren Steuerungen ein, dem Praktiker zeigt es den speziellen Einsatz des Automatisierungssystems SIMATIC S7. Alle Programmierbeispiele des Buches -

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und noch einige mehr - stehen als Download auf der Internetseite des Verlags unter [www.publicis.de/books](http://www.publicis.de/books) bereit.

SIMATIC is the worldwide established automation system for implementing industrial control systems for machines, manufacturing plants and industrial processes. Relevant open-loop and closed-loop control tasks are formulated in various programming languages with the programming software STEP 7. Now in its sixth edition, this book gives an introduction into the latest version of engineering software STEP 7 (basic version) . It describes elements and applications of text-oriented programming languages statement list (STL) and structured control language (SCL) for use with both SIMATIC S7-300 and SIMATIC S7-400, including the new applications with PROFINET and for communication over industrial Ethernet. It is aimed at all users of SIMATIC S7 controllers. First-time users are introduced to the field of programmable controllers, while advanced users learn about specific applications of the SIMATIC S7 automation system. All programming examples found in the book - and even a few extra examples - are available at the download area of the publisher's website.

Lógica digital Autómatas programables industriales Programación relés programables en FBD Programación en STEP 7 (I) Programación en STEP 7 (II) GRAFCET GRAFCET en lenguaje de contactos (KOP) Modos de funcionamiento y estructuración del GRAFCET Tratamiento de datos y señales analógicas en STEP 7 Proyectos Control de un proceso industrial de amasado Mezclado de productos líquidos Llenado de cajas por número de objetos Almacén de cajas por alturas (Factory I/O) Separación de objetos por colores (Factory I/O) Pick&Place (Factory I/O)

A programmable logic controllers (PLC) is a real-time system optimized for use in severe

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conditions such as high/low temperatures or an environment with excessive electrical noise. This control technology is designed to have multiple interfaces (I/Os) to connect and control multiple mechatronic devices such as sensors and actuators. Programmable Logic Controllers, Fifth Edition, continues to be a straight forward, easy-to-read book that presents the principles of PLCs while not tying itself to one vendor or another. Extensive examples and chapter ending problems utilize several popular PLCs currently on the market highlighting understanding of fundamentals that can be used no matter the specific technology. Ladder programming is highlighted throughout with detailed coverage of design characteristics, development of functional blocks, instruction lists, and structured text. Methods for fault diagnosis, testing and debugging are also discussed. This edition has been enhanced with new material on I/Os, logic, and protocols and networking. For the UK audience only: This book is fully aligned with BTEC Higher National requirements. \*New material on combinational logic, sequential logic, I/Os, and protocols and networking \*More worked examples throughout with more chapter-ending problems \*As always, the book is vendor agnostic allowing for general concepts and fundamentals to be taught and applied to several controllers

Intended for undergraduate-level courses in programming and configuration of Programmable Logic Controllers (PLCs) for industrial control, this text describes how to set up and troubleshoot a PLC.

STEP 7 Programming Made Easy in LAD, FBD, and STL, by C. T. Jones A Practical Guide to Programming S7-300/S7-400 Programmable Logic Controllers Finally, STEP 7 programming is made crystal clear! STEP 7 Programming Made Easy, is a comprehensive guide to programming S7-300 and S7-400 Programmable Controllers. This new book introduces and

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thoroughly covers every important aspect of developing STEP 7 programs in LAD, FBD, and STL. You'll learn to correctly apply and develop STEP 7 programs from addressing S7 memory areas and I/O modules, to using Functions, Function Blocks, Organization Blocks, and System Blocks. With over 500 illustrations and examples, STEP7 development is certainly made easier! A programming assistant for every STEP 7 user! Book Highlights • 553 pages • Appendix, glossary, and index • Extensive review of absolute, indirect, and symbolic addressing • Thorough description of S7 data types and data formats • Complete S7-300/S7-400 I/O module addressing • Full description of each LAD, FBD, and STL operation • Organization block application and descriptions • Over 500 detailed illustrations and code examples • Step-by-step details for developing FCs and FBs • Step-by-step strategy for developing STEP 7 program • Concise and easy to read

Hampir seluruh kebutuhan dalam kehidupan saat ini menggunakan sistem pengendalian atau kontrol, terutama dalam bidang industri. Hampir semua kebutuhan di dunia industri menggunakan sistem kendali otomatis, seperti PLC (Programmable Logic Controller). Karena tidak bisa lagi menggunakan cara manual yang melibatkan human atau manusia dalam pengerjaannya. Seperti pada industri otomotif, sangat tidak mungkin apabila seluruh pengerjaannya menggunakan cara manual. Seluruh industri otomotif menggunakan sistem teknologi otomatis atau automatic control system menggunakan PLC. Selain industri otomotif, industri pengolahan baja, industri pembuatan kertas, industri pengolahan makanan, industri kimia, pembangkit tenaga listrik, dan lain sebagainya sudah menggunakan teknologi PLC. Selain itu, PLC juga digunakan dalam dunia pendidikan atau edukasi di tingkat perguruan tinggi, khususnya fakultas teknik. Jenis PLC yang digunakan pada buku ini adalah PLC

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SIMATIC S7-300 CPU 314C 2 DP, yang softwarenya saya sertakan pada buku ini. Selain mempelajari PLC, buku ini juga mengajarkan tentang dasar-dasar SCADA (Supervisory Control and Data Acquisition). SCADA adalah sistem kendali industri berbasis komputer, yang digunakan untuk mengontrol proses-proses, misalnya pada industri seperti manufacturing, pabrik, dan produksi generator tenaga listrik. Pada proses infrastruktur, SCADA digunakan dalam hal, misalnya penjernih air minum dan distribusinya, pengolahan limbah, pipa gas dan minyak, distribusi tenaga listrik, sistem komunikasi yang kompleks, sistem peringatan dini dan sirene. Selain itu, SCADA juga digunakan pada proses fasilitas seperti gedung, bandara, pelabuhan, bahkan sistem ruang angkasa. Pembelajaran SCADA juga diajarkan pada perguruan tinggi. Pembahasan tentang PLC dan SCADA dijelaskan secara mudah pada buku ini.

Dieses Buch richtet sich sowohl an Einsteiger, als auch an diejenigen, die bereits Erfahrung mit anderen Systemen haben. Es stellt die aktuellen Hardware-Komponenten des Automatisierungssystems vor und beschreibt deren Konfiguration und Parametrierung sowie die Kommunikation über PROFINET, PROFIBUS, AS-Interface und PtP-Verbindungen. Eine fundierte Einführung in STEP 7 Basic V14 (TIA Portal) veranschaulicht die Grundlagen der Programmierung und Fehlersuche.

This book addresses both beginners and users experienced in working with automation systems. It presents the hardware components of S7-1200 and illustrates their configuration and parametrization, as well as the communication via PROFINET, PROFIBUS, AS-Interface und PtP-connections. A profound introduction into STEP 7 Basic illustrates the basics of programming and troubleshooting.

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This proceedings book presents selected peer-reviewed papers from the 9th International Workshop on 'Service Oriented, Holonic and Multi-agent Manufacturing Systems for the Industry of the Future' organized by Universitat Politècnica de València, Spain, and held on October 3–4, 2019. The SOHOMA 2019 Workshop aimed to foster innovation in the digital transformation of manufacturing and logistics by promoting new concepts and methods and solutions through service orientation in holonic and agent-based control with distributed intelligence. The book provides insights into the theme of the SOHOMA'19 Workshop – 'Smart anything everywhere – the vertical and horizontal manufacturing integration, ' addressing 'Industry of the Future' (IoF), a term used to describe the 4th industrial revolution initiated by a new generation of adaptive, fully connected, analytical and highly efficient robotized manufacturing systems. This global IoF model describes a new stage of manufacturing, that is fully automatized and uses advanced information, communication and control technologies such as industrial IoT, cyber-physical production systems, cloud manufacturing, resource virtualization, product intelligence, and digital twin, edge and fog computing. It presents the IoF interconnection of distributed manufacturing entities using a 'system-of-systems' approach, discussing new types of highly interconnected and self-organizing production resources in the entire value chain; and new types of intelligent decision-making support based on from real-time production data collected from resources, products and machine learning processing. This book is intended for researchers and engineers working in the manufacturing value chain, and specialists developing computer-based control and robotics solutions for the 'Industry of the Future'. It is also a valuable resource for master's and Ph.D. students in engineering sciences programs.



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This book presents a comprehensive description of the configuration of devices and network for the S7-400 components inside the engineering framework TIA Portal. You learn how to formulate and test a control program with the programming languages LAD, FBD, STL, and SCL. The book is rounded off by configuring the distributed I/O with PROFIBUS DP and PROFINET IO using SIMATIC S7-400 and data exchange via Industrial Ethernet. SIMATIC is the globally established automation system for implementing industrial controllers for machines, production plants and processes. SIMATIC S7-400 is the most powerful automation system within SIMATIC. This process controller is ideal for data-intensive tasks that are especially typical for the process industry. With superb communication capability and integrated interfaces it is optimized for larger tasks such as the coordination of entire systems. Open-loop and closed-loop control tasks are formulated with the STEP 7 Professional V11 engineering software in the field-proven programming languages Ladder Diagram (LAD), Function Block Diagram (FBD), Statement List (STL), and Structured Control Language (SCL). The TIA Portal user interface is tuned to intuitive operation and encompasses all the requirements of automation within its range of functions: from configuring the controller, through programming in the different languages, all the way to the program test. Users of STEP 7 Professional V12 will easily get along with the descriptions based on the V11. With start of V12, the screens of the technology functions might differ slightly from the V11. This book constitutes the proceedings of the 16th International Conference on Detection of Intrusions and Malware, and Vulnerability Assessment, DIMVA 2019, held in Gothenburg, Sweden, in June 2019. The 23 full papers presented in this volume were carefully reviewed and selected from 80 submissions. The contributions were organized in topical sections

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named: wild wild web; cyber-physical systems; malware; software security and binary analysis; network security; and attack mitigation.

This is a comprehensive, practical, easy-to-read book on process control, covering some of the most important topics in the petrochemical process industry, including Fieldbus, Multiphase Flow Metering, and other recently developed control systems. A compilation of all the best instrumentation and control techniques used in industry today Interesting theoretical content as well as practical topics on planning, integration and application Includes the latest on Fieldbus, Profibus and Multiphase Flow Metering.

SIMATIC is the worldwide established automation system for implementing industrial control systems for machines, manufacturing plants and industrial processes. Relevant open-loop and closed-loop control tasks are formulated in various programming languages with the engineering software STEP 7. Ladder diagram (LAD) and function block diagram (FBD) use graphic symbols to display the monitoring and control functions similar those used in schematic circuit diagrams or electronic switching systems. Now in its fifth edition, this book describes these graphic-oriented programming languages combined with the engineering software STEP 7 V5.5 for use with both SIMATIC S7-300 and SIMATIC S7-400 automation systems. New functions of this STEP 7 version are especially related to CPU-Webserver and PROFINET IO like for example the application of I devices, shared devices and isochrone mode. It is aimed at all users of SIMATIC S7 controllers. First-time users are introduced to the field of programmable controllers, while advanced users learn about specific applications of the SIMATIC S7 automation system. All programming examples found in the book - and even a few extra examples - are available over the publisher's website under Downloads.

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Automating with STEP 7 in STL and SCL. SIMATIC is the worldwide established automation system for implementing industrial control systems for machines, manufacturing plants and industrial processes. Relevant open-loop and closed-loop control tasks are formulated in various programming languages with the programming software STEP 7. Now in its third edition, this book introduces Version 5.3 of the programming software STEP 7. It describes elements and applications of the text-oriented programming languages STL (statement list) and SCL (structured control language) for use with both SIMATIC S7-300 and SIMATIC S7-400. It is aimed at all users of SIMATIC S7 controllers. First-time users are introduced to the field of programmable controllers, while advanced users learn about specific applications of the SIMATIC S7 automation system. The accompanying disk contains all programming examples found in the book - and even a few extra examples - as archived block libraries. After retrieving the archives in STEP 7, the examples can be viewed, copied to projects and tested in STL and SCL. Content System overview: SIMATIC S7 and STEP 7 . Programming languages SATL and SCL . data types . binary and digital STL operations . Program flow control . program execution . indirect addressing in STL . SCL control statements . SCL standard functions . S5/S7 converters.

Automating with STEP 7 in LAD and FBD SIMATIC is the worldwide established automation system for implementing industrial control systems for machines, manufacturing plants and industrial processes. Relevant open-loop and closed-loop

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control tasks are formulated in various programming languages with the programming software STEP 7. Now in its third edition, this book introduces Version 5.3 of the programming software STEP 7. It describes elements and applications of the graphic-oriented programming languages LAD (ladder diagram) and FBD (Function block diagram) (for use with both SIMATIC S7-300 and SIMATIC S7-400). It is aimed at all users of SIMATIC S7 controllers. First-time users are introduced to the field of programmable controllers, while advanced users learn about specific applications of the SIMATIC S7 automation system. The accompanying disk contains all programming examples found in the book - and even a few extra examples - as archived block libraries. After retrieving the archives in STEP 7, the examples can be viewed, copied, and tested in LAD and FBD. Content: Operation Principles of Programmable Controllers - System overview: SIMATIC S7 and STEP 7 - LAD and FBD Programming languages - Data Types - Binary and Digital Instructions - Program Sequence Control - User Program Execution.

This book features state-of-the-art contributions from two well-established conferences: Changeable, Agile, Reconfigurable and Virtual Production Conference (CARV2020) and Mass Customization and Personalization Conference (MCPC2020). Together, they focus on the joint design, development, and management of products, production systems, and business for sustainable customization and personalization. The book covers a large range of topics within this domain, ranging from industrial success

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factors to original contributions within the field.

Industrial Ethernet ist schon heute fester Bestandteil eines industriellen Netzwerkes. Durch die Echtzeitfähigkeit von PROFINET wird Ethernet nun auch der Standard für die Anbindung von Feldkomponenten und Antriebstechnik. Damit das von Büroanwendungen geprägte Ethernet auch industrietauglich wird, müssen industrielle Anforderungen wie Verfügbarkeit, Echtzeitfähigkeit und Robustheit erfüllt werden. Dieses Buch vermittelt Anlagenplanern und -betreibern, Programmierern und Inbetriebsetzern die Grundlagen und Begriffe für den Einsatz von Ethernet-LAN-Techniken in der Industrieautomatisierung mit SIMATIC. Die Autoren beschreiben neben Grundlagen und Projektierung auch die Diagnose eines TCP/IP basierten Netzwerkes sowie die Fokusthemen wie IT Security und Wireless-Anwendungen. Außerdem wird auf die aktuellen Komponenten und Übertragungsmedien in der SIMATIC eingegangen. So erhält der Leser einen schnellen und praxisnahen Einstieg in das Thema. 2. Auflage, (Titel der 1. Auflage: "IT in der Industrieautomatisierung") Il volume tratta i PLC S7-1200/1500, caratteristiche hardware, linguaggio LADDER, GRAFCET e SCL. La teoria è sviluppata in modo semplice e corredata di 40 esempi svolti che rendono più facile la comprensione. L'opera è divisa in moduli e al termine è presente un modulo con soli progetti. Sono presenti anche numerose figure che illustrano l'utilizzo e le funzioni del software TIA Portal. per dettagli vai a [www.plcs7-1200.it](http://www.plcs7-1200.it)

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Das Buch beschäftigt sich mit der Programmierung und Anwendung des Basisautomatisierungssystems S7, und zwar für die Reihen S7-300/400, die mittlere und obere Leistungsebene der Automatisierung. Neben den "klassischen" Programmiersprachen AWL, KOP und FUB (FBS) werden auch neuere Programmiersprachen nach IEC 1131 beschrieben und anhand von Aufgabenstellungen mit zugehörigen Musterlösungen vorgestellt. Zu diesen neuen Sprachen zählen SCL (Pascal-ähnliche Hochsprache), S7-Graph (für Ablaufsteuerungen) und S7-HiGraph (Programmierung als Zustandsgraph). Die 2. Auflage enthält neu: Betriebsartenteil für Ablaufsteuerungen in AWL, FUP, KOP und Anwendung des Betriebsartenteils auf ein konkretes Beispiel.

Towards Sustainable Customization: Bridging Smart Products and Manufacturing Systems Proceedings of the 8th Changeable, Agile, Reconfigurable and Virtual Production Conference (CARV2021) and the 10th World Mass Customization & Personalization Conference (MCPC2021), Aalborg, Denmark, October/November 2021 Springer Nature

Inhaltsangabe: Zusammenfassung: Der Inhalt dieser Diplomarbeit befaßt sich mit der Übertragung eines SIMATIC S5-Programms auf ein kombiniertes System von SPS und freiprogrammierbarem Rechner. Um das bestehende Automatisierungsgerät durch ein neues zu ersetzen, war es erforderlich die Leistungsfähigkeit und die Anforderungen zu analysieren. Aus den Ergebnissen der Analyse von Hard- und Software ergaben sich

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dann die Ansatzpunkte für die Auswahl von neuen Komponenten. Ausgewählt wurde ein kombiniertes System SIMATIC S7/M7. Bei diesem System besteht die Möglichkeit durch einfache Programmierung Daten zwischen einem SPS-Prozessor und einem freiprogrammierbaren Intel-Standard-Prozessor zu bewegen um so ein modernes Regelkonzept realisieren zu können. Als praktischer Test für eine Systemkonvertierung wurde ein STEP 5-Programm nach STEP 7 konvertiert. Die bei der Konvertierung aufgetretenen Fehler und Warnungen sind individuell zu bearbeiten. Über den Aufwand für eine Programmumsetzung sind keine genauen Angaben möglich da dies von der Struktur des Programms abhängt. Es wurde als Hardware eine CPU S7-413-2 DP in Verbindung mit einer Applikationsbaugruppe FM 456 ausgewählt und inbetrieb genommen. Der Datenaustausch zwischen den beiden Baugruppen erfolgt über den Nutzdatenbereich der Applikationsbaugruppe. Diese Art der Kommunikation ist einfach und übersichtlich. Insgesamt betrachtet bietet das System S7/M7 ein großes Potential für die Lösung von komplexen Automatisierungsproblemen, da ein offenes Automatisierungskonzept, in dem SPS-Funktionen und PC-Funktionen parallel ablaufen, möglich ist. Inhaltsverzeichnis: Inhaltsverzeichnis: Vorwort1 Das betreuende Unternehmen3 1.Aufbau der SPS eines Betonverteilers4 1.1Hardware des Betonverteilers4 1.2Software des Betonverteilers8 2.Alternative zum bestehenden System12 3.Das Automatisierungssystem SIMATIC 30015 3.1Das Automatisierungssystem S7-30015 3.2Der Automatisierungsrechner M7-30017 3.3Die

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Applikationsbaugruppe FM356-419 3.4Verbindung S7-300 - M7-30021 4.Das Automatisierungssystem SIMATIC 40022 4.1Das Automatisierungssystem S7-40022 4.2Der Automatisierungsrechner M7-40025 4.3Die Applikationsbaugruppe FM456-426 5.Die neuen Systeme S7/M7 im Vergleich mit der S528 5.1Das Betriebssystem der S728 5.2Speicherbereiche der S7-CPU's29 5.2.1Aufteilung der Speicherbereiche29 5.2.2Speicherkonzept S7-30030 5.2.3Speicherkonzept S7-40031 5.3Speichermodule der S732 5.3.1RAM Card33 5.3.2FLASH [...]

This book gathers selected research papers presented at the First International Conference on Digital Technologies and Applications (ICDTA 21), held at Sidi Mohamed Ben Abdellah University, Fez, Morocco, on 29-30 January 2021. highlighting the latest innovations in digital technologies as: artificial intelligence, Internet of things, embedded systems, network technology, information processing, and their applications in several areas such as hybrid vehicles, renewable energy, robotic, and COVID-19. The respective papers encourage and inspire researchers, industry professionals, and policymakers to put these methods into practice.

SIMATIC ist das weltweit etablierte Automatisierungssystem für die Realisierung von Industriesteuerungen für Maschinen, fertigungstechnische Anlagen und verfahrenstechnische Prozesse. Erforderliche Steuerungs- und Regelungsaufgaben werden mit der Engineeringsoftware STEP 7 in verschiedenen Programmiersprachen formuliert. Kontaktplan (KOP) und Funktionsplan (FUP) verwenden für die Darstellung



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der Steuerungsfunktionen grafische Symbole - ähnlich wie in einem Stromlaufplan oder bei elektronischen Schaltkreissystemen. In der sechsten Auflage beschreibt das Buch diese grafikorientierten Programmiersprachen in Verbindung mit der Engineeringsoftware STEP 7 V5.5 für die Automatisierungssysteme SIMATIC S7-300 und S7-400. Neue Funktionen dieser STEP 7-Version betreffen besonders den CPU-Webserver und PROFINET IO, wie beispielsweise die Anwendung von I-Devices, Shared Devices und Taktsynchronität. Das Buch bietet Unterstützung für alle Anwender von SIMATIC-S7-Steuerungen. Anfänger führt es in das Gebiet der speicherprogrammierbaren Steuerungen ein, dem Praktiker zeigt es den speziellen Einsatz des Automatisierungssystems SIMATIC S7. Alle Programmierbeispiele des Buches - und noch einige mehr - stehen als Download auf der Internetseite des Verlags unter [www.publicis-books.de/](http://www.publicis-books.de/) bereit.

Die speicherprogrammierbare Steuerung (SPS) SIMATIC S7-1500 setzt Maßstäbe in Leistung und Produktivität. Der Controller gewährleistet mit seiner Systemperformance und mit PROFINET als Standard-Interface kurze Systemreaktionszeiten bei hoher Flexibilität für Aufgaben in der gesamten Produktionsautomatisierung und bei Applikationen für mittelgroße bis zu High-End-Maschinen. Die Engineeringsoftware STEP 7 Professional bietet mit TIA Portal eine Benutzeroberfläche, die auf intuitive Bedienung abgestimmt ist. Die Funktionalität umfasst alle Belange der Automatisierung, von der Konfiguration der Controller über die Programmierung in den

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IEC-Sprachen KOP, FUP, SCL und AWL bis zum Programmtest. Das Buch beschreibt die Hardware-Komponenten des Automatisierungssystems S7-1500, seine Konfiguration und Parametrierung. Eine fundierte Einführung in STEP 7 Professional veranschaulicht die Grundlagen der Programmierung und Störungssuche. Einsteigern vermittelt es die Grundlagen der Automatisierungstechnik mit SIMATIC S7-1500, Umsteiger von anderen SIMATIC-Steuerungen erhalten die dafür erforderlichen Kenntnisse. Inhalt Einführung in STEP 7 Professional V14 und in die Projektbearbeitung von SIMATIC-Projekten. Hardware-Komponenten des Automatisierungssystems S7-1500. Gerätekonfiguration und Netzprojektierung. Variablen, Addressierung und Datentypen. Betriebszustände und Bearbeitung des Anwenderprogramms. Programmieren in KOP, FUP, SCL und AWL. Ablaufsteuerung S7-GRAF. Online-Betrieb, Diagnose und Programmtest. Dezentrale Peripherie. Kommunikation über Industrial Ethernet. Anhang: Webserver, Technologieobjekte, Datenprotokollierung, Simulation.

Serving as an introduction to PROFINET technology, this book gives engineers, technicians and students an overview of the concept and fundamentals for solving automation tasks. Technical relationships and practical applications are described using SIMATIC products as examples.

Totally Integrated Automation is the concept by means of which SIMATIC controls machines, manufacturing systems and technical processes. Taking the example of the

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S7-300/400 programmable controller, this book provides a comprehensive introduction to the architecture and operation of a state-of-the-art automation system. It also gives an insight into configuration and parameter setting for the controller and the distributed I/O. Communication via network connections is explained, along with a description of the available scope for operator control and monitoring of a plant. As the central automation tool, STEP 7 manages all relevant tasks and offers a choice of various text and graphics-oriented PLC programming languages. The available languages and their respective different features are explained to the reader. For this third edition, the contents of all sections of the book have been revised, updated and the new data communications with PROFINET IO have been added. The STEP 7 basic software is explained in its latest version. The book is ideal for those who have no extensive prior knowledge of programmable controllers and wish for an uncomplicated introduction to this subject.

This book provides profound insights into industrial control system resilience, exploring fundamental and advanced topics and including practical examples and scenarios to support the theoretical approaches. It examines issues related to the safe operation of control systems, risk analysis and assessment, use of attack graphs to evaluate the resiliency of control systems, preventive maintenance, and malware detection and analysis. The book also discusses sensor networks and Internet of Things devices. Moreover, it covers timely responses to malicious attacks and hazardous situations,

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helping readers select the best approaches to handle such unwanted situations. The book is essential reading for engineers, researchers, and specialists addressing security and safety issues related to the implementation of modern industrial control systems. It is also a valuable resource for students interested in this area.

Dieses Buch beschreibt die Hardware-Komponenten des Automatisierungssystems SIMATIC S7-300, seine Konfiguration und Parametrierung. Eine fundierte Einführung in STEP 7 Professional veranschaulicht die Grundlagen der Programmierung mit KOP, FUP, AWL und SCL und die Programmflusssteuerung mit S7-GGRAPH. Nach einer ausführlichen Beschreibung der Programmfunktionen folgt eine Einführung in Online-Betrieb und Programmtest. Abgerundet wird das Buch durch die Projektierung der dezentralen Peripherie mit PROFIBUS DP und PROFINET IO und den Datenaustausch über Industrial Ethernet. Inhalt Einführung in STEP 7 Professional V15 (TIA Portal) und in die Projektbearbeitung Hardware-Komponenten der S7-300 Gerätekonfiguration und Netzprojektierung Variablen, Adressierung und Datentypen Programmierer Programmieren in KOP, FUP, AWL und SCL Ablaufsteuerung S7-GGRAPH Beschreibung der Programmfunktionen Online-Betrieb und Programmtest Dezentrale Peripherie und Kommunikation Anhang: Arbeiten mit Quelldateien, Projektmigration, Simulation mit PLCSIM, Webserver, Ablage von lokalen Variablen Practical, concise and complete reference for the basics of modern antenna design Antennas: from Theory to Practice discusses the basics of modern antenna design and

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theory. Developed specifically for engineers and designers who work with radio communications, radar and RF engineering, this book offers practical and hands-on treatment of antenna theory and techniques, and provides its readers the skills to analyse, design and measure various antennas. Key features: Provides thorough coverage on the basics of transmission lines, radio waves and propagation, and antenna analysis and design Discusses industrial standard design software tools, and antenna measurement equipment, facilities and techniques Covers electrically small antennas, mobile antennas, UWB antennas and new materials for antennas Also discusses reconfigurable antennas, RFID antennas, Wide-band and multi-band antennas, radar antennas, and MIMO antennas Design examples of various antennas are provided Written in a practical and concise manner by authors who are experts in antenna design, with experience from both academia and industry This book will be an invaluable resource for engineers and designers working in RF engineering, radar and radio communications, seeking a comprehensive and practical introduction to the basics of antenna design. The book can also be used as a textbook for advanced students entering a profession in this field.

The SIMATIC S7-1500 programmable logic controller (PLC) sets standards in productivity and efficiency. By its system performance and with PROFINET as the standard interface, it ensures short system response times and a maximum of flexibility and networkability for demanding automation tasks in the entire

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production industry and in applications for medium-sized to high-end machines. The engineering software STEP 7 Professional operates inside TIA Portal, a user interface that is designed for intuitive operation. Functionality includes all aspects of automation: from the configuration of the controllers via programming in the IEC languages LAD, FBD, STL, and SCL up to the program test. In the book, the hardware components of the automation system S7-1500 are presented including the description of their configuration and parameterization. A comprehensive introduction into STEP 7 Professional V14 illustrates the basics of programming and troubleshooting. Beginners learn the basics of automation with Simatic S7-1500, users switching from other controllers will receive the relevant knowledge.

Il volume, al momento l'unico in italiano sui PLC S7-1200 e S7-1500, presenta le principali caratteristiche dei due PLC Siemens attualmente in produzione. Nel testo viene prima analizzato l'aspetto hardware e poi, in modo più dettagliato, ma con un linguaggio tecnico sempre accessibile, il software di gestione. La teoria è sviluppata in modo semplice e corredata di esempi che rendono più facile la comprensione. Le tracce degli esercizi sono definibili affini all'impianto. Successivamente vengono esposte e sviluppate, sempre con esempi, le principali tecniche di programmazione avanzata. L'opera è divisa in moduli e al

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termine di ognuno sono proposti un buon numero di domande ed esercizi molto utili per la revisione e il consolidamento dell'argomento sviluppato. Sono presenti anche numerose figure che illustrano l'utilizzo e le funzioni del software TIA Portal.

This book teaches and demonstrates the basics of the Allen-Bradley MicroLogix 1000 programmable logic controller. Information is provided to help the reader get and operate an inexpensive MicroLogix 1000 and associated hardware and software. Examples with ladder diagrams and circuit diagrams are provided to demonstrate different MicroLogix 1000 capabilities. Background information is provided to relate the MicroLogix 1000 to other programmable logic controllers. SIMATIC S7-300 has been specially designed for innovative system solutions in the manufacturing industry, and with a diverse range of controllers it offers the optimal solution for applications in centralized and distributed configurations. Alongside standard automation safety technology and motion control can also be integrated. The TIA Portal user interface is tuned to intuitive operation and encompasses all the requirements of automation within its range of functions: from configuring the controller, through programming in the different languages, all the way to the program test and simulation. For beginners engineering is easy to learn and for professionals it is fast and efficient. This book describes the

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configuration of devices and network for the S7-300 components inside the new engineering framework TIA Portal. With STEP 7 Professional V12, configuring and programming of all SIMATIC controllers will be possible in a simple and efficient way; in addition to various technology functions the block library also contains a PID control. As reader of the book you learn how a control program is formulated and tested with the programming languages LAD, FBD, STL and SCL. Descriptions of configuring the distributed I/O with PROFIBUS DP and PROFINET IO using SIMATIC S7-300 and exchanging data via Industrial Ethernet round out the book.

With many innovations, the SIMATIC S7-1500 programmable logic controller (PLC) sets new standards in productivity and efficiency in control technology. By its outstanding system performance and with PROFINET as the standard interface, it ensures extremely short system response times and the highest control quality with a maximum of flexibility for most demanding automation tasks. The engineering software STEP 7 Professional operates inside TIA Portal, a user interface that is designed for intuitive operation. Functionality includes all aspects of Automation: from the configuration of the controllers via the programming in the IEC languages LAD, FBD, STL, and SCL up to the program test. In the book, the hardware components of the automation system



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S7-1500 are presented including the description of their configuration and parameterization. A comprehensive introduction into STEP 7 Professional illustrates the basics of programming and troubleshooting. Beginners learn the basics of automation with Simatic S7-1500 and users who will switch from S7-300 and S7-400 receive the necessary knowledge.

The five volume set CCIS 224-228 constitutes the refereed proceedings of the International conference on Applied Informatics and Communication, ICAIC 2011, held in Xi'an, China in August 2011. The 446 revised papers presented were carefully reviewed and selected from numerous submissions. The papers cover a broad range of topics in computer science and interdisciplinary applications including control, hardware and software systems, neural computing, wireless networks, information systems, and image processing.

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