Fault Diagnosis Systems An Introduction From Fault Detection To Fault Tolerance

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Wer die gesamte "Well-to-Wheel"-Kette betrachtet, stellt schnell fest: Der Verbrennungsmotor und seine Kraftstoffe sind auch heute nicht wegzudenken, wenn es gilt, Pkw und Nutzfahrzeuge anzutreiben. Die Erkenntnis, dass die Elektrifizierung der Fahrzeugantriebe sich nur evolutionär entwickeln kann, sichert dem Verbrennungsmotor weiterhin die Pole-Position als Schrittmacher in eine Mobilität mit geringen Schadstoffemissionen. So gilt es, vom Dreizylinder-Pkw- bis zum Achtzylinder-Nfz-Motor, neben verschiedenen technologischen Optimierungsmöglichkeiten, weitere verborgene Potenzial in den Bereichen Mechanik Ladungswechsel, Verbrennung, Abgasnachbehandlung und Wärmemanagement zu heben. Vor dem Hintergrund dieser Entwicklungsaufgaben veranstalten ATZlive und das VDI Wissensforum zum dritten Mal gemeinsam den Internationalen Motorenkongress.

This book consists of one hundred and twenty-five selected papers presented at the 2015 International Conference on Applied Mechanics, Mechatronics and Intelligent Systems (AMMIS2015), which was held in Nanjing, China during June 19–20, 2015. AMMIS2015 focuses on seven main areas, namely, applied mechanics, control and automation, intelligent systems, computer technology, electronics engineering, electrical engineering, and materials science and technology. Experts in this field from all over the world contributed to the collection of research results and development activities. AMMIS2015 provides an excellent international exchange platform for researchers to share their development works and results in these areas. All papers selected for this proceeding were subjected to a rigorous peer-review process. Contents: Applied and Computational MechanicsResearch and Design in Mechanical EngineeringTechnology and Method for Measurement, Test, Detection and MonitoringIntelligent Systems, Processing of Signal and DataControl and AutomationApplied Information TechnologyMaterial Science and Material Processing TechnologyComputational TechnologyElectronics and Electrical EngineeringSystem Science and Engineering Readership: Researchers and professionals interested in applied mechanics, mechatronics and intelligent systems. Key Features:This is a conference that focuses on the latest research effort funded by the Chinese government in applied mechanics and mechatronics in the development of intelligent systems. The readers are mainly participants and contributors to the conference who will be given e-access to the proceedingsKeywords:Applied Mechanics;Control and Automation;Intelligent Systems;Computer Technology;Electronics Engineering;Electrical Engineering;Materials Science and Technology
Für die vorliegende 9. Auflage wurde der Inhalt vollständig neu strukturiert und in kürzere und

in sich abgeschlossene Kapitel aufgeteilt. Einleitend beschreibt das Werk die Funktionsweise von Verbrennungsmotoren für Fahrzeuge und stationäre Anwendungen sowie diejenige für alternative Antriebssysteme. Daran anschließend spannen die Autoren einen Bogen von einfachen thermodynamischen Grundlagen des Verbrennungsmotors hin zu komplexen Modellansätzen zur Beschreibung der Gemischbildung, Zündung, Verbrennung und Schadstoffbildung unter Beachtung der Motorperipherie von Otto- und Dieselmotoren. Damit liegt der inhaltliche Schwerpunkt dieses Bandes auf den Simulationsmodellen und deren strömungstechnischen, thermodynamischen und verbrennungschemischen Grundlagen sowie der Messtechnik zur Verifikation dieser Modelle, wie sie für die Entwicklung moderner Verbrennungsmotoren unentbehrlich sind. Für die aktuelle Auflage wurde vor allem das Thema alternative Antriebssysteme durch die Behandlung von Brennstoffzellen und elektrischen Antriebssystemen stark erweitert. Alle Kapitel wurden vollständig überarbeitet und aktualisiert. The two-volume set LNCS 7552 + 7553 constitutes the proceedings of the 22nd International Conference on Artificial Neural Networks, ICANN 2012, held in Lausanne, Switzerland, in September 2012. The 162 papers included in the proceedings were carefully reviewed and selected from 247 submissions. They are organized in topical sections named: theoretical neural computation; information and optimization; from neurons to neuromorphism; spiking dynamics; from single neurons to networks; complex firing patterns; movement and motion; from sensation to perception; object and face recognition; reinforcement learning; bayesian and echo state networks; recurrent neural networks and reservoir computing; coding architectures; interacting with the brain; swarm intelligence and decision-making; mulitlayer perceptrons and kernel networks; training and learning; inference and recognition; support

vector machines; self-organizing maps and clustering; clustering, mining and exploratory analysis; bioinformatics; and time weries and forecasting.

This textbook will help you learn all the skills you need to pass Level 3 and 4 Vehicle Maintenance and Repair courses from City and Guilds, IMI and BTEC, and is also ideal for higher level ASE, AUR and other qualifications. Advanced Automotive Fault Diagnosis covers the fundamentals of vehicle systems and components and explains the latest diagnostic techniques employed in effective vehicle maintenance and repair. Diagnostics, or fault finding, is an essential part of an automotive technician's work, and as automotive systems become increasingly complex there is a greater need for good diagnostics skills. For students new to the subject, this book will help to develop these skills, but will also assist experienced technicians in further improving their performance and keeping up with recent industry developments. In full colour and including examples of the latest technology, this is the guide that no student enrolled on an automotive maintenance and repair course should be without. Also by Tom Denton: Automobile Mechanical and Electrical Systems Tom Denton ISBN: 978-0-08-096945-9 Automobile Electrical and Electronic Systems, Fourth Edition Tom Denton ISBN: 978-0-08-096942-8

This book constitutes the thoroughly refereed post-conference proceedings of the 7th International Conference on Intelligent Computing, ICIC 2011, held in Zhengzhou, China, in August 2011. The 94 revised full papers presented were carefully reviewed and selected from 832 submissions. The papers are organized in topical sections on neural networks; machine learning theory and methods; fuzzy theory and models; fuzzy systems and soft computing; evolutionary learning & genetic algorithms; swarm intelligence and optimization; intelligent

computing in computer vision; intelligent computing in image processing; biometrics with applications to individual security/forensic sciences; intelligent image/document retrievals; natural language processing and computational linguistics; intelligent data fusion and information security; intelligent computing in pattern recognition; intelligent agent and web applications; intelligent computing in scheduling; intelligent control and automation.

This book offers first a short introduction to advanced supervision, fault detection and diagnosis methods. It then describes model-based methods of fault detection and diagnosis for the main components of gasoline and diesel engines, such as the intake system, fuel supply, fuel injection, combustion process, turbocharger, exhaust system and exhaust gas aftertreatment. Additionally, model-based fault diagnosis of electrical motors, electric, pneumatic and hydraulic actuators and fault-tolerant systems is treated. In general series production sensors are used. It includes abundant experimental results showing the detection and diagnosis quality of implemented faults. Written for automotive engineers in practice, it is also of interest to graduate students of mechanical and electrical engineering and computer science.

This book presents research advances in automotive AC systems using an interdisciplinary approach combining both thermal science, and automotive engineering. It covers a variety of topics, such as: control strategies, optimization algorithms, and diagnosis schemes developed for when automotive air condition systems interact with powertrain dynamics. In contrast to the rapid advances in the fields of building HVAC and automotive separately, an interdisciplinary examination of

both areas has long been neglected. The content presented in this book not only reveals opportunities when interaction between on-board HVAC and powertrain is considered, but also provides new findings to achieve performance improvement using model-based methodologies.

Modern control systems are complex in the sense of implementing numerous functions, such as process variable processing, digital control, process monitoring and alarm indication, graphic visualization of process running, or data exchange with other systems or databases. This book conveys a description of the developed DiaSter system as well as characteristics of advanced original methods of modeling, knowledge discovery, simulator construction, process diagnosis, as well as predictive and supervision control applied in the system. The system allows early recognition of abnormal states of industrial processes along with faults or malfunctions of actuators as well as technological and measuring units. The universality of solutions implemented in DiaSter facilitates its broad application, for example, in the power, chemical, pharmaceutical, metallurgical and food industries. The system is a world-scale unique solution, and due to its open architecture it can be connected practically with any other control systems. The monograph presents theoretical and practical results of research into fault diagnosis and control conducted over many years within the cooperation of Polish research teams from the Warsaw University of Technology, the University of Zielona Góra, the Silesian University of Technology in Gliwice, and the Technical

University of Rzeszów. The book will be of great interest to researchers and advanced students in automatic control, technical diagnostics and computer engineering, and to engineers tasked with the development of advanced control systems of complex industrial processes.

This comprehensive work presents the status and likely development of fault diagnosis, an emerging discipline of modern control engineering. It covers fundamentals of model-based fault diagnosis in a wide context, providing a good introduction to the theoretical foundation and many basic approaches of fault detection.

These Proceedings provide a general overview as well as detailed information on the developing field of reliability and safety of technical processes in automatically controlled processes. The plenary papers present the state-of-the-art and an overview in the areas of aircraft and nuclear power stations, because these safety-critical system domains possess the most highly developed fault management and supervision schemes. Additional plenary papers covered the recent developments in analytical redundancy. In total there are 95 papers presented in these Proceedings.

Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches tackles multivariate challenges in process monitoring by merging the advantages of univariate and traditional multivariate techniques to enhance their performance and widen their practical applicability. The book proceeds with merging the desirable properties of shallow learning approaches – such as a one-class support

vector machine and k-nearest neighbours and unsupervised deep learning approaches – to develop more sophisticated and efficient monitoring techniques. Finally, the developed approaches are applied to monitor many processes, such as waste-water treatment plants, detection of obstacles in driving environments for autonomous robots and vehicles, robot swarm, chemical processes (continuous stirred tank reactor, plug flow rector, and distillation columns), ozone pollution, road traffic congestion, and solar photovoltaic systems. Uses a data-driven based approach to fault detection and attribution Provides an in-depth understanding of fault detection and attribution in complex and multivariate systems Familiarises you with the most suitable data-driven based techniques including multivariate statistical techniques and deep learning-based methods Includes case studies and comparison of different methods

This monograph presents a variety of techniques that can be used for designing robust fault diagnosis schemes for non-linear systems. The introductory part of the book is of a tutorial value and can be perceived as a good starting point for the new-comers to this field. Subsequently, advanced robust observer structures are presented. Parameter estimation based techniques are discussed as well. A particular attention is drawn to experimental design for fault diagnosis. The book also presents a number of robust soft computing approaches utilizing evolutionary algorithms and neural networks. All approaches described in this book are illustrated by practical applications.

There is an increasing demand for dynamic systems to become more safe and reliable.

This requirement extends beyond the normally accepted safety-critical systems of nuclear reactors and aircraft where safety is paramount important, to systems such as autonomous vehicles and fast railways where the system availability is vital. It is clear that fault diagnosis (including fault detection and isolation, FDI) has been becoming an important subject in modern control theory and practice. For example, the number of papers on FDI presented in many control-related conferences has been increasing steadily. The subject of fault detection and isolation continues to mature to an established field of research in control engineering. A large amount of knowledge on model-based fault diagnosis has been ac cumulated through the literature since the beginning of the 1970s. However, publications are scattered over many papers and a few edited books. Up to the end of 1997, there is no any book which presents the subject in an unified framework. The consequence of this is the lack of "common language", dif ferent researchers use different terminology. This problem has obstructed the progress of model-based FDI techniques and has been causing great concern in research community. Many survey papers have been published to tackle this problem. However, a book which presents the materials in a unified format and provides a comprehensive foundation of model-based FDI is urgently needed. The problem of fault diagnosis and reconfigurable control is a new and actually developing field of science and engineering. The subject becomes more interesting since there is an increasing demand for the navigation and control systems of

aerospace vehicles, automated actuators etc. to be more safe and reliable. Nowadays, the problems of fault detection and isolation and reconfigurable control attract the attention the scientists in the world. The subject is emphasized in the recent international congresses such as IF AC World Congresses (San Francisco-1996, Beijing-1999, and Barcelona-2002) and IMEKO World Congresses (Tampere-1997, Osaka-1999, Vienna-2000), and also in the international conferences on fault diagnosis such as SAFEPROCESS Conferences (Hull-1997, Budapest-2000). The presented methods in the book are based on linear and nonlinear dynamic mathematical models of the systems. Technical objects and systems stated by these models are very large, and include various control systems, actuators, sensors, computer systems, communication systems, and mechanical, hydraulic, pneumatic, electrical and electronic devices. The analytical fault diagnosis techniques of these objects have been developed for several decades. Many of those techniques are based on the use of the results of modem control theory. This is natural, because it is known that fault diagnosis process in control systems is considered as a part of general control process. xxii In organization of fault diagnosis of control systems, the use of the concepts and methods of modem control theory including concepts of state space, modeling, controllability, observability, estimation, identification, and filtering is very efficient.

This book presents bond graph model-based fault detection with a focus on hybrid system models. The book addresses model design, simulation, control and model-

based fault diagnosis of multidisciplinary engineering systems. The text beings with a brief survey of the state-of-the-art, then focuses on hybrid systems. The author then uses different bond graph approaches throughout the text and provides case studies. Fault-tolerant control aims at a gradual shutdown response in automated systems when faults occur. It satisfies the industrial demand for enhanced availability and safety, in contrast to traditional reactions to faults, which bring about sudden shutdowns and loss of availability. The book presents effective model-based analysis and design methods for fault diagnosis and fault-tolerant control. Architectural and structural models are used to analyse the propagation of the fault through the process, to test the fault detectability and to find the redundancies in the process that can be used to ensure fault tolerance. It also introduces design methods suitable for diagnostic systems and fault-tolerant controllers for continuous processes that are described by analytical models of discrete-event systems represented by automata. The book is suitable for engineering students, engineers in industry and researchers who wish to get an overview of the variety of approaches to process diagnosis and fault-tolerant control. The authors have extensive teaching experience with graduate and PhD students, as well as with industrial experts. Parts of this book have been used in courses for this audience. The authors give a comprehensive introduction to the main ideas of diagnosis and fault-tolerant control and present some of their most recent research achievements obtained together with their research groups in a close cooperation with

European research projects. The third edition resulted from a major re-structuring and re-writing of the former edition, which has been used for a decade by numerous research groups. New material includes distributed diagnosis of continuous and discrete-event systems, methods for reconfigurability analysis, and extensions of the structural methods towards fault-tolerant control. The bibliographical notes at the end of all chapters have been up-dated. The chapters end with exercises to be used in lectures.

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field. Control and Mechatronics presents concepts of control theory in a way that makes them easily understandable and

practically useful for engineers or students working with control system applications. Focusing more on practical applications than on mathematics, this book avoids typical theorems and proofs and instead uses plain language and useful examples to: Concentrate on control system analysis and design, comparing various techniques Cover estimation, observation, and identification of the objects to be controlled—to ensure accurate system models before production Explore the various aspects of robotics and mechatronics Other volumes in the set: Fundamentals of Industrial Electronics Power Electronics and Motor Drives Industrial Communication Systems Intelligent Systems

Focusing on the most rapidly changing areas of mechatronics, this book discusses signals and system control, mechatronic products, metrology and nanometrology, automatic control & robotics, biomedical engineering, photonics, design manufacturing and testing of MEMS. It is reflected in the list of contributors, including an international group of 302 leading researchers representing 12 countries. The book is intended for use in academic, government and industry R&D departments, as an indispensable reference tool for the years to come. Thid volume can serve a global community as the definitive reference source in Mechatronics. The book comprises carefully selected 93 contributions presented at the 11th International Conference Mechatronics 2015, organized by Faculty of Mechatronics, Warsaw University of Technology, on September 21-23, in Warsaw, Poland.

Einführung in den Aufbau und die Modellbildung mechatronischer Systeme in einheitlicher Form und stellt das Verhalten von mechanischen Bauelementen, elektrischen Antrieben, Maschinen, Sensoren, Aktoren und Mikrorechnern dar. Die zweite Auflage enthält wesentliche Erweiterungen bei der Entwicklungsmethodik, bei mechanischen Komponenten, elektrischen Antrieben, Beispielen von Maschinenmodellen, Sensoren, hydraulischen und pneumatischen Aktoren und fehlertoleranten Systemen. Aufgabensammlungen ergänzen die einzelnen Kapitel. This book constitutes the refereed proceedings of the Second IFIP WG 5.5/SOCOLNET Doctoral Conference on Computing, Electrical and Industrial Systems, DoCEIS 2011, held in Costa de Caparica, Portugal, in February 2011. The 67 revised full papers were carefully selected from numerous submissions. They cover a wide spectrum of topics ranging from collaborative enterprise networks to microelectronics. The papers are organized in topical sections on collaborative networks, service-oriented systems, computational intelligence, robotic systems, Petri nets, sensorial and perceptional systems, sensorial systems and decision, signal processing, fault-tolerant systems, control systems, energy systems, electrical machines, and electronics. Fault-Diagnosis SystemsAn Introduction from Fault Detection to Fault ToleranceSpringer Science & Business Media This book describes the challenges that critical infrastructure systems face, and presents state of the art solutions to address them. How can we design intelligent

systems or intelligent agents that can make appropriate real-time decisions in the management of such large-scale, complex systems? What are the primary challenges for critical infrastructure systems? The book also provides readers with the relevant information to recognize how important infrastructures are, and their role in connection with a society's economy, security and prosperity. It goes on to describe state-of-the-art solutions to address these points, including new methodologies and instrumentation tools (e.g. embedded software and intelligent algorithms) for transforming and optimizing target infrastructures. The book is the most comprehensive resource to date for professionals in both the private and public sectors, while also offering an essential guide for students and researchers in the areas of modeling and analysis of critical infrastructure systems, monitoring, control, risk/impact evaluation, fault diagnosis, fault-tolerant control, and infrastructure dependencies/interdependencies. The importance of the research presented in the book is reflected in the fact that currently, for the first time in human history, more people live in cities than in rural areas, and that, by 2050, roughly 70% of the world's total population is expected to live in cities.

Das Bremsenhandbuch ermöglicht einen tiefen Einblick in den heutigen Stand, die Potentiale und die zukünftige Entwicklung von Kraftfahrzeugbremsanlagen. Mikroelektronik und Mechatronik haben das technische Potential und die Funktionalität von Bremsanlagen enorm gesteigert. Hydraulisch, elektrohydraulisch oder elektromechanisch betätigte Bremsen und die gesamte Bremsanlage mit all ihren Komponenten sind ein unverzichtbarer Teil des heute bereits erreichten bzw. zukünftig noch möglichen Niveaus der Sicherheit, der Fahrerassistenz

und der Unfallvermeidung. Das Bremsenhandbuch behandelt umfassend Grundlagen, Anforderungen, Auslegung, Simulation, Komponenten, Systeme, Betriebsverhalten und Funktionen im modernen Fahrzeug. Es berücksichtigt dabei Personenwagen, Nutzfahrzeuge, Anhänger, Schienenfahrzeuge, geländegängige Rad- und Kettenfahrzeuge, Motor- und Fahrräder sowie Rennfahrzeuge und Flugzeuge. Diese dritte Auflage wurde gründlich überarbeitet, aktualisiert und z.B. durch neue Kapitel zu Bremssystemen von Schienenfahrzeugen, mechatronischen Systemen, mechanischen Bremsen in Industrieanlagen oder Bremsen mit nichtmetallischen Bremsscheiben erheblich erweitert. Einheitliche Formelzeichen wurden für alle Kapitel eingeführt.

This book reviews current design paths for soft sensors, and guides readers in evaluating different choices. The book presents case studies resulting from collaborations between the authors and industrial partners. The solutions presented, some of which are implemented on-line in industrial plants, are designed to cope with a wide range of applications from measuring system backup and what-if analysis through real-time prediction for plant control to sensor diagnosis and validation.

Fault Diagnosis of Dynamic Systems provides readers with a glimpse into the fundamental issues and techniques of fault diagnosis used by Automatic Control (FDI) and Artificial Intelligence (DX) research communities. The book reviews the standard techniques and approaches widely used in both communities. It also contains benchmark examples and case studies that demonstrate how the same problem can be solved using the presented approaches. The book also introduces advanced fault diagnosis approaches that are currently still being researched, including methods for non-linear, hybrid, discrete-event and

software/business systems, as well as, an introduction to prognosis. Fault Diagnosis of Dynamic Systems is valuable source of information for researchers and engineers starting to work on fault diagnosis and willing to have a reference guide on the main concepts and standard approaches on fault diagnosis. Readers with experience on one of the two main communities will also find it useful to learn the fundamental concepts of the other community and the synergies between them. The book is also open to researchers or academics who are already familiar with the standard approaches, since they will find a collection of advanced approaches with more specific and advanced topics or with application to different domains. Finally, engineers and researchers looking for transferable fault diagnosis methods will also find useful insights in the book.

Mass production companies have become obliged to reduce their production costs and sell more products with lower profit margins in order to survive in competitive market conditions. The complexity and automation level of machinery are continuously growing. This development calls for some of the most critical issues that are reliability and dependability of automatic systems. In the future, machines will be monitored remotely, and computer-aided techniques will be employed to detect faults in the future, and also there will be unmanned factories where machines and systems communicate to each other, detect their own faults, and can remotely intercept their faults. The pioneer studies of such systems are fault diagnosis studies. Thus, we hope that this book will contribute to the literature in this regard.

Written by leading experts in the field, this book provides the state-of-the-art in terms of fault tolerant control applicable to civil aircraft. The book consists of five parts and includes online material.

With increasing demands for efficiency and product quality plus progress in the integration of automatic control systems in high-cost mechatronic and safety-critical processes, the field of supervision (or monitoring), fault detection and fault diagnosis plays an important role. The book gives an introduction into advanced methods of fault detection and diagnosis (FDD). After definitions of important terms, it considers the reliability, availability, safety and systems integrity of technical processes. Then fault-detection methods for single signals without models such as limit and trend checking and with harmonic and stochastic models, such as Fourier analysis, correlation and wavelets are treated. This is followed by fault detection with process models using the relationships between signals such as parameter estimation, parity equations, observers and principal component analysis. The treated fault-diagnosis methods include classification methods from Bayes classification to neural networks with decision trees and inference methods from approximate reasoning with fuzzy logic to hybrid fuzzy-neuro systems. Several practical examples for fault detection and diagnosis of DC motor drives, a centrifugal pump, automotive suspension and tire demonstrate applications.

In many industrial applications early detection and diagnosis of abnormal behavior of the plant is of great importance. During the last decades, the complexity of process plants has been drastically increased, which imposes great challenges in development of model-based monitoring approaches and it sometimes becomes unrealistic for modern large-scale processes. The main objective of Adel Haghani Abandan Sari is to study efficient fault diagnosis techniques for complex industrial systems using process historical data and considering the nonlinear behavior of the process. To this end, different methods are presented to solve the fault diagnosis problem based on the overall behavior of the process

and its dynamics. Moreover, a novel technique is proposed for fault isolation and determination of the root-cause of the faults in the system, based on the fault impacts on the process measurements.

This book gives a wide-ranging description of the many facets of complex dynamic networks and systems within an infrastructure provided by integrated control and supervision: envisioning, design, experimental exploration, and implementation. The theoretical contributions and the case studies presented can reach control goals beyond those of stabilization and output regulation or even of adaptive control. Reporting on work of the Control of Complex Systems (COSY) research program, Complex Systems follows from and expands upon an earlier collection: Control of Complex Systems by introducing novel theoretical techniques for hard-to-control networks and systems. The major common feature of all the superficially diverse contributions encompassed by this book is that of spotting and exploiting possible areas of mutual reinforcement between control, computing and communications. These help readers to achieve not only robust stable plant system operation but also properties such as collective adaptivity, integrity and survivability at the same time retaining desired performance quality. Applications in the individual chapters are drawn from: • the general implementation of model-based diagnosis and systems engineering in medical technology, in communication, and in power and airport networks; • the creation of biologically inspired control brains and safety-critical human–machine systems, • process-industrial uses; • biped robots; • large space structures and unmanned aerial vehicles; and • precision servomechanisms and other advanced technologies. Complex Systems provides researchers from engineering, applied mathematics and computer science backgrounds with innovative

theoretical and practical insights into the state-of-the-art of complex networks and systems research. It employs physical implementations and extensive computer simulations. Graduate students specializing in complex-systems research will also learn much from this collection./pp Supervision, condition-monitoring, fault detection, fault diagnosis and fault management play an increasing role for technical processes and vehicles in order to improve reliability, availability, maintenance and lifetime. For safety-related processes fault-tolerant systems with redundancy are required in order to reach comprehensive system integrity. This book is a sequel of the book "Fault-Diagnosis Systems" published in 2006, where the basic methods were described. After a short introduction into fault-detection and fault-diagnosis methods the book shows how these methods can be applied for a selection of 20 real technical components and processes as examples, such as: Electrical drives (DC, AC) Electrical actuators Fluidic actuators (hydraulic, pneumatic) Centrifugal and reciprocating pumps Pipelines (leak detection) Industrial robots Machine tools (main and feed drive, drilling, milling, grinding) Heat exchangers Also realized fault-tolerant systems for electrical drives, actuators and sensors are presented. The book describes why and how the various signal-model-based and process-model-based methods were applied and which experimental results could be achieved. In several cases a combination of different methods was most successful. The book is dedicated to graduate students of electrical, mechanical, chemical engineering and computer science and for engineers.

The book presents selected, extended and peer reviewed papers from the International Multiconference on System, Automation and Control held Leipzig in 2018. These are complemented with solicited contributions by international experts. Main topics are automatic control, robotics, synthesis of automation systems. Application examples range from man-machine interaction, mechatronics, on to biological and economical models.

Condition monitoring, fault diagnosis and prognosis of machinery have received considerable attention and they are important in industry because of the need to increase reliability. This book is suitable for those who want to study feature-based intelligent machine fault diagnosis and prognosis techniques.

Die Mechatronik im Fahrzeug hat heute entscheidenden Einfluss auf die Gestaltung der Radaufhängungen, Bremsen und Lenkungen und die dadurch möglichen aktiven Eingriffe. Regelungen ermöglichen so eine Beeinflussung der Fahrdynamik. Der Entwurf und die Erprobung dieser mechatronischen Systeme erfordert ein modellgestütztes Vorgehen mit verschiedenen Arten der Simulation, modellbasierten Regelungen, Überwachungs- und Diagnosemethoden bis hin zum Test einer automatisierten Fahrzeugführung. Hier gibt das Buch einen detaillierten Überblick. Dabei werden besonders mechatronische Bremssysteme, aktive Radaufhängungen, aktive Stabilisatoren, aktive Lenksysteme, ABS-, ESP- und AFS-Regelungen und Fahrer-Assistenz-Systeme zur Abstandsregelung mit Stop-and-Go, zur Spurführung

und ein Parkassistent betrachtet. Weitere Kapitel behandeln Diagnosesysteme für die Querdynamik-Regelung und aktive Fahrwerke.

Die Wettbewerbsfahigkeit von Industrieunternehmen hangt massgeblich von der Produktivitat der eingesetzten Anlagen und Produktionsprozesse ab. Um ein hohes Mass an Produktivitat zu garantieren, mussen durch Fehler verursachte Standzeiten so kurz wir moglich gehalten werden. Dazu werden effiziente Methoden zur Fehlerdiagnose benotigt. In der vorliegenden Arbeit wurde ein modellbasiertes Diagnose-Verfahren fur ereignisdiskrete Closed-Loop Systeme entwickelt. Die betrachteten Systeme bestehen aus dem geschlossenen Kreis von Steuerung und Prozess. Durch den systematischen Vergleich von aktuell beobachtetem und durch ein Systemmodell erwartetem Verhalten konnen Fehler in Echtzeit erkannt und isoliert werden. In der Arbeit wurden geeignete Modellidentifikationsverfahren fur Ereignisdiskrete Systeme entwickelt, sodass die aufwandige manuelle Modellbildung vermieden wird. Die entwickelten Methoden wurden im Labor und im Rahmen einer Industrieanwendung erfolgreich getestet.