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Research Interests

Robotics: Medical Robotics, Haptics, Teleoperation, Design of Mechatronic Systems

Human-Machine Interfaces / Virtual Environments: Surgical Simulation, Haptic Interfacing to Virtual Environments, Physical Modeling for Simulation in Virtual Environments

Systems and Control: Modeling and Simulation of Complex Biological Systems

Education

Ph.D. 1997-2000, **University of California, Berkeley**, Electrical Engineering and Computer Sciences

Thesis: “Telesurgery and Surgical Simulation: Design, Modeling, and Evaluation of Haptic Interfaces to Real and Virtual Surgical Environments”

Advisor: S. Shankar Sastry, Frank Tendick (co-advisor)

Dissertation Committee: S. Shankar Sastry (chair), Frank Tendick, Brian Barsky, Andrew Packard

M.S. 1995-1997, **University of California, Berkeley**, Electrical Engineering and Computer Sciences

Title: “Control of a Telesurgical Workstation”

Advisor: S. Shankar Sastry

B.S. 1991-1995, **Middle East Technical University, Ankara, Turkey**, Electrical and Electronic Engineering

Professional Experience

August 2002-Present Assistant Professor (Tenure-track)
Electrical Engineering and Computer Science
Case Western Reserve University, Cleveland, OH

December 2000-August 2002 Research Specialist
Electrical Engineering and Computer Sciences
University of California, Berkeley

January 2001-May 2001 Lecturer
Electrical Engineering and Computer Sciences
University of California, Berkeley

August 2000-December 2000 Visiting Postdoctoral Researcher
Electrical Engineering and Computer Sciences
University of California, Berkeley

May 1996-August 2000 Research Assistant
Electrical Engineering and Computer Sciences
University of California, Berkeley

Summer 1998 Visiting Scholar
SHARP group, INRIA Rhône-Alpes Research Center, France

Honors and Awards

- 2006 Elevated to the grade of Senior Member of the Institute of Electrical and Electronic Engineers (Nominated by the IEEE Engineering in Medicine and Biology Society)
- 2005 Finalist for the **best paper award** at the 12th International Conference on Advanced Robotics (ICAR 2005)
- 2000 Joseph H. Engelberger **best paper award** at the 4th Biannual World Automation Congress (WAC 2000).
- 1995 Ranked second in the university and first in the School of Engineering and the Department of Electrical and Electronic Engineering graduating class of 1995, Middle East Technical University (METU).
- 1991-1995 Bülent Kerim Altay Award for excellent academic achievement in the Department of Electrical and Electronic Engineering, METU
- 1991-1995 Undergraduate fellowship from Turkish Scientific and Technical Research Council (TÜBİTAK)
- 1991-1995 Undergraduate fellowship from Hacı Ömer Sabancı Foundation (VAKSA)
- 1991 Ranked 11th in the nation among over 1 million students in the Turkish national university entrance examination (ÖYS-1991)

Professional Memberships

- Institute of Electrical and Electronic Engineers (IEEE) – Senior Member
- IEEE Robotics and Automation Society (RAS)
- IEEE Engineering in Medicine and Biology Society (EMBS)

Research Grant and Contract Support

Current

- 09/2003-09/2007 “SENSORS: Intelligent Micro-Sensor Array and Signal Processing for In Vivo Real-Time Study of Biological System Dynamics”
NSF CISE EIA-0329811
Total Amount: \$675,000
Percentage: 15% (co-PI)
- 09/2004-09/2007 “Medical Robotics and Human-Machine Interfacing Research at the Case Western Reserve University”
NSF CISE CNS-0423253
Total Amount: \$159,945
Percentage: 50% (PI)
- 10/2004-09/2007 “Deployment and Evaluation of Networked Surgical Simulations”
U.S. Dept. of Commerce NTIA, TOP-39-60-04003
Total Amount: \$898,767 (\$440,000 federal funding + \$458,767 cost share)
Percentage: 40% (co-PI)
- 06/2005-05/2010 “CNS Plasticity Induced by Motor Learning Technologies Following Stroke”
Veterans Administration (VA)
Total (Subaward) Amount: \$109,000 (Multi-institution total: \$3,285,817)
Percent (of Multi-Institutional Total): 15% (co-I)
- 06/2006-09/2007 “REU: Medical Robotics and Human-Machine Interfacing Research at the Case Western Reserve University”
NSF CISE CNS-0626003
Total Amount: \$12,000
Percentage: 100% (PI)
- 11/2006-12/2007 “Virtual Reality as a Training Tool for Endoscopic Neurosurgical Procedures”
Rainbow Foundation
Total Amount: \$20,000
Percentage: 50% (co-PI)
- 09/2006-08/2009 “CRI: Infrastructure for Managing and Analyzing Large Scale Biological Data via Utility Computing”
NSF
Total Amount: \$313,000
Percent: 10% (Senior Personnel)
- 06/2007-09/2007 “REU: Medical Robotics and Human-Machine Interfacing Research at the Case Western Reserve University”
NSF CISE CNS-0732568
Total Amount: \$12,000
Percentage: 100% (PI)

Pending

05/2008-04/2013 “Development of Robotic Tools for Off-Pump Coronary Artery Bypass Graft Surgery”
NIH
Total Amount: \$3,734,212
Percent: 75% (PI)

Completed

09/2003-08/2005 “Core Development, Integration and Demonstration of the DARPA Virtual Soldier”
DARPA
Total (Subaward) Amount: \$18,600 (Multi-institution total: \$1,500,000)
Percentage: 1% (Consultant)

07/2004-12/2005 “Virtual Reality as a Training Tool for Endoscopic Neurosurgical Procedures”
Rainbow Foundation
Total Amount: \$20,000
Percentage: 50% (co-PI)

09/2002-09/2006 “Intelligent Robotic Tools and Telepresence Environment for Off-Pump (Beating Heart) Coronary Artery Bypass Graft Surgery”
NSF CISE IIS-0222743
Total (Subaward) Amount: \$190,755 (Multi-institution total: \$324,567)
Percentage (of Multi-Institutional Total): 50% (PI of Subaward)

Teaching Activities

Assistant Professor, EECS Department, Case Western Reserve University (CWRU)

- Spring 2007 **Computer Graphics (EECS366/466)** a graduate/undergraduate (dual code) course on introductory computer graphics (Enrollment: 18, Contact Hours: 54, TA: 0.5 FTE, Graduate Level Course Evaluation: 17%E, 0%VG, 33%G, 33%F, 0%P, Graduate Level Instructor Evaluation: 17%E, 17%VG, 17%G, 33%F, 0%P; Undergraduate Level Course Evaluation: 0%E, 38%VG, 13%G, 13%F, 38%P, Undergraduate Level Instructor Evaluation: 0%E, 25%VG, 25%G, 38%F, 13%P)
- Spring 2007 **Introduction to Computer Game Design (EECS290)** [Co-instructor: 25% effort] a freshman/sophomore undergraduate course on introduction to computer game design and implementation (Enrollment: 35, Contact Hours: 26 (out of a total of 105), TA: 1, Course Evaluation: 12%E, 47%VG, 29%G, 12%F, 0%P, Instructor Evaluation: 12%E, 12%VG, 53%G, 12%F, 6%P)
- Fall 2006 **Signals and Systems (EECS246)** a junior-level undergraduate course on fundamentals of signals and systems required for Electrical Engineering and Systems Engineering majors (Enrollment: 34, Contact Hours: 136, TA: 1 FTE, Course Evaluation: 9%E, 9%VG, 35%G, 26%F, 17%P Instructor Evaluation: 9%E, 17%VG, 39%G, 26%F, 4%P)
- Fall 2006 **Robotics I (EECS489/EMAE489)**, a graduate level course on robotics (Enrollment:5, Contact Hours:15, TA: 0, Course Evaluation: 25%E, 50%VG, 25%G, 0%F, 0%P, Instructor Evaluation: 75% E, 25% VG, 0%G, 0%F, 0%P)
- Spring 2006 **Computer Graphics (EECS366/466)** a graduate/undergraduate (dual code) course on introductory computer graphics (Enrollment: 32, Contact Hours: 96, TA: 1, Course Evaluation: 33%E, 47%VG, 20%G, 0%F, 0%P, Instructor Evaluation: 67%E, 20%VG, 13%G, 0%F, 0%P)
- Spring 2006 **Introduction to Computer Game Design (EECS290)** [Co-instructor: 30% effort] a freshman/sophomore undergraduate course on introduction to computer game design and implementation (Enrollment: 76, Contact Hours: 76 (out of a total of 228), TA: 2, Course Evaluation: 21%E, 38%VG, 24%G, 18%F, 0%P, Instructor Evaluation: N/A – not primary instructor)
- Fall 2005 **Signals and Systems (EECS246)** a junior-level undergraduate course on fundamentals of signals and systems required for Electrical Engineering and Systems Engineering majors (Enrollment: 41, Contact Hours: 164, TA: 1.5, Course Evaluation: 11%E, 22%VG, 28%G, 39%F, 0%P Instructor Evaluation: 11%E, 22%VG, 44%G, 22%F, 0%P)
- Fall 2005 **Robotics I (EECS489/EMAE489)**, a graduate level course on robotics (Enrollment: 12, Contact Hours: 36, TA: 0, Course Evaluation: 20%E, 40%VG, 20%G, 20%F, Instructor Evaluation: 20% E, 20% VG, 40%G, 20%F)
- Fall 2005 **Advanced Game Development Project (EECS396L)** [Co-instructor: 15% effort] a senior level undergraduate project course on production (including design and implementation) of computer games taught in conjunction with the Cleveland Institute of Art Technology Integrated Media Environment and Communication Design Departments (**INM3IX-4IX-5IX Game Production Seminar**) (CASE Only Enrollment: 29, Contact Hours: 29 (out of a total of 87), TA: 1, Course Evaluation: 57%E, 29%VG, 14%G, 0%F, 0%P, Instructor Evaluation: N/A – not primary instructor)

- Spring 2005 **Computer Graphics (EECS366/466)** a graduate/undergraduate (dual code) course on introductory computer graphics (Enrollment: 30, Contact Hours: 90, TA: 1 FTE, Course Evaluation: 15%E, 35%VG, 20%G, 25%F, 5%P, Instructor Evaluation: 15%E, 30%VG, 35%G, 15%F, 5%P)
- Fall 2004 **Robotics I (EECS489/EMAE489)**, a graduate level course on robotics (Enrollment: 7, Contact Hours: 21, TA: 0, Course Evaluation: 50%VG, 33%G, 17%F, Instructor Evaluation: 17% E, 50% VG, 33%G)
- Spring 2004 **Computer Graphics (EECS366/466)**, a graduate/undergraduate (dual code) course on introductory computer graphics (Enrollment: 53, Contact Hours: 159, TA: 1.5, Course Evaluation: 5%E, 38%VG, 38%G, 16%F, 3%P, Instructor Evaluation: 16%E, 35%VG, 32%G, 16%F)
- Fall 2003 **Robotics I (EECS489/EMAE489)**, a graduate level course on robotics (Enrollment: 17, Contact Hours: 51, TA: 0, Course Evaluation: 36%E, 55%G, 9%F, Instructor Evaluation: 36%E, 64%G)
- Spring 2003 **3-D Computer Graphics for Simulation (EECS396/600)**, a graduate/undergraduate (dual code) course on 3-D computer graphics, with emphasis on physical modeling and simulation (Enrollment: 20, Contact Hours: 60, TA:1, Graduate Level Course Evaluation: 17%E, 50%VG, 33%G, Graduate Level Instructor Evaluation: 50%E, 17%VG, 33%G, Undergraduate Level Course Evaluation: 20%E, 20%VG, 40%G, 20%F Undergraduate Level Instructor Evaluation: 20%E, 20%VG, 60%G)
- Fall 2002 **Computer Assisted Surgical Systems: Medical Robotics and Surgical Simulation (EECS 600)**, a special topics course on medical robotics and surgical simulation for graduate students

Note: Course and instructor evaluation scores at CWRU are based on a scale: E: Excellent, VG: Very Good, G: Good, F: Fair, P: Poor.

Lecturer, EECS Department, University of California, Berkeley

- Spring 2001 **Introduction to Robotics (EE/BioE 125)**, an introductory course on robotics taken by upper-division undergraduate and graduate students (Enrollment: 17, Course Evaluation: 5.3/7, Instructor Evaluation: 5.0/7)

Graduate Student Instructor, EECS Department, University of California, Berkeley

- Fall 1995, **Introduction to Electrical Engineering (EECS 1)**
 Spring 1996 Instructor: Richard White, (Enrollment: 100)
- Spring 1997, **Introduction to Robotics (EE125)**
 Fall 1997, Instructor: Frank Tendick, (Enrollment: 25)
 Fall 1998

Student Supervising Activities

Postdoctoral Students

Sangeun Choi (2003-2004, 2005)

Ph.D. Students

Ozkan Bebek (In progress, Ph.D. candidate, expected: Fall 2007)

Suriya Natsupakpong (In progress, Ph.D. candidate)

Michael Fu (In progress, Ph.D. candidate)

Emine Zeynep Erson (In progress, Ph.D. candidate)

M.S. Students

Nathan Wedge (August 2004)

Jason Rotella (August 2004)

Michael Fu (November 2005)

Venkata Kode (November 2005)

Paul Jacobs (October 2006)

Christian Miller (July 2007)

Nathan Brown (In progress, expected: Fall 2007)

Jonathan Hearn (In progress, expected: Fall 2007)

Brandon Evans (In progress, expected: Spring 2008)

Steven Buchi (In progress, expected: Spring 2008)

Mark Renfrew (In progress, expected: Spring 2008)

Research Experience for Undergraduates

Jason Rotella (Spring 2003, Summer 2003)

Paul Jacobs (Summer 2003, Fall 2003, Spring 2004, Summer 2004)

Christian Miller (Summer 2004)

Svend Johannsen (Fall 2004, Spring 2005, Summer 2005)

Christopher Shoemaker (Spring 2005, Fall 2005, Spring 2006, Summer 2006, Fall 2006, Spring 2007)

David Prabhu (Spring 2006, Summer 2006, Fall 2006, Spring 2007)

Tim Franke (Spring 2006, Summer 2006, Fall 2006, Spring 2007, Summer 2007)

John Pao (Summer 2006, Fall 2006)

Rik Ganguly (Summer 2006)

Andrew Hershberger (Fall 2006, Spring 2007, Summer 2007)

Robin Hu (Summer 2007)

Senior Projects

Dan Meismer, Mark Renfrew (Spring 2004)

Rocco Parro, Ran Ari-Gur, Chase Peers (Fall 2004)

Jonathan Hearn, Robert Kofsky (Spring 2005)

Mark Bell (Summer 2005)

Hyung J. Kim (Summer 2005)

Di Xiao, Noah Berland, Mariam Nawawi, Yunni Hairuddin (Fall 2005)

Nasrulridza Yusuf, Mohd Zariff Amin Abu Bakar (Fall 2006)

Mike Monkiewicz, Drew Wallet (Fall 2006)

Visiting International Students

Keehoon Kim (Ph.D. student from Pohang University of Science and Technology (POSTECH), South Korea, 2003-2004)

Svend Johannsen (B.S./M.S. student from Danmarks Tekniske Universitet (Technical University of Denmark), Copenhagen, Denmark, 2004-2005)

Awards to Student Advisees

- 2007 Zeynep Erson, Case Western Reserve University, 2007 Research ShowCASE Outstanding Graduate Student Poster Winner
- 2005 Ozkan Bebek, Jason Rotella, Case Western Reserve University, 2005 Research ShowCASE Outstanding Graduate Student Poster Winner
- 2005 Jonathan Hearn, Robert Kofsky, Second Place in Philips Best Capstone Project Competition in Computer Engineering, EECS Department, Case Western Reserve University
- 2004 Dan Meismer, Mark Renfrew, Winner of Philips Best Senior Project Competition in Computer Engineering, EECS Department, Case Western Reserve University

Professional Service Activities

- 2005-2008 **Associate Editor** for the **IEEE Transactions on Robotics** (term: September 1, 2005-August 31, 2008)
- 2007 Publicity committee member for the IEEE/IRJ International Conference on Intelligent Robots and Systems (*IROS 2007*)
- 2007 Program committee member for the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (*AIM 2007*)
- 2007 Program committee member for the Robotics Science and Systems Conference (*RSS 2007*)
- 2007 Program committee member for International Symposium on Innovations in Intelligent Systems and Applications (*INISTA 2007*)
- 2007 Reviewer / panel member in (program name confidential), National Science Foundation (NSF)
- 2006 Member, “Interoperability Standards for Medical Modeling and Simulation” panel in MMVR 2006 Conference, organized by Telemedicine and Advanced Technology Research Center (TATRC), U.S. Army Medical Research & Materiel Command
- 2006 Program committee member for the special track on Medical Simulation at the 2006 IEEE International Symposium on Computer-Based Medical Systems (*CBMS 2006*)
- 2006 Program committee member for the IEEE/IRJ International Conference on Intelligent Robots and Systems (*IROS 2006*)
- 2006 External Reviewer for proposals submitted to the US Army Medical Research and Materiel Command (USAMRMC)
- 2006 **Session Chair** at the IEEE 2006 International Conference of the Engineering in Medicine and Biology Society (*EMBC 2006*)
- 2005 Member, “Interoperability Standards for Medical Modeling and Simulation” panel in MMVR 2005 Conference, organized by Telemedicine and Advanced Technology Research Center (TATRC), U.S. Army Medical Research & Materiel Command
- 2005 Organizing committee and program committee member for International Symposium on Innovations in Intelligent Systems and Applications (*ASYU-INISTA 2005*)
- 2005 External Reviewer for the Natural Sciences and Engineering Research Council (NSERC) of **Canada**
- 2004 Reviewer / panel member in (program name confidential), National Science Foundation (NSF)
- 2004 Program committee member for the IEEE/IRJ International Conference on Intelligent Robots and Systems (*IROS 2004*)
- 2004 Member, DARPA Integrated Research Team on “Medical Robotics: Next Steps”
- 2003 Reviewer / panel member in Special Emphasis Panel ZRG1 SSS-H(91)S, Center for Scientific Review, National Institute of Health (NIH)
- 2002 Program committee member, Turkish Automatic Control Conference (*TOK'02*)

Ongoing Service Activities:

Reviewer for the *IEEE Transactions on Robotics* (and former *IEEE Transactions on Robotics and Automation*), *Int'l. Journal of Robotics Research*, *Int'l. Journal of Robotics and Automation*, *Advanced Robotics*, *Haptics-e*, *Journal of Systems and Software*, *IEEE Transactions on Biomedical Engineering*, *IEEE Engineering in Medicine and Biology Magazine*, and various conferences.

Number of conference presentations and invited talks (*Please see the attached list of publications*).

University and Department Committee and Administrative Services

2007-current	Case School of Engineering Research Committee Member
2005-current	Computer Engineering Program Undergraduate Advisor
2005-current	University Undergraduate Faculty (UUF) Academic Computing Committee Member
2004-current	ECE Division Curriculum Committee member of the Electrical Engineering and Computer Science Department
2004-current	Mt. Sinai Skills and Simulation Center (Case Western Reserve University, School of Medicine) Working Group Member
2003-current	Electrical Engineering Program Undergraduate Advisor
2007	Electrical Engineering Program PhD Qualifying Exam Committee (May)
2007	Electrical Engineering Program PhD Qualifying Exam Committee (January)
2006	Chair, Electrical Engineering Program PhD Qualifying Exam Committee (May)
2006	Electrical Engineering Program PhD Qualifying Exam Committee (January)
2005-2006	Mt. Sinai Skills and Simulation Center (Case Western Reserve University, School of Medicine) Information Technology Subcommittee Member
2005	Electrical Engineering Program PhD Qualifying Exam Committee
2004-2005	EECS Department Freshmen Advisor
2003-2004	EECS Department Freshmen Advisor
2003	Electrical Engineering Program PhD Qualifying Exam Committee

Dissertation and Exam Committee Service

2007	PhD Dissertation Committee Member for George Takla
2007	PhD Dissertation Committee Member for Atikan Teber
2007	PhD Dissertation Committee Member for Farhad Khaffashi
2007	MS Thesis Committee Member for Yiming Huang
2007	MS Thesis Committee Member for Robert Hryniewicz
2006	MS Thesis Committee Member for Isaac Hirt
2006	MS Thesis Committee Member for David Pawlowski
2006	MS Thesis Committee Member for Keith Bourgoïn
2006	MS (Plan B) Committee Member for Dmitriy Goldman
2006	PhD Dissertation Committee Member for Jianfeng Wei
2006	PhD Oral Qualifying Exam Committee Chair for Michael Fu
2006	PhD Oral Qualifying Exam Committee Member for Nathan Wedge
2005	MS Thesis Committee Member for Donald Santos
2005	MS Thesis Committee Member for Adam Covitch
2005	MS Thesis Committee Member for Nathan Diederich
2005	MS (Plan B) Committee Member for Rick Hudson
2005	PhD Dissertation Committee Member for Siddharth Chhatpar
2005	PhD Dissertation Committee Member for Bo Yang
2005	PhD Dissertation Committee Member for Simon Melikian
2004	MS Thesis Committee Member for Joshua Aaron Levine
2004	MS Thesis Committee Member for Ahmad T. Al-Hammouri
2004	MS Thesis Committee Member for Stuart B. Morgan
2004	PhD Oral Qualifying Exam Committee Member for Wen-Teng Chang
2003	PhD Dissertation Committee Member for Ravi Hebbar
2003	PhD Dissertation Committee Member for Xianqing Huang
2003	PhD Oral Qualifying Exam Committee Member for Glenn Emelko
2003	PhD Oral Qualifying Exam Committee Member for Rick Hudson