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Designing A Pid
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*Practical
Design and
Application of
Model*

*Predictive
Control is a
self-learning*

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resource on

*how to design,
tune and*

*deploy an MPC
using MATLAB®
and Simulink®.*

*This reference
is one of the
most detailed
publications*

*on how to
design and*

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tune MPC

controllers.

Examples

presented

range from

double-Mass

spring system,

ship heading

and speed

control,

robustness

analysis

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*through Monte-Carlo
simulations,
photovoltaic
optimal
control, and
energy
management of
power-split
and air-
handling
control.*

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Readers will also learn how to embed the designed MPC controller in a real-time platform such as Arduino®. The selected problems are nonlinear and challenging,

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*and thus serve
as an
excellent
experimental,
dynamic system
to show the
reader the
capability of
MPC. The step-
by-step
solutions of
the problems*

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*are thoroughly
documented to
allow the
reader to
easily
replicate the
results.*

*Furthermore,
the MATLAB®
and Simulink®
codes for the
solutions are*

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free download.*

*Readers can
connect with
the authors
through the
dedicated
website which
includes
additional
free resources
at www.practic*

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almpc.com.

*Illustrates
how to design,
tune and
deploy MPC for
projects in a
quick manner
Demonstrates a
variety of
applications
that are
solved using*

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*MATLAB® and
Simulink®
Bridges the
gap in
providing a
number of
realistic
problems with
very hands-on
training
Provides
MATLAB® and*

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*Simulink® code
solutions.*

*This includes
nonlinear
plant models
that the
reader can use
for other
projects and
research work
Presents
application*

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*problems with
solutions to
help reinforce
the*

*information
learned*

*This volume
contains the
papers*

*presented at
INDIA-2012:*

International

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conference on

Information

system Design

and

Intelligent

Applications

held on

January 5-7,

2012 in Vishak

apatnam,

India. This

conference was

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*organized by
Computer
Society of
India (CSI),
Vishakhapatnam
chapter well
supported by
Vishakhapatnam
Steel, RINL,
Govt of India.
It contains
108 papers*

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*contributed by
authors from
six different
countries
across four
continents.
These research
papers mainly
focused on
intelligent
applications
and various*

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*system design
issues. The
papers cover a
wide range of
topics of
computer
science and
information
technology
discipline
ranging from
image*

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*processing,
data base
application,
data mining,
grid and cloud
computing,
bioinformatics
among many
others. The
various
intelligent
tools like*

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*intelligence,
artificial
intelligence,
evolutionary
algorithms,
bio-inspired
algorithms
have been
applied in
different
papers for*

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solving

various

challenging IT

related

problems.

Written to

inspire and

cultivate the

ability to

design and

analyze

feasible

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*algorithms for
a wide range
of engineering
applications,
this
comprehensive
text covers
the
theoretical
and practical
principles*

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*involved in
the design and
analysis of
control
systems. From
the
development of
the
mathematical
models for
dynamic
systems, the*

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*author shows
how they are
used to obtain
system
response and
facilitate
control, then
addresses
advanced
topics, such
as digital
control*

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systems,

adaptive and

robust

control, and

nonlinear

control

systems.

This volume

contains the

Proceedings of

the 4th IFToMM

Symposium on

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Mechanism

*Design for
Robotics, held
in Udine,
Italy, 11-13
September,
2018. It
includes
recent
advances in
the design of
mechanisms and*

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*their robotic
applications.
It treats,
among others,
the following
topics:
mechanism
design,
mechanics of
robots,
parallel
manipulators,*

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*actuators and
their control,
linkage and
industrial
manipulators,
innovative mec
hanisms/robots
and their
applications.
This book can
be used by
students,*

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*researchers
and engineers
in the
relevant areas
of mechanisms,
machines and
robotics.*

*Control of
Mechatronic
Systems*

Real-time

Design of

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Robust PID

Controller for
Speed Control
of DC Motor

Embedded

Microcomputer
Systems: Real
Time

Interfacing

Design of PID
Controller

Using PLC

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*Design and
Implementation
of PID*

*Controller for
DC Motor Using
PIC*

*Fractional
Order Motion
Controls*

Parallel robots
modeling and
analysis.-

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Parallel robots design, calibration and control.- Robot design.- Robot control.- Mobile robots design, modeling and control.- Humans and humanoids.- Perception. The papers in this volume provide a vision of the

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evolution of the robotics disciplines and indicate new directions in which these disciplines are foreseen to develop. Paper topics include, but are not limited to, novel robot design and robot

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modules/components, service, rehabilitation, mobile robots, humanoid robots, challenges in control, modeling, kinematical and dynamical analysis of robotic systems, innovations in sensor systems

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for robots and perception, and recent advances in robotics. In particular, many contributions on parallel robotics from leading researchers in this domain are included.

The project focused on speed

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control of DC motor. The main objective is to design and develop GUI software for speed control experiment, where PID controllers' design approaches has been applied. The controllers

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have been designed and the system is simulated using MATLAB to analyze their initial performance. The computer is connected to DC Motor via data acquisition card (DAQ Card) and Visual Basic is

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used to conduct the experiment. Field-testing is implemented to compare the results between the original and modified system with the PID controller. Finally, the performance of the system is analyzed and

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validation is done in terms of time response, robustness and percentage of error.

This book concentrates on intelligent technologies as it relates to engineering systems. The book covers the

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following
topics:
networking,
signal
processing,
artificial
intelligence,
control and
software
engineering,
intelligent
electronic
circuits and
systems,

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communications,
and materials
and mechanical
engineering. The
book is a
collection of
original papers
that have been
reviewed by
technical
editors. These
papers were
presented at the
International

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Conference on
Intelligent
Technologies and
Engineering
Systems, held
Dec. 13-15,
2012.

The ultimate
goal of this
paper is to
control the
angular speed ,
in a model of a
DC motor driving

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an inertial load has the angular speed, ω , as the output and applied voltage, V , as the input, by varying the applied voltage using different control strategies for comparison purpose. The comparison is

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made between the
proportional
controller,
integral
controller,
proportional and
integral
controller,
phase lag
compensator,
derivative
controller, lead
integral
compensator,

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lead lag

compensator, PID controller and the linear quadratic tracker design based on the optimal control theory. It has been realized that the design based on the linear quadratic tracker will

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give the best steady state and transient system behavior, mainly because, the other compensator designs are mostly based on trial and error while the linear quadratic tracker design is based on the

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optimal control theory which can give best dynamic performance for the controlled system.

Industrial Engineering,
Machine Design
And Automation
(Iemda 2014) -
Proceedings Of
The 2014

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Congress &
Computer Science
And Application
(Ccsa 2014) -
Proceedings Of
The 2nd Congress
Proceedings of
the Sixth
Conference on
Design and
Modeling of
Mechanical
Systems,
CMSM'2015, March

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23-25, Hammamet,
Tunisia

Speed Control of
DC Motor Using
PID Controller
Implementation
with Visual
Basic

Advances in
Automation,
Signal
Processing,
Instrumentation,
and Control

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Flexible

Electronics for

Electric

Vehicles

Stable Adaptive

Control and

Estimation for

Nonlinear

Systems

This book

presents the select

proceedings of the

International

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Conference on
Automation, Signal
Processing,
Instrumentation
and Control (i-
CASIC) 2020. The
book mainly
focuses on
emerging
technologies in
electrical systems,
IoT-based
instrumentation,

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advanced
industrial
automation, and
advanced image
and signal
processing. It also
includes studies
on the analysis,
design and
implementation of
instrumentation
systems, and high-
accuracy and

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energy-efficient controllers. The contents of this book will be useful for beginners, researchers as well as professionals interested in instrumentation and control, and other allied fields.

Embedded

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Microcomputer
Systems: Real
Time Interfacing
provides an in-
depth discussion
of the design of
real-time
embedded
systems using
9S12
microcontrollers.
This book covers
the hardware

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aspects of interfacing, advanced software topics (including interrupts), and a systems approach to typical embedded applications. This text stands out from other microcomputer systems books

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because of its balanced, in-depth treatment of both hardware and software issues important in real time embedded systems design. It features a wealth of detailed case studies that demonstrate basic concepts in the

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context of actual working examples of systems. It also features a unique simulation software package on the bound-in CD-ROM (called Test Execute and Simulate, or TExaS, for short) that provides a self-contained software

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environment for
designing, writing,
implementing, and
testing both the
hardware and
software
components of
embedded
systems.

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description or the product text may not be available in the ebook version.

This book presents the outcomes of the 2019 International Conference on Cyber Security Intelligence and Analytics (CSIA2019), an

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international
conference
dedicated to
promoting novel
theoretical and
applied research
advances in the
interdisciplinary
field of cyber
security,
particularly
focusing on threat
intelligence,

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analytics, and countering cyber crime. The conference provides a forum for presenting and discussing innovative ideas, cutting-edge research findings, and novel techniques, methods and

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applications on all aspects of Cyber Security Intelligence and Analytics.

This book offers a collection of original peer-reviewed contributions presented at the 6th International Congress on

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Design and
Modeling of
Mechanical
Systems
(CMSM'2015), held
in Hammamet,
Tunisia, from the
23rd to the 25th of
March 2015. It
reports on both
recent research
findings and
innovative

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industrial

applications in the
fields of

mechatronics and
robotics, dynamics

of mechanical
systems, fluid

structure

interaction and

vibroacoustics,

modeling and

analysis of

materials and

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structures, and design and manufacturing of mechanical systems. Since its first edition in 2005, the CMSM Congress has been held every two years with the aim of bringing together specialists from

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universities and industry to present the state-of-the-art in research and applications, discuss the most recent findings and exchange and develop expertise in the field of design and modeling of mechanical

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systems. The
CMSM Congress is
jointly organized
by three Tunisian
research
laboratories: the
Mechanical
Engineering
Laboratory of the
National
Engineering
School of
Monastir; the

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Mechanical

Laboratory of

Sousse, part of the

National

Engineering

School of Sousse;

and the

Mechanical,

Modeling and

Manufacturing

Laboratory at the

National

Engineering

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School of Sfax.

PID Controller

Design for DC

Motor Using

Matlab Application

Cyber Security

Intelligence and

Analytics

Control of DC

Motor Using

Different Control

Strategies

Mechanism Design

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for Robotics

Design and

Analysis of

Control Systems

Mobile Ad Hoc

Robots and

Wireless Robotic

Systems: Design

and

Implementation

The purpose of this

study is to control the

speed of direct

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current (DC) motor with PID controller using Proportional Integral Derivative (PID). The PID Controller will be design and must be tune, so the comparison between simulation result and experimental result can be made. The scopes includes the simulation and

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modeling of direct current (DC) motor, implementation of Proportional Integral Derivative (PID) Controller into actual DC motor and comparison of MATLAB simulation result with the experimental result. This research was about introducing the new ability of in

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estimating speed and controlling the permanent magnet direct current (PMDC) motor. In this project, PID Controller will be used to control the speed of DC motor. The PID Controller will be programmed to control the speed of DC motor at certain speed level. The sensor will be used to

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detect the speed of motor. Then, the result from sensor is fed back to PIC to find the comparison between the desired output and measured output to get the estimating speed.

The emergence of wireless robotic systems has provided new perspectives on technology. With the

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combination of disciplines such as robotic systems, ad hoc networking, telecommunications and more, mobile ad hoc robots have proven essential in aiding future possibilities of technology. Mobile Ad Hoc Robots and Wireless Robotic Systems: Design and

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Implementation aims to introduce robotic theories, wireless technologies, and routing applications involved in the development of mobile ad hoc robots. This reference source brings together topics on the communication and control of network ad hoc robots, describing how they

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work together to carry out coordinated functions.

This 5-volume set (CCIS 214-CCIS 218) constitutes the refereed proceedings of the International Conference on Computer Science, Environment, Ecoinformatics, and Education, CSEE 2011, held in Wuhan,

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China, in July 2011. The 525 revised full papers presented in the five volumes were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on information security, intelligent information, neural networks, digital library,

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algorithms,
automation, artificial
intelligence,
bioinformatics,
computer networks,
computational
system, computer
vision, computer
modelling and
simulation, control,
databases, data
mining, e-learning, e-
commerce, e-
business, image

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processing,
information systems,
knowledge
management and
knowledge
discovering,
multimedia and its
application,
management and
information system,
mobile computing,
natural computing and
computational
intelligence, open and

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innovative education,
pattern recognition,
parallel and
computing, robotics,
wireless network, web
application, other
topics connecting with
computer,
environment and
ecoinformatics,
modeling and
simulation,
environment
restoration,

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environment and energy, information and its influence on environment, computer and ecoinformatics, biotechnology and biofuel, as well as biosensors and bioreactor.

The book investigates the fractional calculus-based approaches and their benefits to

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adopting in complex
real-time areas.

Another objective is to
provide initial
solutions for new
areas where fractional
theory has yet to
verify the expertise.

The book focuses on
the latest scientific
interest and illustrates
the basic idea of
general fractional
calculus with

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MATLAB codes. This book is ideal for researchers working on fractional calculus theory both in simulation and hardware.

Researchers from academia and industry working or starting research in applied fractional calculus methods will find the book most

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useful. The scope of this book covers most of the theoretical and practical studies on linear and nonlinear systems using fractional-order integro-differential operators.

Practical

Microcontroller

Engineering with ARM

Technology

Proceedings of the

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International

Conference on
Information Systems
Design and Intelligent
Applications 2012
(India 2012) held in
Visakhapatnam, India,
January 2012

PID Digital Controller
for DC Motor Speed
Using MC68HC11
Microcontroller

Sustainable Design
and Manufacturing

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2018

Advances in
Engineering Materials
and Applied
Mechanics

Proceedings of the
5th International
Conference on
Sustainable Design
and Manufacturing
(KES-SDM-18)

***The objective of
this work is to
design***

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***Proportional
Integral Derivative
controller using
PLC and
implement it to
control the speed
of a DC motor. The
modifications of
control system
have to be done
frequently. In
order to do so we
have to come
across lots of***

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complexities.

These PLC based systems removes the detailed hardware design considerations.

Now PLC offers us an easy technique to modify the wiring of control system without changing its hardware. The speed of a DC

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Motor Controller

motor is controlled here by varying the armature voltage using PLC as discrete state controller. Thus by applying an appropriate ladder logic a PID controller is developed as it has the combined advantages of proportional,

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integral & derivative control action. Here soft start method is implemented to start the motor safely without any external starter. In this controller the set point can be changed during run time. So, it is not required to off the controller to

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set new set point speed. This increases the flexibility of the controller. The detail ladder logic, hardware components and circuit required to perform this work is discussed in this book.

This project is a simulation and

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***experimental
investigation into
the development of
PID controller
using MATLAB/SI
MULINK software.
The simulation
development of the
PID controller with
the mathematical
model of DC motor
is done using
Ziegler-Nichols
method and trial***

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***and error method.
The PID parameter
is to be tested with
an actual motor
also with the PID
controller inMATL
AB/SIMULINK
software. In order
to implement the
PID controller
from the software
to the actual DC
motor data
acquisition is used.***

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From the simulation and the experiment, the result performance of the PID controller is compared in term of response and the assessment is presented.

Covers PID control systems from the very basics to the advanced topics

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This book covers the design, implementation and automatic tuning of PID control systems with operational constraints. It provides students, researchers, and industrial practitioners with everything they need to know about

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PID control systems—from classical tuning rules and model-based design to constraints, automatic tuning, cascade control, and gain scheduled control. PID Control System Design and Automatic Tuning using

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***MATLAB/Simulink
introduces PID
control system
structures,
sensitivity analysis,
PID control design,
implementation
with constraints,
disturbance
observer-based PID
control, gain
scheduled PID
control systems,
cascade PID***

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***control systems,
PID control design
for complex
systems, automatic
tuning and
applications of PID
control to
unmanned aerial
vehicles. It also
presents resonant
control systems
relevant to many
engineering
applications. The***

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***implementation of
PID control and
resonant control
highlights how to
deal with
operational
constraints.
Provides unique
coverage of PID
Control of
unmanned aerial
vehicles (UAVs),
including
mathematical***

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***models of multi-
rotor UAVs, control
strategies of UAVs,
and automatic
tuning of PID
controllers for
UAVs Provides
detailed
descriptions of
automatic tuning
of PID control
systems, including
relay feedback
control systems,***

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frequency response estimation, Monte-Carlo simulation studies, PID controller design using frequency domain information, and MATLAB/Simulink simulation and implementation programs for automatic tuning
Includes 15

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***MATLAB/Simulink
tutorials, in a step-
by-step manner, to
illustrate the
design, simulation,
implementation
and automatic
tuning of PID
control systems
Assists lecturers,
teaching
assistants,
students, and other
readers to learn***

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PID control with constraints and apply the control theory to various areas.

Accompanying website includes lecture slides and MATLAB/ Simulink programs PID Control System Design and Automatic Tuning using

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***MATLAB/Simulink
is intended for
undergraduate
electrical,
chemical,
mechanical, and
aerospace
engineering
students, and will
greatly benefit
postgraduate
students,
researchers, and
industrial***

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personnel who work with control systems and their applications.

This work investigates several methods for the design of a pitch control system, which actively reduces the fatigue loads on the tower of a wind turbine. As

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***major contribution,
this work
demonstrates that
it is possible to
design collective
pitch controllers
that, additionally
to basic rotor
speed control and
active damping of
the first fore-aft
tower bending
mode, allow to
reduce the fore-aft***

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*tower bending
loads due to 3p
harmonic
excitation.*

*Gain Scheduling
Pitch Control for
Fatigue Load
Reduction for Wind
Turbines*

*Microprocessor-
Based Control
Systems*

*Robust Design of
PID Controllers for*

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Systems
Design and
Implementation***

***Intelligent
Technologies and
Engineering
Systems***

**The first
microcontroller
textbook to
provide complete
and systemic**

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introductions to
all components
and materials
related to the
ARM® Cortex®-M4
microcontroller
system,
including
hardware and
software as well
as practical
applications
with real
examples. This

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book covers both
the
fundamentals, as
well as
practical
techniques in
designing and
building
microcontrollers
in industrial
and commercial
applications.
Examples
included in this

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book have been
compiled, built,
and tested
Includes Both
ARM® assembly
and C codes
Direct Register
Access (DRA)
model and the
Software Driver
(SD) model
programming
techniques and
discussed If you

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are an

instructor and
adopted this
book for your
course, please
email ieeeproposals@wiley.com to
get access to
the instructor
files for this
book.

This proceedings
put together 68
selected

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articles from
the joint
conferences of
2014 Congress on
Industrial
Engineering,
Machine Design
and Automation
(IEMDA2014) and
the 2nd Congress
on Computer
Science and
Application
(CCSA2014), held

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in Sanya, China
during December
12 - 14, 2014.

The conference
program of IEMDA
2014 focused on
areas of
Industrial
Engineering,
Machine Design
and Automation,
while the CCSA
2014 program
provided the

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platform for
Computer Science
and Applications
.Collected
together the
latest research
results and
applications on
industrial
engineering,
machine design,
automation, and
computer science
and other

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Engineering
topics. All
submitted papers
to this
proceedings were
subjected to
strict peer-
reviewing by 2-4
expert referees,
to ensure that
all articles
selected are of
highest standard

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relevance to the
conference.

With the rapid
development of
Machinery,
Materials
Science and
Engineering
Application,
discussion on
new ideas
related
mechanical

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engineering and
materials
science arise.

In this
proceedings
volume the
author(s) are
focussed on
Machinery,
Materials
Science and
Engineering
Applications and
other related

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topics. The
Conference has
pro
This book
compiles the
refereed papers
presented during
the 2nd Flexible
Electronics for
Electric
Vehicles (FlexEV
- 2021). It
presents the
diligent work of

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including
research on
the circular
economy. The
corresponding
application
areas are wide
and varied.
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cutting-edge
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and economic systems. Karl Åström and Richard Murray use techniques from physics, computer science, and operations research to introduce control-oriented

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modeling. They begin with state space tools for analysis and design, including stability of solutions, Lyapunov functions, reachability,

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state feedback
observability,
and
estimators.
The matrix
exponential
plays a
central role
in the
analysis of
linear control
systems,

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allowing a
concise
development of
many of the
key concepts
for this class
of models.

Åström and
Murray then
develop and
explain tools
in the

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frequency
domain,
including
transfer
functions,
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contained

resource on

control theory

The proportion

al-integral-

derivative

(PID)

controllers

are widely

used in many

industrial

control

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systems for
several
decades since
Ziegler and
Nichols
proposed their
first PID
tuning method.
This is
because the
PID controller
structure is

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simple and its principle is easier to understand than most other advanced controllers. On the other hand, the general performance of PID controller

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is

satisfactory
in many
applications.

For these
reasons, the
majority of
the

controllers
used in
industry are
of PI/PID

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type. PID controllers are widely used for process control applications requiring very precise and accurate control. The purpose of the

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motor speed controller is to take a signal representing the demanded speed, and to drive a motor at that speed. The controller does not actually

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measure the speed of the motor. Thus, it is called an Open Loop Speed Controller.

Motors come in a variety of forms, and the speed controller's

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motor drive

output will be
different
dependent on
these forms.

The speed
controller
presented here
is designed to
drive special
dc motor which
is not easily

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anywhere in
store, thus it
is a good
example to be
used due to
the special ch
aracteristics
and
parameters.

Matlab

Simulink® is

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an important
tool used in
this project,
from designing
the
mathematical
model of the
dc motor,
obtaining the
transfer
function, and
designing the

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using both
model and
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using m-files.
The transfer
function will
be linearized
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tuning the
gain of PID
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like K_P , K_I ,
and K_D .

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chosen to
simulate the
performance of
the control
system.

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Modern industry
has huge

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demands on motion control. One of the most widely used plants among all the available electrical systems is the DC motor. It is necessary to control the speed of the DC motor to meet desired

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specifications in various industrial applications. Proportional-Integral-Derivative (PID) controllers are widely used for industrial applications because they are simple in structure and easy to

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LSI technology and

the consequent

availability of

inexpensive but

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powerful

microprocessors

have already

affected the process

control industry in a

significant manner.

Microprocessors are

being increasingly

utilized for

improving the

performance of

control systems and

making them more

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sophisticated as well as reliable.

Many concepts of adaptive and learning control theory which were considered impractical only 20 years ago are now being implemented. With these developments there has been a steady

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growth in hardware and software tools to support the microprocessor in its complex tasks. With the current trend of using several microprocessors for performing the complex tasks in a modern control system, a great deal

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of emphasis is being given to the topic of the transfer and sharing of information between them. Thus the subject of local area networking in the industrial environment has become assumed great importance. The object of this

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book is to present both hardware and software concepts that are important in the development of microprocessor-based control systems. An attempt has been made to obtain a balance between theory and practice, with emphasis on

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practical applications. It should be useful for both practicing engineers and students who are interested in learning the practical details of the implementation of microprocessor-based control systems. As some

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of the related material has been published in the earlier volumes of this series, duplication has been avoided as far as possible.

PID Controllers
Real-time Design of Robust PID
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X-by-wire

Unmanned Ground Vehicles (UGVs) have been attracting increased attention for various civilian or military applications. The x-by-wire techniques (drive-by-wire, steer-by-wire, and brake-by-wire techniques) provide the possibility of

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achieving novel vehicle design and advanced dynamics control, which can significantly improve the overall performance, maneuverability, and mobility of the UGVs. However, there are few full x-by-wire UGVs prototype models

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reported in the world. Therefore, there is no book that can fully describe the design, configuration, and dynamics control approach of full x-by-wire UGVs, which makes it difficult for readers to study this hot and interesting topic. In this book,

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we use a full x-by-wire UGV, developed by our group, as the example. This UGV is completely x-by-wire with four in-wheel motors driven and a four-wheel independent steer. In this book, the overall design of the UGV, the design

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of the key
subsystems (battery
pack system, in-
wheel motor-driven
system,
independent steer
system, remote and
autonomous control
system), and the
dynamics control
approach will be
introduced in detail,
and the

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experiment's results will be provided to validate the proposed dynamics control approach. Control systems are pervasive in our lives. Our homes have environmental controls. The appliances we use, such as the washing machine,

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microwave, etc.

carry embedded
controllers in them.

We fly in airplanes
and drive

automobiles that
extensively use
control systems.

The industrial plants
that produce
consumer goods run
on process control
systems. The recent

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drive toward automation has increased our reliance on control systems technology. This book discusses control systems design from a model-based perspective for dynamic system models of single-input single-output

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type. The emphasis in this book is on understanding and applying the techniques that enable the design of effective control systems in multiple engineering disciplines. The book covers both time-domain and the frequency-domain

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