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# Double Inverted Pendulum Model

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Robotics in Natural Settings  
Advances in Partial Differential Equations and  
Control  
2021 IEEE International Conference on  
Mechatronics (ICM)  
Brain, Body and Machine  
Advances in Neural Networks-isnn 2006  
Mechanism and Machine Science  
Trends in Control and Decision-Making for  
Human-Robot Collaboration Systems  
IX Latin American Congress on Biomedical  
Engineering and XXVIII Brazilian Congress on  
Biomedical Engineering  
Modeling, Control and Optimization of Complex  
Systems  
Informatics in Control, Automation and Robotics  
Modelling and Control in Biomedical Systems  
2006  
Dynamics of the Unicycle  
Nonlinear Approaches in Engineering Application  
Intelligent Prognostics for Engineering Systems  
with Machine Learning Techniques  
Climbing and Walking Robots  
Motor Control and Learning  
Recent Advances in Mechanical Engineering  
Advances in Robotics Research  
Modeling, Analysis And Control Of Dynamical

Systems With Friction And Impacts  
The Inverted Pendulum in Control Theory and Robotics  
Communications and Information Processing  
Control Theory for Practical Applications  
AETA 2022—Recent Advances in Electrical Engineering and Related Sciences: Theory and Application  
Nonlinear Approaches in Engineering Applications  
The Reaction Wheel Pendulum  
Mechanical Engineering, Materials and Energy  
Cutting Edge Robotics  
MICAI 2000: Advances in Artificial Intelligence  
Automatic Control with Interactive Tools  
Advanced Control Design with Application to Electromechanical Systems  
Proceedings of International Conference on Advances in Computing  
ICOM 2003 - International Conference on Mechatronics  
Life System Modeling and Intelligent Computing  
AETA 2019 - Recent Advances in Electrical Engineering and Related Sciences: Theory and Application  
Proceedings of the 12th International Conference on Robotics, Vision, Signal Processing and Power Applications  
Mechanics And Mechanical Engineering - Proceedings Of The 2015 International Conference (Mme2015)  
Innovation in Electrical Power Engineering, Communication, and Computing Technology

Soft Computing in Data Analytics  
Proceedings of the 2015 Chinese Intelligent  
Automation Conference  
2021 International Conference on Intelligent  
Technologies (CONIT)

Double  
Inverted  
Pendulum  
Model

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**GAMBLE  
HOBBS**

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**Robotics in  
Natural  
Settings**

Springer  
Nature  
This book  
presents a  
three-  
dimensional  
model of the  
complete  
unicycle-unicy-  
clist system. A  
unicycle with  
a unicyclist on  
it represents a  
very complex  
system. It  
combines  
Mechanics,  
Biomechanics

and Control  
Theory into  
the system,  
and is  
impressive in  
both its  
simplicity and  
improbability.  
Even more  
amazing is the  
fact that most  
unicyclists  
don't know  
that what  
they're doing  
is, according  
to science,  
impossible -  
just like  
bumblebees  
theoretically  
shouldn't be  
able to fly.  
This book is  
devoted to the  
problem of

modeling and  
controlling a  
3D dynamical  
system  
consisting of a  
single-  
wheeled  
vehicle,  
namely a  
unicycle and  
the cyclist  
(unicyclist)  
riding it. The  
equations of  
motion are  
derived with  
the aid of the  
rarely used  
Boltzmann-Ha-  
mel Equations  
in Matrix  
Form, which  
are based on  
quasi-  
velocities. The  
Matrix Form

allows Hamel coefficients to be automatically generated, and eliminates all the difficulties associated with determining these quantities. The equations of motion are solved by means of Wolfram Mathematica. To more faithfully represent the unicyclist as part of the model, the model is extended according to the main principles of biomechanics. The impact of

the pneumatic tire is investigated using the Pacejka Magic Formula model including experimental determination of the stiffness coefficient. The aim of control is to maintain the unicycle-unicyclist system in an unstable equilibrium around a given angular position. The control system, based on LQ Regulator, is applied in Wolfram Mathematica. Lastly, experimental validation, 3D

motion capture using software OptiTrack – Motive:Body and high-speed cameras are employed to test the model’s legitimacy. The description of the unicycle-unicyclist system dynamical model, simulation results, and experimental validation are all presented in detail. [Advances in Partial Differential Equations and Control](#) Springer Nature

This proceedings book features selected papers on 12 themes, including telecommunication, power systems, digital signal processing, robotics, control systems, renewable energy, power electronics, soft computing and more. Covering topics such as optoelectronic oscillator at S-band and C-band for 5G telecommunications, neural networks identification of eleven

types of faults in high voltage transmission lines, cyber-attack mitigation on smart low voltage distribution grids, optimum load of a piezoelectric-based energy harvester, the papers present interesting ideas and state-of-the-art overviews. **2021 IEEE International Conference on Mechatronics (ICM)** Springer Science & Business Media

This book provides an overview of recent research developments in the automation and control of robotic systems that collaborate with humans. A measure of human collaboration being necessary for the optimal operation of any robotic system, the contributors exploit a broad selection of such systems to demonstrate the importance of the subject,

particularly where the environment is prone to uncertainty or complexity. They show how such human strengths as high-level decision-making, flexibility, and dexterity can be combined with robotic precision, and ability to perform task repetitively or in a dangerous environment. The book focuses on quantitative methods and control design for guaranteed robot

performance and balanced human experience from both physical human-robot interaction and social human-robot interaction. Its contributions develop and expand upon material presented at various international conferences. They are organized into three parts covering: one-human-one-robot collaboration; one-human-multiple-robot collaboration; and human-swarm

collaboration. Individual topic areas include resource optimization (human and robotic), safety in collaboration, human trust in robot and decision-making when collaborating with robots, abstraction of swarm systems to make them suitable for human control, modeling and control of internal force interactions for collaborative manipulation, and the sharing of

control between human and automated systems, etc. Control and decision-making algorithms feature prominently in the text, importantly within the context of human factors and the constraints they impose. Applications such as assistive technology, driverless vehicles, cooperative mobile robots, manufacturing robots and swarm robots are considered.

Illustrative figures and tables are provided throughout the book. Researchers and students working in controls, and the interaction of humans and robots will learn new methods for human-robot collaboration from this book and will find the cutting edge of the subject described in depth.

### **Brain, Body and Machine**

Springer  
Science & Business  
Media  
Nonlinear  
Approaches in

Engineering Applications focuses on nonlinear phenomena that are common in the engineering field. The nonlinear approaches described in this book provide a sound theoretical base and practical tools to design and analyze engineering systems with high efficiency and accuracy and with less energy and downtime. Presented here are nonlinear approaches in

areas such as dynamic systems, optimal control and approaches in nonlinear dynamics and acoustics. Coverage encompasses a wide range of applications and fields including mathematical modeling and nonlinear behavior as applied to microresonators, nanotechnologies, nonlinear behavior in soil erosion, nonlinear population dynamics, and optimization in reducing vibration and

noise as well as vibration in triple-walled carbon nanotubes. Advances in Neural Networks-issn 2006 Springer Nature Fifty years ago, A. Turing predicted that by 2000 we would have a machine that could pass the Turing test. Although this may not yet be true, AI has advanced significantly in these 50 years, and at the dawn of the XXI century is still an active and challenging field. This year is also sig

nificant for AI in Mexico, with the merging of the two major AI conferences into the biennial Mexican International Conference on Artificial Intelligence (MICAI) series. MICAI is the union of the Mexican National AI Conference (RNIA) and the International AI Symposium (ISAI), organized annually by the Mexican Society for AI (SMIA, since 1984) and by the Monterrey Institute of Technology (ITESM, since 1988), res



pectively. The first Mexican International Conference on Artificial Intelligence, MICAI 2000, took place April 11-14, 2000, in the city of Acapulco, Mexico. This conference seeks to promote research in AI, and cooperation among Mexican researchers and their peers worldwide. We welcome you all. Over 163 papers from 17 different countries were submitted for consideration to MICAI 2000. After reviewing them

thoroughly, MICAI's program committee, referees, and program chair accepted 60 papers for the international track. This volume contains the written version of the papers and invited talks presented at MICAI. We would like to acknowledge the support of the American Association for Artificial Intelligence (AAAI), and the International Joint Conference on Artificial Intelligence

(IJCAI). We are specially grateful for the warm hospitality and generosity offered by the Acapulco Institute of Technology. **Mechanism and Machine Science** Springer Science & Business Media The scope of the conference include, but not limited to, the following Aerospace Technology Antenna & Microwave Biomedical Engineering Circuits and Systems Machine

Learning, Cloud and Data Analytics Computer Architecture & Systems Devices, Materials & Processing Disasters and Humanitarian Technology Engineering Management Engineering Education Marine and Offshore Engineering Multimedia Engineering Photonics Power & Energy Robotics, Control Systems & Theory Signal and Image Processing Software & Database	Systems Social Implications of Technology Wireless Communicatio ns & Networks <b>Trends in Control and Decision- Making for Human-Robo t Collaboratio n Systems</b> Springer Nature Proceedings of the 2015 Chinese Intelligent Automation Conference presents selected research papers from the CIAC'15, held in Fuzhou, China. The topics include	adaptive control, fuzzy control, neural network based control, knowledge based control, hybrid intelligent control, learning control, evolutionary mechanism based control, multi-sensor integration, failure diagnosis, reconfigurable control, etc. Engineers and researchers from academia, industry and the government can gain valuable insights into interdisciplinary
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y solutions in the field of intelligent automation. *IX Latin American Congress on Biomedical Engineering and XXVIII Brazilian Congress on Biomedical Engineering* Springer Nature  
The German Workshop on Robotics is a convention of roboticists from academia and industry working on mathematical and algorithmic foundations of robotics, on the design and analysis

of robotic systems as well as on robotic applications. Selected contributions from researchers in German-speaking countries as well as from the international robotics community compose this volume. The papers are organized in ten scientific tracks: Kinematic and Dynamic Modeling, Motion Generation, Sensor Integration, Robot Vision, Robot

Programming, Humanoid Robots, Grasping, Medical Robotics, Autonomous Helicopters, and Robot Applications. Due to an extensive review and discussion process, this collection of scientific contributions is of very high caliber and promises to strongly influence future robotic research activities. **Modeling, Control and Optimization of Complex Systems** Springer

Nonlinear Approaches in Engineering Applications: Design Engineering Problems examines the latest applications of nonlinear approaches in engineering and addresses a range of scientific problems. Chapters are authored by world-class scientists and researchers and focus on the application of nonlinear approaches in different disciplines of engineering and scientific applications,

with a strong emphasis on application, physical meaning, and methodologies of the approaches. Topics covered are of high interest in engineering and physics, and an attempt has been made to expose engineers and researchers to a broad range of practical topics and approaches. This book is appropriate for researchers, students, and practicing engineers who are interested in the

applications of engineering, physics, and mathematics in nonlinear approaches to solving engineering and science problems. Informatics in Control, Automation and Robotics Springer Nature This volume presents select papers from the Asian Conference on Mechanism and Machine Science 2018. This conference includes contributions from both academic and industry researchers

and will be of interest to scientists and students working in the field of mechanism and machine science.

**Modelling and Control in Biomedical Systems 2006** Springer Science & Business Media

This book is part I of a two-volume work that contains the refereed proceedings of the International Conference on Life System Modeling and Simulation, LSMS 2010 and the

International Conference on Intelligent Computing for Sustainable Energy and Environment, ICSEE 2010, held in Wuxi, China, in September 2010. The 194 revised full papers presented were carefully reviewed and selected from over 880 submissions and recommended for publication by Springer in two volumes of Lecture Notes in Computer Science (LNCS) and one volume of Lecture Notes

in Bioinformatics (LNBI). This particular volume of Lecture Notes in Computer Science (LNCS) includes 55 papers covering 7 relevant topics. The 55 papers in this volume are organized in topical sections on intelligent modeling, monitoring, and control of complex nonlinear systems; autonomy-oriented computing and intelligent agents; advanced

theory and methodology in fuzzy systems and soft computing; computational intelligence in utilization of clean and renewable energy resources; intelligent modeling, control and supervision for energy saving and pollution reduction; intelligent methods in developing vehicles, engines and equipments; computational methods and intelligence in modeling genetic and biochemical

networks and regulation. *Dynamics of the Unicycle* World Scientific The reader will find here papers on human-robot interaction as well as human safety algorithms; haptic interfaces; innovative instruments and algorithms for the sensing of motion and the identification of brain neoplasms; and, even a paper on a saxophone-playing robot. *Nonlinear Approaches in*

*Engineering Application* John Wiley & Sons This monograph describes the Reaction Wheel Pendulum, the newest inverted-pendulum-like device for control education and research. We discuss the history and background of the reaction wheel pendulum and other similar experimental devices. We develop mathematical models of the reaction wheel pendulum in depth,

including linear and nonlinear models, and models of the sensors and actuators that are used for feedback control. We treat various aspects of the control problem, from linear control of the motor, to stabilization of the pendulum about an equilibrium configuration using linear control, to the nonlinear control problem of swingup control. We also discuss hybrid and switching

control, which is useful for switching between the swingup and balance controllers. We also discuss important practical issues such as friction modeling and friction compensation, quantization of sensor signals, and saturation. This monograph can be used as a supplement for courses in feedback control at the undergraduate level, courses in mechatronics,

or courses in linear and nonlinear state space control at the graduate level. It can also be used as a laboratory manual and as a reference for research in nonlinear control. [Intelligent Prognostics for Engineering Systems with Machine Learning Techniques](#) Springer Nature This book is aimed primarily towards physicists and mechanical engineers

specializing in modeling, analysis, and control of discontinuous systems with friction and impacts. It fills a gap in the existing literature by offering an original contribution to the field of discontinuous mechanical systems based on mathematical and numerical modeling as well as the control of such systems. Each chapter provides the reader with both the theoretical background and results of

verified and useful computations, including solutions of the problems of modeling and application of friction laws in numerical computations, results from finding and analyzing impact solutions, the analysis and control of dynamical systems with discontinuities, etc. The contents offer a smooth correspondence between science and engineering and will allow the reader to discover new

ideas. Also emphasized is the unity of diverse branches of physics and mathematics towards understanding complex piecewise-smooth dynamical systems. Mathematical models presented will be important in numerical experiments, experimental measurements, and optimization problems found in applied mechanics. **Climbing and Walking Robots** Butterworth-



Heinemann  
The present book includes a set of selected papers from the Fifth International Conference on Informatics in Control Automation and Robotics (ICINCO 2008), held in Funchal, Madeira - Portugal, from 11 to 15 May 2008. The conference was organized in three simultaneous tracks: Intelligent Control Systems and Optimization, Robotics and Automation, and Systems

Modeling, Signal Processing and Control. The book is based on the same structure. ICINCO 2008 received 392 paper submissions, from more than 50 different countries in all continents. From these, after a blind review process, only 33 were - cepted as full papers, of which 18 were selected for inclusion in this book, based on the classifications provided by the Program

Committee. The selected papers reflect the interdisciplinary nature of the conference. The diversity of topics is an important feature of this conference, enabling an overall perception of several important scientific and technological trends. These high quality standards will be maintained and reinforced at ICINCO 2009, to be held in Milan, Italy, and in future editions of this conference.

*Motor Control and Learning*  
Springer  
Nature  
This book provides an overall picture of historical and current trends and developments in nonlinear control theory, based on the simple structure and rich nonlinear model of the inverted pendulum.

**Recent Advances in Mechanical Engineering**

Springer  
Nature  
Automatic Control with Interactive Tools is a textbook for undergraduat

e study of automatic control. Providing a clear course structure, and covering concepts taught in engineering degrees, this book is an ideal companion to those studying or teaching automatic control. The authors have used this text successfully to teach their students. By providing unique interactive tools, which have been designed to illustrate the most important

automatic control concepts, Automatic Control with Interactive Tools helps students overcome the potential barriers presented by the significant mathematical content of automatic control courses. Even when they have previously had only the benefit of an introductory control course, the software tools presented will help readers to get to grips with the use of such

techniques as differential equations, linear algebra, and differential geometry. This textbook covers the breadth of automatic control topics, including time responses of dynamic systems, the Nyquist criterion and PID control. It switches smoothly between analytical and practical approaches. *Automatic Control with Interactive Tools* offers a clear introduction to automatic control, ideal for undergraduate students, instructors and anyone wishing to familiarize themselves with the fundamentals of the subject. *Advances in Robotics Research* Springer Science & Business Media This proceedings consists of 162 selected papers presented at the 2nd Annual International Conference on Mechanics and Mechanical Engineering (MME2015), which was successfully held in Chengdu, China between December 25-27, 2015. MME2015 is one of the key international conferences in the fields of mechanics, mechanical engineering. It offers a great opportunity to bring together researchers and scholars around the globe to deliver the latest innovative research and the most recent

developments in the field of Mechanics and Mechanical Engineering. ME2015 received over 400 submissions from about 600 laboratories, colleges and famous institutes. All the submissions have undergone double blind reviewed to assure the quality, reliability and validity of the results presented. These papers are arranged into 6 main chapters

according to their research fields. These are: 1) Applied Mechanics 2) Mechanical Engineering and Manufacturing Technology 3) Material Science and Material Engineering 4) Automation and Control Engineering 5) Electrical Engineering 6) System Modelling and Simulation. This proceedings will be invaluable to academics and professionals interested in Mechanics and Mechanical

Engineering. *Modeling, Analysis And Control Of Dynamical Systems With Friction And Impacts* Springer  
The text discusses the latest data-driven, physics-based, and hybrid approaches employed in each stage of industrial prognostics and reliability estimation. It will be a useful text for senior undergraduate, graduate students, and academic researchers in areas such as industrial and

<p>production engineering, electrical engineering, and computer science. The book Discusses basic as well as advance research in the field of prognostics Explores integration of data collection, fault detection, degradation modeling and reliability prediction in one volume Covers prognostics and health management (PHM) of engineering systems Discusses</p>	<p>latest approaches in the field of prognostics based on machine learning The text deals with tools and techniques used to predict/ extrapolate/ forecast the process behavior, based on current health state assessment and future operating conditions with the help of Machine learning. It will serve as a useful reference text for senior undergraduate, graduate</p>	<p>students, and academic researchers in areas such as industrial and production engineering, manufacturing science, electrical engineering, and computer science. <u>The Inverted Pendulum in Control Theory and Robotics</u> Springer This book reports on the latest research and developments in Biomedical Engineering, with a special emphasis on topics of interest and findings achieved in Latin America.</p>
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This first volume of a 4-volume set covers advances in modeling and simulation of biological and biomedical systems, mechanical characterization, and biological evaluation of biomaterials for medical applications, including tissues regeneration. It also covers some related special topics, such as advanced methodologies

for agricultural and food production and public health management. Throughout the book, a special emphasis is given to low-cost technologies and to their development for and applications in clinical settings. Based on the IX Latin American Conference on Biomedical Engineering (CLAIB 2022) and the XXVIII Brazilian

Congress on Biomedical Engineering (CBEB 2022), held jointly, and virtually on October 24-28, 2022, from Florianópolis, Brazil, this book provides researchers and professionals in the biomedical engineering field with extensive information on new technologies and current challenges for their clinical applications. .