OMB No. 1275633950814

A Controller Implementation Using Fpga In Labview Environment

What's an FPGA? My book Getting Started with FPGAs is NOW AVAILABLE! FPGA based Implementations of Symbolic Controllers Create a simple video controller with a FPGA — Stefany Allaire Simulation of FPGA implementation of a CPG controller for a hexapod robot using computer vision CPU vs FPGA The \"Do Anything\" Chip: FPGA FPGA - Assembly code for shifter These Chips Are Better Than CPUs (ASICs and FPGAs) FPGA Programming Projects for Beginners | FPGA Concepts Driving a VGA Display?! Getting started with an FPGA! (TinyFPGA) How to make a FPGA Obstacle Avoidance Robot at home using VHDL | Best FPGA Project Ever! Deep Learning Cars Writing a SDRAM memory controller in Verilog! FPGA RISCV Tutorial:Using SDRAM and asynchronous FIFO on DE1-SoC FPGA Board EEVblog #496 - What Is An FPGA? Interfacing FPGAs with DDR Memory - Phil's Lab #115 Add USB To Your Electronics Projects! - The USB Protocol Explained Week 8 | NPTEL | Digital Controller Implementation using Fixed Point Arithmetic and Verilog HDL Overview on LTE implementation using XILINX FPGA Graduation Project (Arabic) SDRAM Controller [FPGA] Session C2: Programmable FPGA based Memory Controller The HARDEST part about programming 🤦‍♂ #code #programming #technology #tech #software #developer project using fpga Developing a New Control Unit Using an FPGA Senior Programmers vs Junior Developers #shorts What is FPGA (Field-programmable gate array)? - #shorts

New Technologies, Development and Application II

Towards Smarter Algorithms

15th International Conference, ICAISC 2016, Zakopane, Poland, June 12-16, 2016, Proceedings, Part I

Advanced FPGA Design

FPGA Fuzzy (Pd & Pid) Controller Models for Insulin Pumps in Diabetes

Proceedings of KKA 2017—The 19th Polish Control Conference, Kraków, Poland, June 18–21, 2017

Design of Digital Systems and Devices

Introduction to Embedded System Design Using Field Programmable Gate Arrays

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PID Controller Tuning Using the Magnitude Optimum Criterion

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FPGA Implementation of Digital PID Controller

FPGA-based Implementation of Signal Processing Systems

FPGA Algorithms and Applications for the Internet of Things

Implementation of a PID Controller on FPGA for DC Motor Speed

Prototyping of Concurrent Control Systems Implemented in FPGA Devices

9th Mexican International Conference on Artificial Intelligence, MICAI 2010, Pachuca, Mexico, November 8-13, 2010, Proceedings, Part II

Implementation of a CAN Bus based Measurement System on an FPGA Development Kit

Frontiers in Advanced Control Systems

Digital System Design with FPGA: Implementation Using Verilog and VHDL

Fuzzy Logic Type 1 and Type 2 Based on LabVIEWTM FPGA

A Controller Implementation Using Fpga In Labview Environment *OMB No. 1275633950814 edited by*

BARKER DANIELLE

New Technologies, Development and Application II Springer

The PID Controller is the most common controller used in industries and provides a number of arrangements. The parallel arrangement, in which all the three parameters of the PID controller are added, is implemented in this project. The PID controls the speed on motor on the basis of the difference (known as error signal) between the desired speed and the actual speed. This Project aims to implement a digital PID controller on FPGA for DC Motor Speed control. The system mainly consists of PID controller, PWM and DC Motor with feedback circuit. The DC motor has high degree of non-linearity. The PID controller will help us to control this non-linearity.

Towards Smarter Algorithms Springer

Many different kinds of FPGAs exist, with different programming technologies, different architectures and different software. Field-Programmable Gate Array Technology describes the major FPGA architectures available today, covering the three programming technologies that are in use and the major architectures built on those programming technologies. The reader is introduced to concepts relevant to the entire field of FPGAs using popular devices as examples. Field-Programmable Gate Array Technology includes discussions of FPGA integrated circuit manufacturing, circuit design and logic design. It describes the way logic and interconnect are implemented in various kinds of FPGAs. It covers particular problems with design for FPGAs and future possibilities for new architectures and software. This book compares CAD for FPGAs with CAD for traditional gate arrays. It describes algorithms for placement, routing and optimization of FPGAs. Field-Programmable Gate Array Technology describes all aspects of FPGA design and development. For this reason, it covers a significant amount of material. Each section is clearly explained to readers who are assumed to have general technical expertise in digital design and design tools. Potential developers of FPGAs will benefit primarily from the FPGA architecture and software discussion. Electronics systems designers and ASIC users will find a background to different types of FPGAs and applications of their use.

15th International Conference, ICAISC 2016, Zakopane, Poland, June 12-16, 2016, Proceedings, Part I Springer Nature

Artificial intelligence (AI) is a branch of computer science that models the human ability of reasoning, usage of human language and organization of knowledge, solving problems and practically all other human intellectual abilities. Usually it is characterized by the application of heuristic methods because in the majority of cases there is no exact solution to this kind of problem. Soft computing can be viewed as a branch of AI that deals with the problems that explicitly contain incomplete or complex information, or are known to be impossible for direct computation, i.e., these are the same problems as in AI but viewed from the perspective of their computation. The Mexican International Conference on Artificial Intelligence (MICAI), a yearly international conference series organized by the Mexican Society for Artificial Intelligence (SMIA), is a major international AI forum and the main event in the academic life of the country's growing AI community. In 2010, SMIA celebrated 10 years of activity related to the organization of MICAI as is represented in its slogan "Ten years on the road with AI". MICAI conferences traditionally publish high-quality papers in all areas of artificial intelligence and its applications. The proceedings of the previous MICAI events were also published by Springer in its Lecture Notes in Artificial Intelligence (LNAI) series, vols. 1793, 2313, 2972, 3789, 4293, 4827, 5317, and 5845. Since its foundation in 2000, the conference has been growing in popularity and improving in quality.

Advanced FPGA Design

LAP Lambert Academic Publishing

This book is a comprehensive introduction to LabVIEW FPGATM, a package allowing the programming of intelligent digital controllers in field programmable gate arrays (FPGAs) using graphical code. It shows how both potential difficulties with understanding and programming in VHDL and the consequent difficulty and slowness of implementation can be sidestepped. The text includes a clear theoretical explanation of fuzzy logic (type 1 and type 2) with case studies that implement the theory and systematically demonstrate the implementation process. It goes on to describe basic and advanced levels of programming LabVIEW FPGA and show how implementation of fuzzy-logic control in FPGAs improves system responses. A complete toolkit for implementing fuzzy controllers in LabVIEW FPGA has been developed with the book so that readers can generate new fuzzy controllers and deploy them immediately. Problems and their solutions allow readers to practice the techniques and to absorb the theoretical ideas as they arise. Fuzzy Logic Type 1 and Type 2 Based on LabVIEW FPGATM, helps students studying embedded control systems to design and program those controllers more efficiently and to understand the benefits of using fuzzy logic in doing so. Researchers working with FPGAs find the text useful as an introduction to LabVIEW and as a tool helping them design embedded systems.

FPGA Fuzzy (Pd & Pid) Controller Models for Insulin Pumps in Diabetes LAP Lambert Academic Publishing

This book discusses the design and performance analysis of SDRAM controllers that cater to both real-time and best-effort applications, i.e. mixed-time-criticality memory controllers. The authors describe the state of the art, and then focus on an architecture template for reconfigurable memory controllers that addresses effectively the quickly evolving set of SDRAM standards, in terms of worst-case timing and power analysis, as well as implementation. A prototype implementation of the controller in SystemC and synthesizable VHDL for an FPGA development board are used as a

proof of concept of the architecture template.

Proceedings of KKA 2017—The 19th Polish Control Conference, Kraków, Poland, June 18–21, 2017 Springer Science & Business Media

This book focuses on control units, which are a vital part of modern digital systems, and responsible for the efficiency of controlled systems. The model of a finite state machine (FSM) is often used to represent the behavior of a control unit. As a rule, control units have irregular structures that make it impossible to design their logic circuits using the standard library cells. Design methods depend strongly on such factors as the FSM used, specific features of the logic elements implemented in the FSM logic circuit, and the characteristics of the control algorithm to be interpreted. This book discusses Moore and Mealy FSMs implemented with FPGA chips, including look-up table elements (LUT) and embedded memory blocks (EMB). It is crucial to minimize the number of LUTs and EMBs in an FSM logic circuit, as well as to make the interconnections between the logic elements more regular, and various methods of structural decompositions can be used to solve this problem. These methods are reduced to the presentation of an FSM circuit as a composition of different logic blocks, the majority of which implement systems of intermediate logic functions different (and much simpler) than input memory functions and FSM output functions. The structural decomposition results in multilevel FSM circuits having fewer logic elements than equivalent single-level circuits. The book describes well-known methods of structural decomposition and proposes new ones, examining their impact on the final amount of hardware in an FSM circuit. It is of interest to students and postgraduates in the area of Computer Science, as well as experts involved in designing digital systems with complex control units. The proposed models and design methods open new possibilities for creating logic circuits of control units with an optimal amount of hardware and regular interconnections.

Design of Digital Systems and Devices Springer

Advances in PID ControlIntechOpen

Introduction to Embedded System Design Using Field Programmable Gate Arrays Springer Nature

This book provides the advanced issues of FPGA design as the underlying theme of the work. In practice, an engineer typically needs to be mentored for several years before these principles are appropriately utilized. The topics that will be discussed in this book are essential to designing FPGA's beyond moderate complexity. The goal of the book is to present practical design techniques that are otherwise only available through mentorship and real-world experience.

Structural Decomposition in Logic Design Springer

An instructive reference that will help control researchers and engineers, interested in a variety of industrial processes, to take advantage of a powerful tuning method for the ever-popular PID control paradigm. This monograph presents explicit PID tuning rules for linear control loops regardless of process complexity. It shows the reader how such loops achieve zero steady-position, velocity, and acceleration errors and are thus able to track fast reference signals. The theoretical development takes place in the frequency domain by introducing a general-transfer-function-known process model and by exploiting the principle of the magnitude optimum criterion. It is paralleled by the presentation of real industrial control loops used in electric motor drives. The application of the proposed tuning rules to a large class of processes shows that irrespective of the complexity of the controlled process the shape of the step and frequency response of the control loop exhibits a specific performance. This specific performance, along with the PID explicit solution, formulates the basis for developing an automatic tuning method for the PID controller parameters which is a problem often met in many industry applications—temperature, pH, and humidity control, ratio control in product blending, and boiler-drum level control, for example. The process of the model is considered unknown and controller parameters are tuned automatically such that the aforementioned performance is achieved. The potential both for the explicit tuning rules and the automatic tuning method is demonstrated using several examples for benchmark process models recurring frequently in many industry applications.

PID Controller Tuning Using the Magnitude Optimum Criterion Springer Science & Business Media

This book discusses data communication and computer networking, communication technologies and the applications of IoT (Internet of Things), big data, cloud computing and healthcare informatics. It explores, examines and critiques intelligent data communications and presents inventive methodologies in communication technologies and IoT. Aimed at researchers and academicians who need to understand the importance of data communication and advanced technologies in IoT, it offers different perspectives to help readers increase their knowledge and motivates them to conduct research in the area, highlighting various innovative ideas for future research.

Unleash the System On Chip using FPGAs and Handel C LAP Lambert Academic Publishing

FPGA Implementation of PID Controller for the Stabilization of a DC-DC "Buck" Converter.

A New Approach Springer Science & Business Media

System-on-Chip for Real-Time Applications will be of interest to engineers, both in industry and academia, working in the area of SoC VLSI design and application. It will also be useful to graduate and undergraduate students in electrical and computer engineering and computer science. A selected set of papers from the 2nd International Workshop on Real-Time Applications were used to form the basis of this book. It is organized into the following chapters: -Introduction; -Design Reuse; -Modeling; -Architecture; -Design Techniques; -Memory; -Circuits; -Low Power; -Interconnect and Technology; -MEMS. System-on-Chip for Real-Time Applications contains many signal processing applications and will be of particular interest to those working in that community.

FPGA Implementation of Digital PID Controller

Springer

In the research area of computer science, practitioners are constantly searching for faster platforms with pertinent results. With analytics that span environmental development to computer hardware emulation, problem-solving algorithms are in high demand. Field-Programmable Gate Array (FPGA) is a promising computing platform that can be significantly faster for some applications and can be applied to a variety of fields. FPGA Algorithms and Applications for the Internet of Things provides emerging research exploring the theoretical and practical aspects of computable algorithms and applications within robotics and electronics development. Featuring coverage on a broad range of topics such as neuroscience, bioinformatics, and artificial intelligence, this book is ideally designed for computer science specialists, researchers, professors, and students seeking current research on cognitive analytics and advanced computing.

FPGA-based Implementation of Signal Processing Systems

Createspace Independent Publishing Platform

Inhaltsangabe:Abstract: The Controller Area Network (CAN) is a serial field bus protocol which was originally used in road vehicles. Most people still use Microcontrollers (MCU) to control the CAN bus. The development of Field-programmable Gate Array (FPGA) is very advanced, and compared to the MCU the FPGA has many advantages. For this reason, this thesis uses an Altera FPGA development kit to design a CAN bus based measurement system. During the work, four Direct Digital Synthesizers (DDS) were simulated for four wave channels in the FPGA. All signals of the channels were transmitted from the FPGA to a CAN bus. Between the CAN bus and FPGA an Atmel CAN MCU, which contains both serial and CAN ports, was used as the third party. Whereby the data output from the FPGA were first transmitted to the serial port of the CAN MCU and then shifted to the CAN port of the CAN MCU. The CAN bus device (NI CAN USB-8473) which was used in this thesis, has a CAN port to connect to the CAN port of the CAN MCU, and a USB 2.0 port to connect to a PC. Finally, the data of the CAN bus was monitored on the PC with the LabVIEW platform. With this platform the data could also be transmitted to the CAN bus and then to the FPGA to change the tuning word of DDS. In order to achieve the speed limit of the complete measurement system, the communication rates of FPGA, CAN bus and CAN MCU were programmed to be the maximum. Inhaltsverzeichnis:Table of Contents: 1Introduction4 1.1Background4 1.2Objective4 1.3Outline6 2CAN Introduction7 2.1Background7 2.2Architecture Layers8 2.2.1Physical Layer8 2.2.2Data Link Layer10 2.2.3Higher Layer10 2.3Frame Structure11 2.3.1Data Frame11 2.3.2Remote Frame14 2.3.3Error Frame15 2.3.4Overload Frame16 2.3.5Interframe Space16 2.4Frame Coding17 2.5Error Detecting and Handling18 2.6Fault Confinement19 3CAN and MCU Serial Port Effective Data Study22 3.1CAN Effective Data Study22 3.2MCU Serial Port Study25 3.2.1General 8051 MCU25 3.2.2Using Timer 227 3.2.3X2 Mode28 3.3CAN vs. MCU Serial Port29 4Experiment Components and Setup32 4.1Stratix III FPGA Development Kit32 4.2CAN MCU AT89C51CC0335 4.35-3.3 V Voltage Level Transistor38 4.4NI CAN USB-847340 4.5PC with NI CAN Driver42 4.6Setup42 5Software Development43 5.1FPGA with Quartus II43 5.1.1DDS Design43 5.1.2PLL Application45 5.1.3UART Reception49 5.1.4UART Transmission51 5.2MCU with Keil C5153 5.2.1Serial Port Programming53 5.2.2CAN […]

FPGA Algorithms and Applications for the Internet of Things Springer

Logic design of digital devices is a very important part of the Computer Science. It deals with design and testing of logic circuits for both data-path and control unit of a digital system. Design methods depend strongly on logic elements using for implementation of logic circuits. Different programmable logic devices are wide used for implementation of logic circuits. Nowadays, we witness the rapid growth of new and new chips, but there is a strong lack of new design methods. This book includes a variety of design and test methods targeted on different digital devices. It covers methods of digital system design, the development of theoretical base for construction and designing of the PLD–based devices, application of UML for digital design. A considerable part of the book is devoted to design methods oriented on implementing control units using FPGA and CPLD chips. Such important issues as design of reliable FSMs, automatic design of concurrent logic controllers, the models and methods for creating infrastructure IP services for the SoCs are also presented. The editors of the book hope that it will be interesting and useful for experts in Computer Science and Electronics, as well as for students, who are viewed as designers of future digital devices and systems.

Implementation of a PID Controller on FPGA for DC Motor Speed

McGraw Hill Professional

"This thesis formulates, and implements an automotive Anti-lock Brake System (ABS), reporting on its design simulation, synthesis, and eventual layout steps, from which extensions are drawn towards digital onto controllers FPGA technology, and the potential migration of the design onto ASIC technology. Implementation/environment fine-tuning of embedded controllers as such necessitate quickly prototyped circuit realizations. Examination of its functionality, real-time response, implementation, and testability is performed in an attempt to measure the usefulness of higher level design entry facilities such as VHDL in a rapid prototyping environment. Continuous on-line testing is included using aperiodic sample injections where the resultant generated values are compared to signatures known a priori, without compromising functionality. The achievable area and timing aid in the determination of the efficiency of the process and provide fuel for an FPGA and/or ASIC migration path for eventual implementation. Commentaries and generalized methodologies are assembled from the design's simulation, synthesis and layout utilizing VHDL and FPGAs, illustrating CAD tool capabilities/requirements/limitations, with respect to real-time synthesis and rapid prototyping of general controller applications involving asynchronous elements. (Abstract shortened by UMI.)" --

Prototyping of Concurrent Control Systems Implemented in FPGA Devices Springer Science & Business Media

This book focuses on prototyping aspects of concurrent control systems and their further implementation and partial reconfiguration in programmable devices. Further, it lays out a full prototyping flow for concurrent control systems. Based on a given primary specification, a system is described with an interpreted Petri net, which naturally reflects the concurrent and sequential relationships of the design. The book shows that, apart from the traditional option of static configuration of the entire system, the latest programmable devices (especially FPGAs) offer far more sophistication. Partial reconfiguration allows selected parts of the system to be replaced without having to reprogram the entire structure of the device. Approaches to dynamic and static partial reconfiguration of concurrent control systems are presented and described in detail.“/p> The theoretical work is illustrated by examples drawn from various applications, with a milling machine and a traffic-light controller highlighted as representative interpreted Petri nets. Given the ubiquity of concurrent control systems in a huge variety of technological areas including transportation, medicine, artificial intelligence, manufacturing, security and safety and planetary exploration, the innovative software and hardware design methods described here will be of considerable interest to control engineers and systems and circuits researchers in many areas of industry and academia.

9th Mexican International Conference on Artificial Intelligence, MICAI 2010, Pachuca, Mexico, November 8-13, 2010, Proceedings,

Part II Advances in PID Control
The use of the system-level tool DSP Builder for high-level development of FPGA-based controllers was studied. The capabilities of the DSP Builder tool were further extended by developing the Custom Control Library. The custom library is comprised of widely used components such as discretized integrators, PID controller, PWM generator, and A/D controller. DSP Builder and the Custom Control Library together can be used to rapidly develop controllers in the familiar and standard Simulink design environment for FPGA implementation. An implementation case study demonstrated usage of DSP Builder and the Custom Control Library to develop a FPGA-based controller for an air levitation system in the Matlab/Simulink environment.

Implementation of a CAN Bus based Measurement System on an FPGA Development Kit

Margret Schneider
This book pretends to bring the state-of-art research results on advanced control from both the theoretical and practical perspectives. The fundamental and advanced research results as well as the contributions in terms of the technical evolution of control theory are of particular interest. This book can serve as a bridge between people who are working on the theoretical and practical research on control theory, and facilitate the proposal of development of new control techniques and its applications. In addition, this book presents educational importance to help students and researchers to know the frontiers of the control technology.
Frontiers in Advanced Control Systems Springer
Author's abstract: This research compares the behavior of three robot navigation controllers namely: PID, Artificial Neural Networks (ANN), and Fuzzy Logic (FL), that are used to control the same autonomous mobile robot platform navigating a real unknown indoor environment that contains simple geometric-shaped static objects to reach a goal in an unspecified location. In particular, the study presents and compares the design, simulation, hardware implementation, and testing of these controllers. The first controller is a traditional linear PID controller, and the other two are intelligent non-linear controllers, one using Artificial Neural Networks and the other using Fuzzy Logic Techniques. Each controller is simulated first in MATLAB® using the Simulink Toolbox. Later the controllers are implemented using Quartus II® software and finally the hardware design of each controller is implemented and downloaded to a Field-Programmable Gate Array (FPGA) card which is mounted onto the mobile robot platform. The response of each controller was tested in the same physical testing environment using a maze that the robot should navigate avoiding obstacles and reaching the desired goal. To evaluate the controllers' behavior each trial run is graded with a standardized rubric based on the controllers' ability to react to situations presented within the trial run. The results of both the MATLAB® simulation and FPGA implementation show the two intelligent controllers, ANN and FL, outperformed the PID controller. The ANN controller was marginally superior to the FL controller in overall navigation and intelligence.