

Honors and Awards

- Outstanding Graduate Student Instructor Award, 2009
University of California, Berkeley
- Best Student Paper Award, 2008
The IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)
- Best Poster Finalist, 2008
The 17th International Federation of Automatic Control (IFAC) World Congress
- Best Student Paper Finalist, 2005
The IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)
- Best Paper Award, 2005
The Division of Dynamics and Control Systems, KSME Spring Conference
- Best Poster Award, 2005
The 3rd CIR (Center of Intelligent Robot) Workshop
- Top Graduation Award, 2004
with Honors in the College of Engineering, Sogang University

Seminar Talks and Invited Lectures

- University of Tsukuba, Japan, 2010
Invited Lecture, Title: Controls and Robotics
- University of California, Berkeley, 2009
Seminar Talk (Robotics and Embedded Systems Seminar)
Title: Mechatronic Considerations for Human Assistive and Rehabilitation Systems
- University of California, Los Angeles, 2009
Seminar Talk, Title: Mechatronics for Assisting Humans
- Korea Advanced Institution of Science and Technology, 2009
Seminar Talk, Title: Mechatronics for Assisting Humans
- Sogang University, 2009
Research Seminar, Title: Computer Aided Controller Design
- NI-Week, 2008
Seminar Talk (Embedded Systems Session)
Title: Mechatronic Technologies for Assisting Humans
- NI-Week, 2007
Demonstration in Keynote Presentation
- US-Japan Workshop on Advanced Integrated Sensor Technologies for Safe and Secure Societies and Better Quality of Life, 2007
Seminar Talk, Title: A Gait Monitoring System Based on Smart Shoes

Professional Memberships and Services

IEEE, Member, 2003 – Present

ASME, Member, 2003 – Present

KSME (Korean Society of Mechanical Engineering), Member, 2004 – Present

ICROS (Institution of Control, Robotics, and Systems), Member, 2004 – Present

Journal Referee

IEEE Transactions on Robotics

IEEE/ASME Transactions on Mechatronics

ASME Journal of Journal of Dynamic Systems, Measurement, and Control

IFAC Journal of Mechatronics

Journal of Systems and Control Engineering

Conference Referee

IEEE International Conference on Robotics and Automation (ICRA)

IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)

ASME Dynamic Systems and Control Conference (DSCC)

American Control Conference (ACC)

Program Committee

Associate Editor of 2010 AIM Conference

Associate Editor of 2011 AIM Conference

Proposal Review Panel

External Reviewer of the Research Grants Council, Hong Kong

Courses Taught

Microprocessor Applications, Spring 2011

Sogang University

Mechanical Engineering Analysis, Spring 2011

Sogang University

Advanced Control Systems I, Fall 2008

Teaching Assistant (Instructor: Professor Masayoshi Tomizuka)

University of California, Berkeley

TA Evaluation 4.9/5.0, Outstanding GSI Award

Advanced Control Systems I, Spring 2005

Teaching Assistant (Instructor: Professor Doyoung Jeon)

Sogang University

Digital Control, Spring 2005

Teaching Assistant (Instructor: Professor Doyoung Jeon)

Sogang University

Automatic Control, Fall 2004

Teaching Assistant (Instructor: Professor Doyoung Jeon)

Sogang University

Research Experiences

I have participated in the following research projects.

Development of Core Technology for Urban Smart Vehicles Based on Open Architecture

Sponsored by Sogang University, 2011 – 2016

PI: Professor Sooyong Park
Participating as a Co-PI

Project Description A smart unmanned vehicle is to be developed in this project.

Development of a Rehabilitation and Health Monitoring System Based on a Body Sensor Network

Sponsored by Sogang University, 2011 – 2012

PI: Professor Kyoungchul Kong

Project Description A health monitoring system will be developed based on sensor-fusion technology. The developed system will be verified by clinical tests and utilized for rehabilitation robots.

Monitoring and Mobility Assistance with Wireless Body Sensor Network and Mechatronic Actuation

Sponsored by National Science Foundation, United States, 2010 – 2011

PI: Professor Masayoshi Tomizuka
Co-PI: Professor Aloysius K. Mok, University of Texas, Austin
Co-PI: Professor Nancy Byl, University of California, San Francisco

Project Description A networked health monitoring system and a lower-extremity rehabilitation system were developed in this project. The devices are monitored and controlled based on a cloud computing system. High-speed wireless network, human body dynamics characterization, and network-based human robot interaction are of main issues in this project.

Smart Shoes and Smart Socks for Abnormal Gait Diagnosis and Assistance

Sponsored by National Science Foundation, United States, 2006 – 2010

PI: Professor Masayoshi Tomizuka
Co-PI: Professor Alison B. Flatau, University of Maryland, College Park
Co-PI: Professor Nancy Byl, University of California, San Francisco
Co-PI: Professor Yoshiyuki Sankai, Tsukuba University

Project Description This research investigated ground contact force (GCF) measurements and their utilization in assistive and rehabilitation systems to help patients with gait disorders. The GCF measurements have been accomplished by utilizing sensors embedded in shoes.

Design and Control of Exoskeletons for Patients and Elderly People

Sponsored by Ministry of Knowledge and Economy, Korea, 2003 – 2006

PI: Professor Doyoung Jeon
Co-PI: Professor Duk Hyun Sung, Samsung Medical Center

Project Description This research had focused on the development of assistive robots for patients and elderly people. Human-interactive control systems, robot system design, and sensing technologies are included in the major topics of this research.

Biopsy Tools for Capsule Endoscopes

Sponsored by Ministry of Knowledge and Economy, Korea, 2003 – 2006

PI: Professor Doyoung Jeon

Project Description In this research, a biopsy module, which is integrated in capsule endoscopes, had been studied. The prototypes were fabricated by MEMS technology.

Design of High Precision Controller for Multi-Purpose Machining Tools

Sponsored by Ministry of Knowledge and Economy, Korea, 2004 – 2006

PI: Professor Doyoung Jeon

Project Description This research has studied on the control of a customized machining tool actuated by a linear motor. Dynamic stiffness enhancement, repetitive error rejection, and automatic gain tuning are included in the major topics of this research.

Control of a Nano-Stage Based on Piezo Actuators

Sponsored by Jiutec. Co., 2004 – 2005

PI: Professor Doyoung Jeon

Project Description Control of a flexure stage actuated by piezo actuators is the main topic. Preview control and model following control have been studied in this research.

Control of a Seat Suspension System Using MR Dampers

Sponsored by Sogang University, 2004 – 2005

PI: Professor Doyoung Jeon

Project Description A seat suspension system has been developed to suppress the vibration of a driver seat in vehicles. The control of a magneto-rheological fluid (MRF) damper is the main approach of this research.

Publications

Journal Articles

1. K. KONG, J. Bae, and M. Tomizuka, "A Compact Rotary Series Elastic Actuator for Knee Joint Assistive System," IEEE/ASME Transactions on Mechatronics, Accepted (available online, pending for paper publication)
2. J. Bae, K. KONG, and M. Tomizuka, "A Mobile Gait Monitoring System for Abnormal Gait Diagnosis and Rehabilitation: A Pilot Study for Parkinson's Disease Patients," ASME Journal of Biomechanical Engineering, Vol. 133 / 041005-1, 2011

3. K. KONG, H. C. Kniep, and M. Tomizuka, "Output Saturation in Electric Motor Systems: Identification and Controller Design," *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 132 / 051002, 2010
4. K. KONG, H. Moon, D. Jeon, and M. Tomizuka, "Control of an Exoskeleton for Realization of Aquatic Therapy Effects," *IEEE/ASME Transactions on Mechatronics*, Vol. 15, No. 2, pp. 191-200, 2010
5. K. KONG and M. Tomizuka, "Control of Exoskeletons Inspired by Fictitious Gain in Human," *IEEE/ASME Transactions on Mechatronics*, Vol. 14, No. 6, pp. 689-698, 2009
6. K. KONG and M. Tomizuka, "A Gait Monitoring System Based on Air Pressure Sensors Embedded in a Shoe," *IEEE/ASME Transactions on Mechatronics*, Vol. 14, No. 3, pp. 358-370, 2009
7. K. KONG, H. Moon, B. Hwang, D. Jeon, and M. Tomizuka, "Impedance Compensation of SUBAR for Back-Drivable Force Mode Actuation," *IEEE Transactions on Robotics*, Vol. 25, No. 3, pp. 512-521, 2009
8. K. KONG, J. Bae, and M. Tomizuka, "Control of Rotary Series Elastic Actuator for Ideal Force Mode Actuation in Human-Robot Interaction Applications," *IEEE/ASME Transactions on Mechatronics*, Vol. 14, No. 1, pp. 105-118, 2009
9. K. KONG and D. Jeon, "Design and Control of an Exoskeleton for the Elderly and Patients," *IEEE/ASME Transactions on Mechatronics*, Vol.11, No.4, pp. 936-942, 2006
10. K. KONG and D. Jeon, "Design and Control of a Novel Tendon-Driven Exoskeletal Power Assistive Device," *Journal of Control, Automation, and Systems Engineering*, Vol.11, No.11, 2005
11. K. KONG and D. Jeon, "Fuzzy Control of the Seat Suspension System Considering the Acceleration of a Driver's Head," *Journal of Control, Automation, and Systems Engineering*, Vol.11, No.7, pp. 572-577, 2005
12. K. KONG, J. Bae, and M. Tomizuka, "A Cable-Driven Human Assistive System and Its Impedance Compensation by Sensor Fusion," *ASME Journal of Dynamic Systems, Measurement, and Control*, under review
13. K. KONG and M. Tomizuka, "Nominal Model Manipulation for Enhancement of Stability Robustness for Disturbance Observer-Based Control Systems," *International Journal of Control, Automation, and Systems*, under review
14. K. KONG and M. Tomizuka, "Design of a Rehabilitation Device Based on a Mechanical Link System," *ASME Journal of Mechanisms and Robotics*, under review
15. C. Y. Lai, K. KONG, C. Xiang, T. H. Lee, and M. Tomizuka, "Identification of Piecewise Affine Systems using Multiple Models and its Experimental Verification," *Control Engineering Practice*, under review

Refereed Conference Proceedings

Design and Control of Human Assistive and Rehabilitation Systems

16. J. Bae, K. KONG, and M. Tomizuka, "Control Algorithms for Prevention of Impacts in Rehabilitation Systems," in *Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, pp. 128-133, 2011
17. K. KONG and M. Tomizuka, "Proxy-based Impedance Control of a Cable-Driven Assistive System for Upper Extremity Rehabilitation," Accepted from the 18th IFAC World Congress, 2011

18. K. KONG and M. Tomizuka, "Realization of Fictitious Gain in Human: Experimental Verification on an Elbow Joint," in Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 439-444, 2009
19. K. KONG, H. Moon, D. Jeon, and M. Tomizuka, "Robotic Rehabilitation Treatments: Realization of Aquatic Therapy Effects in Exoskeleton Systems," in Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), pp. 1923-1928, 2009
20. K. KONG, C. Baek, and M. Tomizuka, "Design of a Rehabilitation Device Based on Mechanical Link System," in Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), pp. 2306-2311, 2009
21. K. KONG and M. Tomizuka, "Control of Exoskeletons Inspired by Fictitious Variable Gain in Human," in Proceedings of the ASME Dynamic Systems and Control Conference (DSCC), No. 2116, 2008
22. K. KONG and D. Jeon, "Fuzzy Control of a New Tendon-Driven Exoskeletal Power Assistive Device," in Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 146-151, 2005 [Best Student Paper Finalist]
23. K. KONG and D. Jeon, "Design and Control of a New Tendon-Driven Exoskeletal Lower Body Power Assistive Device," in Proceedings of the ASME International Mechanical Engineering Congress and Exposition (IMECE), 2005

Sensors, Health Monitoring, and Human Motion Detection

24. E. Chang-Siu, M. Tomizuka, and K. KONG, "Time-Varying Complementary Filtering for Attitude Estimation," Accepted from IEEE/RSJ International Conference on Intelligent Robots and Systems, 2011
25. J. Bae, K. KONG, and M. Tomizuka, "Design of a Mobile Gait Monitoring System," in Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. FrC3, 2010
26. J. Bae, K. KONG, and M. Tomizuka, "Real-time Estimation of Lower Extremity Joint Torques in Normal Gait," in Proceedings of the International IFAC Symposium on Robot Control (SYROCO), pp. 577-582, 2009
27. J. Bae, K. KONG, and M. Tomizuka, "A Mobile Gait Monitoring System for Gait Analysis," in Proceedings of the IEEE International Conference on Rehabilitation Robotics (ICORR), pp. 73-79, 2009
28. K. KONG and M. Tomizuka, "Estimation of Abnormalities in a Human Gait Using Sensor-Embedded Shoes," in Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 1331-1336, 2008
29. K. KONG and M. Tomizuka, "Smooth and Continuous Human Gait Phase Detection Based on Foot Pressure Patterns," in Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), pp. 3678-3683, 2008

Impedance Compensation of Actuators

30. K. KONG, J. Bae, and M. Tomizuka, "A Cable-Driven Human Assistive System and Its Impedance Compensation by Sensor Fusion," in Proceedings of the ASME Dynamic Systems and Control Conference (DSCC), No. 4021, 2010

31. J. Bae, K. KONG, and M. Tomizuka, "Cable Friction Compensation and Rehabilitation Algorithms for a Cable-Driven Human Assistive System," in Proceedings of the ASME Dynamic Systems and Control Conference (DSCC), No. 4022, 2010
32. K. KONG, J. Bae, and M. Tomizuka, "A Compact Rotary Series Elastic Actuator for Knee Joint Assistive System," in Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), pp. 2940-2945, 2010
33. J. Bae, K. KONG, and M. Tomizuka, "Gait Phase-Based Smoothed Sliding Mode Control for a Rotary Series Elastic Actuator Installed on the Knee," in Proceedings of the American Control Conference (ACC), pp. 6030-6035, 2010
34. K. KONG, M. Tomizuka, H. Moon, B. Hwang and D. Jeon, "Mechanical Design and Impedance Compensation of SUBAR (Sogang University's Biomedical Assist Robot)," in Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 377-382, 2008 [Best Student Paper Award]
35. K. KONG, J. Bae and M. Tomizuka, "Impedance Compensation of Flexible Joint Actuator for Ideal Force Mode Control," in Proceedings of the 17th IFAC World Congress, 2008 [Best Poster Finalist]
36. K. KONG, J. Bae and M. Tomizuka, "Biologically Inspired Actuator for Human-Robot Interaction," in Proceedings of the International Symposium on Flexible Automation, pp. 2442-2447, 2008
37. K. KONG and M. Tomizuka, "Flexible Joint Actuator for Patient's Rehabilitation Devices," in Proceedings of the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), pp. 1179-1184, 2007

Dynamic Systems and Control

38. M. Chan, K. KONG, and M. Tomizuka, "Automatic Controller Gain Tuning of a Multiple Joint Robot Based on Modified Extremum Seeking Control," Submitted to the 18th IFAC World Congress, 2011
39. W. Chen, K. KONG, and M. Tomizuka, "Hybrid Adaptive Friction Compensation of Indirect Drive Trains," in Proceedings of the ASME Dynamic Systems and Control Conference (DSCC), No. 2736, 2009
40. K. KONG, H. Kniep, and M. Tomizuka, "Control of Electronically Commutated Motors Considering Input/Output Saturation," in Proceedings of the ASME Dynamic Systems and Control Conference (DSCC), No. 2513, 2009
41. C.-H. Han, K. KONG, and M. Tomizuka, "Sensor-based Controller Tuning of Robot Manipulators by Real-time Optimization," in Proceedings of the International IFAC Symposium on Robot Control (SYROCO), pp. 715-720, 2009
42. K. KONG, K. Inaba and M. Tomizuka, "Real-Time Nonlinear Programming by Amplitude Modulation," in Proceedings of the ASME Dynamic Systems and Control Conference (DSCC), No. 2160, 2008
43. K. KONG and D. Jeon, "A Study on the Control of a Linear Motor System of the Universal Machining Center," in Proceedings of the KSPE (Korean Society of Precision Engineering) Annual Conference, 2005
44. D. Jeon and K. KONG, "Fuzzy Control of a Seat Suspension System with an MR Damper," in Proceedings of the KSME (Korean Society of Mechanical Engineering) Fall Conference, pp. 619-624, 2004 [Best Paper Award]

Micro Medical Devices for Capsule Endoscopes

45. K. KONG, J. Cha, D. Jeon, and D. Cho, "A Rotational Micro Biopsy Device for the Capsule Endoscope," in Proceedings of the IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS), pp. 3057-3061, 2005
46. K. KONG and D. Jeon, "Design of a Biopsy Module for the Capsule Type Endoscope," in Proceedings of the ASME International Mechanical Engineering Congress and Exposition (IMECE), 2005

Non-refereed Conference Proceedings

47. J. Bae , K. KONG, and M. Tomizuka, "A Tele-Gait Monitoring System with an Inertial Measurement Unit and Smart Shoes," in Proceedings of the SPIE Structures/NDE, 2011
48. K. KONG, J. Bae, and M. Tomizuka, "Actuator Design for Human Machine Interaction," in Proceedings of the International Symposium on Application of Biomechanical Control Systems to Precision Engineering, 2010
49. J. Bae , K. KONG, and M. Tomizuka, "Design of a Mobile Gait Monitoring System and Its Experimental Results," in Proceedings of the SPIE Structures/NDE, 2010
50. M. Tomizuka, K. KONG, and J. Bae "Smart Shoes and Smart Socks for Abnormal Gait Diagnosis and Assistance," in Proceedings of the NSF Engineering Research and Innovation Conference, Honolulu, Hawaii, 2009
51. L.M. Castano, J. Bae , K. KONG, M. Tomizuka, and A.B. Flatau, "Fusion of Air Pressure Sensors and Conductive Polymer Sensors for a Multi-Functional Gait Monitoring System," in Proceedings of Asian-Pacific Network of Centers for Research in Smart Structure Technology (ANCRiSST), 2009
52. K. KONG, J. Bae, and M. Tomizuka, "Detection of Abnormalities in a Human Gait Using Smart Shoes," in Proceedings of the SPIE Smart Structures/NDE, 2008
53. K. KONG, "Human Motion Phase Detection Based on Ground Contact Force Measurement," in Proceedings of the US-Japan Workshop on Advanced Integrated Sensor Technologies for Safe and Secure Societies and Better Quality of Life, Japan, 2007
54. K. KONG and D. Jeon, "New Design of Tendon-Driven Exoskeletal Assistive Device," in Proceedings of the KSME (Korean Society of Mechanical Engineering) Spring Conference, 2005
55. K. KONG and D. Jeon, "A Study on the Control of a New Tendon-Driven Exoskeletal Power Assistive Device," in Proceedings of the KSME (Korean Society of Mechanical Engineering) Spring Conference, 2005
56. K. KONG, J. Cha, D. Jeon, and D. Cho, "A Micro Biopsy Device for the Capsule Endoscope," in Proceedings of the KSME (Korean Society of Mechanical Engineering) Spring Conference, pp. 1244-1248, 2005
57. K. KONG, S. Lee, and D. Jeon, "Exoskeleton Systems for Assisting Elderly," in Proceedings of the 3rd CIR (Center of Intelligent Robot) Workshop, 2005
58. T. Jeong, K. KONG, and D. Jeon, "Hardware Development of Exoskeleton Systems," in Proceedings of the 2nd CIR (Center of Intelligent Robot) Workshop, 2004
59. K. KONG, G. Lee, and D. Jeon, "Fuzzy Control of a Seat Suspension System with an MR Damper," in Proceedings of the 9th International Conference of ER and MR Fluids, 2004

Patents

60. K. KONG, J. Bae, and M. Tomizuka, "Smart Shoes for Abnormal Gait Diagnosis and Assistance," USA Patent Pending
61. K. KONG and D. Jeon, "A Walking Aid for Patients' Power Augmentation and its Control Method," Patent No: 10-0612031, Korea, 2006
62. K. KONG and D. Jeon, "A Rotational Biopsy Device for Capsule Endoscopes," Patent No: 10-0649543, Korea, 2006
63. K. KONG, H. Seo, and D. Jeon, "An Intelligent Human-Power Assistive Robot," Patent No: 10-0651637, Korea, 2006
64. K. KONG, H. Seo, and D. Jeon, "A Thigh Muscle Sensor for Human-Power Assistive Devices," Patent No: 10-0651638, Korea, 2006
65. K. KONG, H. Seo, and D. Jeon, "A Foot Pressure Sensor for Human-Power Assistive Devices," Patent No: 10-0651639, Korea, 2006

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