

**Cumulative Bio-Bibliography**  
**Jacob Rosen, Professor**  
**Department of Mechanical & Aerospace Engineering (Primary Appointment)**  
**Department of Surgery (Joint Appointment)**  
**Department of Bioengineering (Joint Appointment)**  
**University of California, Los Angeles, CA**

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**EMPLOYMENT HISTORY (Academia)**

2014 – Current	<b>Professor</b> <b>Graduate Research Field Chair:</b> Design Robotic and Manufacturing (Since 2016) Department of Mechanical & Aerospace Engineering School of Engineering, University of California Los Angeles, CA, USA  <b>Director of Surgical Robotics Engineering / Executive Member</b> Center for Advanced Surgical and Interventional Technology (CASIT) School of Medicine, University of California Los Angeles, CA, USA  <b>Professor (Joint Appointment)</b> Department of Surgery Department of Surgery, Division of General Surgery School of Medicine, University of California Los Angeles, CA, USA
2015 – Current	<b>Professor (Joint Appointment)</b> Department of Bioengineering School of Engineering, University of California Los Angeles, CA, USA
2012 – 2014	<b>Professor</b> Department of Computer Engineering School of Engineering, University of California, Santa Cruz, CA, USA
2008 – 2012	<b>Associate Professor</b> Department of Computer Engineering School of Engineering, University of California, Santa Cruz, CA, USA
2008 – 2012	<b>Affiliated Associate Professor</b> Department of Electrical Engineering University of Washington, Seattle WA, USA
2006 - 2008	<b>Research Associate Professor</b> Department of Electrical Engineering <b>Adjunct Positions with the Department of Surgery and the Department of Mechanical Engineering</b> University of Washington, Seattle WA, USA
2005 - 2008	<b>Co-Director of Research</b> <b>Institute for Surgical and Interventional Simulation</b> <b>School of Medicine</b> University of Washington, Seattle WA, USA
2000 – 2006	<b>Research Assistant Professor</b> Department of Electrical Engineering <b>Adjunct Positions with the Department of Surgery (Since 2002) and the Department of Mechanical Engineering (Since 2005)</b> University of Washington, Seattle WA, USA

- 1997 – 2000     **Research Associate (Post- Doc)**  
BioRobotics Laboratory  
Department of Electrical Engineering, and Department of Bioengineering  
University of Washington, Seattle WA, USA
- Project: Biomechanics/Biorobotics of Minimally Invasive Surgery (MIS)
- 1993 – 1997     **Research Assistant**  
Biomechanics Laboratory, Department of Biomedical Engineering  
Faculty of Engineering, Tel-Aviv University, Israel  
Exoskeleton Project (Leading Research Engineer)
- Developing a 3 DOF Exoskeleton (robotic arm) controlled by neural signal (electromyography - EMG Signals)
  - Research fields: Human Body Modeling, Musculoskeletal Modeling, EMG Analysis, Real-Time Discrete Servo Control, Finite Element Analysis, Orthopedic Implants Design, Contact Mechanics.
- 1994 – 1995     **Teaching Assistant**  
Department of Biomedical Engineering,  
Faculty of Engineering, Tel-Aviv University, Israel  
Courses: Engineering Principles of Biological Systems, Biomechanics, Measurements in Biomechanics, Biomaterials.

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#### **EMPLOYMENT HISTORY (Industry)**

- 2021 – Present    **Horizon Surgical - Cofounder**
- 2013 – Present    **Applied Dexterity Robotics LLC - Cofounder**
- 2012 – Present    **ExoSense Inc. Cofounder**
- 2010 – Present    **SPI Inc. Cofounder**
- 2020 – Present    **Cyberdonics Inc.**  
Board Member and Consultant
- 2018 - 2019     **Taron Malkhashyan (Plaintiff) vs. Los Angels School District (Defendants)** - Work with Vanderford & Ruiz LLP (Shakira L. Ferguson, Esq.) and serve as an expert consultant in a personal injury case during a robotic competition in a chargeable butterfly exploded and created a personal injury to the Plaintiff.  
Case No. BC658007 Superior Court of the Sate of CA, County of Los Angeles, Central District  
**Status – Completed**
- 2018             **Citi Bank** – Surgical Robotics Round Table – Q&A with Investors  
**Status – Completed**
- 2018             **Eleanor Stambaugh (Plaintiff) vs. Intuitive Surgical Inc. and Charleston Area Medical Center (Defendants)** - Work with Moore & Biser PLLC (Tonya P. Shuler, Esq.) representing Charleston Area Medical Center – Malpractice case  
Civil Action No. 15-C-1846 Circuit Court of Kanawha County, West Virginia  
**Status – Completed**

- 2018            **Citi Bank** – Surgical Robotics Round Table – Q&A with Investors  
**Status – Completed**
- 2017            **McKinsey & Company, Inc.** - Overview of the Automation in Medical Robotics – Challenges & Opportunities  
**Status – Completed**
- 2017            **DuPont** – Advanced materials for Medical Robotics  
**Status – Completed**
- 2016            **PureTech Ventures, Boston, MA** - Surgical Robotics – Academic/Market Trends  
**Status – Completed**
- 2015            **Surveyor Capital** - Surgical Robotics – Market Trends  
**Status – Completed**
- 2015            **Tactile Feedback Technology vs. LLC v. Samsung & ZTE** - Working with Warner Narcross & Judd representing Tactile Feedback Technology – Consulting on Haptics, actuation, and mechanical engineering.  
• Tactile Feedback Technology, LLC v. Samsung Electronics America, Inc. (E.D. Texas, Case No. 2:14-cv-940);  
• Tactile Feedback Technology, LLC v. ZTE (USA) Inc. (E.D. Texas, Case No. 2:14-cv-943)  
**Status – Completed**
- 2015            **Turiya Capital Management** – Lower Limb Exoskeleton - Technology & Market Analysis.  
**Status – Completed**
- 2014            **Covidien** - Surgical robotics system development - advisory board  
**Status – Completed**
- 2014            **Donald Gates vs. Sutter General Hospital & Intuitive Surgical – Malpractice** – Working with Wilke Fleueury Hoffelt, Gould & Birney LLP (Consoler Ronald Lamb) as an expert witness in a malpractice case (prostatectomy) involving a surgical robotic system.  
• Donald Gates Plaintiff vs. Sutter General Hospital & Intuitive Surgical Defendants, Superior Court for the State of California – County of Sacramento – Case No. 34-2011-00103436  
**Status – Completed**
- 2012            **McKinsey & Company, Inc.** - Overview of the surgical robotics field, and IP landscape analysis (two cases)  
**Status – Completed**
- 2012            **Immersion versus HTC & Motorola - IP Infringement** – Working with Morrison & Forster (Palo Alto) representing Immersion – Consulting on Haptics, actuation, and mechanical engineering.  
• Immersion Corporation vs. Motorola Mobility, Inc., Motorola Mobility Holdings, Inc., HTC Corporation, HTC America Holding, Inc., HTC America, Inc., HTC (B.V.I.) Corporation U.S. International Trade Commission - Investigation No. 337-TA-834  
• Immersion Corporation Plaintiff, Plaintiff, vs. Motorola Mobility Holding, Defendant. The United States District Court for the District of Delaware Case:1:12-cv-00148-RGA  
• Immersion Corporation Plaintiff v. HTC Corporation et al Delaware District Court, Case No. 1:12-cv-00259  
**Status – Completed**
- 2008            **Ridgetop Research LLC** – IP landscape overview of Surgical Robotics & Haptics  
**Status – Completed**

- 2008            **Simulab Inc.** - Tech Transfer - Consulting Simulab Inc. regarding the development of the "Edge" – a system for assessing minimally invasive surgical skills based on haptics and kinematics of the surgical tools. The Edge is a technology based on the Red Dragon that was developed by my colleagues, students and myself at the University of Washington.  
**Status – Completed**
- 2008            **Startup Company** – Technical consulting in design of surgical robotics systems and haptics  
**Status – Completed**
- 2008            **Tektronix**  
**Status – Completed**
- 2008            **Ridgetop Research LLC** - IP landscape overview of Surgical Robotics & Haptics  
**Status – Completed**
- 2006            **Boston Consulting Group (BCG)** - Overview of the surgical robotics field, and IP landscape analysis comparing potential IP and claims with an existing IP by lead companies.  
**Status – Completed**
- 2006            **St. Jude Medical** – Design principles of a surgical robotics console and haptics  
**Status – Completed**
- 1993 – 1997    **Consultant**  
RAMOT - University Authority for Applied Research & Industrial Development, Ramat-Aviv, Israel.
- NAYOT - ORTIM Ltd. Technological Incubator, Nazareth Illite, Israel.  
Design, Finite element analysis and biomechanical tests of innovative spine/pelvis implants (Ilio-Lumbar Fixation Device, Intra Vertebral Implant)
  - NAYOT - MPRS Ltd. Technological Incubator, Nazareth Illite, Israel.  
3D Finite element analysis of modular pelvis replacement system
- 1987 - 1991    **Technical Officer**  
Test and Evaluation Unit, Israel Defense Forces (IDF) - Ordnance Headquarters  
Design and analysis of combat systems. Special Topics: Human machine Interface, Mechanical Engineering, Biomechanics  
Rank on Discharge: Captain

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## EDUCATION

- 1993 - 1997    **Ph.D. in Biomedical Engineering (June 1997)**  
Department of Biomedical Engineering,  
Faculty of Engineering, Tel-Aviv University, Israel  
Ph.D. Thesis: *Natural Integration of a Human-Arm / Powered Exoskeleton System*  
Supervision: Prof. Mircea Arcan, Prof. Moshe B. Fuchs
- 1989 - 1993    **M.Sc. in Biomedical Engineering - Magna Cum Laude (June 1993)**  
Department of Biomedical Engineering,  
Faculty of Engineering, Tel-Aviv University, Israel  
M.Sc. Thesis: *Modeling the Human Body/Chair System in a Vibrational Environment - Numerical Approach*  
Supervision: Prof. M. Arcan
- 1983 - 1987    **B.Sc. in Mechanical Engineering (June 1987)**  
Department of Solid Mechanics Materials and Structures  
Faculty of Engineering, Tel-Aviv University, Israel

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## PROFESSIONAL COMPETENCE AND ACTIVITY

### Honors and Awards

- 2012      **Healthcare Hero 2012 Award in the Research & Innovation Category** – Silicon Valley Business Journal Selected among 100 candidates grouped into in 7 categories
- 2008      EDGE surgical skills evaluation device, (Technology licensed to Simulab Inc.) one of 8 winners: - 2008 Innovation of the year, Society of Laparoscopic Surgeons.
- 2007      The James F. Lincoln Arc Welding Foundation Silver Award in recognition for the design of the Red Dragon System - Scott Gunther & **Jacob Rosen**
- Medicine Meets Virtual Reality Conference - Winning Posters (2008)
- T. Lendvay, F. J Hseih, B. Hannaford, **J. Rosen**, The Biomechanics of Percutaneous Needle Insertion, Medicine Meets Virtual Reality (MMVR 16), Long Beach CA, Jan. 29 - Feb. 1, 2008
- Medicine Meets Virtual Reality Conference - Winning Posters (2007)
- Lum M.J.H., **J. Rosen**, H. King, D.C.W. Friedman, G. Donlin, G. Sankaranarayanan, B. Harnett, L. Huffman, C. Doarn, T. Broderick and B. Hannaford, Telesurgery Via Unmanned Aerial Vehicle (UAV) With a Field Deployable Surgical Robot, Proceedings of Medicine Meets Virtual Reality (MMVR 15) pp. 313-315, Long Beach CA, Feb. 6-9, 2007
  - Mackel T., **J. Rosen**, C. Pugh, Application of Hidden Markov Modeling to Objective Medical Skill Evaluation, Proceedings of Medicine Meets Virtual Reality (MMVR 15) pp. 316-318, Long Beach CA, Feb. 6-9, 2007
  - De. S., A. Dagan, P. Roan, **J. Rosen**, M. Sinanan, M. Gupta, B. Hannaford, CIELab and sRGB Color Values of in vivo Normal and Grasped Porcine Liver, Proceedings of Medicine Meets Virtual Reality (MMVR 15) pp.109-111, Long Beach CA, Feb. 6-9, 2007
- 2006      Medicine Meets Virtual Reality Conference - Winning Posters
- Fodero K. II, H. King, M.J.H. Lum, C. Bland, **J. Rosen**, M. Sinanan, B. Hannaford, Control System Architecture for a Minimally Invasive Surgical Robot Proceedings of Medicine Meets Virtual Reality, Long Beach, CA, USA, January 2006
- 2002      Best Paper award finalist – International Conference of Robotics and Automation (ICRA), May 2002, Washington DC. (9 Finalist 3 in each category out of 790 accepted papers)
- 1996      Valdimir Shraiber scholarship for Ph.D., Tel-Aviv University
- 1995      Dean's special recognition for excellence, Faculty of Engineering, Tel-Aviv University
- 1993      M.Sc. in Biomedical Engineering - *Magna Cum Laude*
- 1992      Leslie Porter scholarship for M.Sc., Tel-Aviv University
- 1994      Scholarship for Athletes (Graduate Studies)- Rowing Committee - The Israeli Sport Federation
- 1990      Award and special recognition of creative contribution to a new Human Engineering military standard, IDF, Israel.
- 1983-1985      Scholarship for Athletes (Undergraduate Studies)- Rowing Committee - The Israeli Sport Federation

### Undergraduate Students' Awards

- 2010      • Dean of Engineering Undergraduate Awards for Capstone Project

Lower Limb Exoskeleton (LEX)

Students: Aimen Al-Refia (CE), Priyesh Panchal (CE), John Havener (BME), Jared Newmiller (CE), and Owen Ajioka (EE).

Mentor: Jacob Rosen

- Best Poster Award  
Award for physical Sciences and Mathematics Research  
Annual Biomedical Research Conference for Minority Students (ABRCMS)  
Student: Ariel Anders  
Mentor: Jacob Rosen
- Best Poster Design Award  
Summer Undergraduate Research Fellowship in Information Technology (SURF-IT)  
Student: Ariel Anders  
Mentor: Jacob Rosen

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## GRANTS & CONTRACTS

**SUMMARY:** Total amount of funding from grants & contracts **11.664 M**

### Active

- Vitreoretinal Surgery via Robotic Microsurgical System with Image Guidance, Force Feedback, Virtual Fixture, and Augmented Reality, Co-PI with Jean-Pierre Hubschman (PI), and Tsu-Chin Tsao (Co-PI), NIH (NIBIB) \$2.5M (UCLA) Feb 1, 2019 - Jan 31, 2024, NIH R01EY029689
- Intraocular Robotic Interventional and Surgical System for Automated Cataract Surgery, Researcher with Jean-Pierre Hubschman (PI), and Tsu-Chin Tsao (Co-PI), NIH (NIBIB) \$2.431M (UCLA) Sep 30, 2019 - Aug 31, 2023, NIH R01EY030595

### Completed

- MRI: Development of an Exoskeleton for Simultaneous Assessment of Brain, Muscular, and Nervous System Output during Functional Arm and Hand Tasks Co-PI with Joel Perry (PI) – University of Idaho, NSF \$2.5M (175K UCLA) 2016-2019
- National Robotic Initiative (NRI) Large: Multilateral Manipulation by Human-Robot Collaborative Systems, Co-PI Jacob Rosen with PI Allison Okamura – Stanford, Co PIs Peter Abbeel UC – Berkeley, Gregory Hager John Hopkins University, \$3.535M (\$616K for UCLA), 2012-2016
- Electrooculography Based Control of an Anthropomorphic Upper Limb Exoskeleton, Doris Duke Foundation – Researcher with PI Karunesh Ganguly, MD Ph.D. UCSF – (20K for UCSC) 2013-2014
- Neural Control of an Upper Limb Powered Exoskeleton System - National Science Foundation - 320K - PI with Co-PI Blake Hannaford Ph.D. (EE) and Consultant Stephen Burns MD (Rehabilitation Medicine - VA Seattle) Sep. 2002 – Sep. 2005.
- The Blue DRAGON - A System for Monitoring the Kinematics and the Dynamics of Endoscopic Tools in Minimally Invasive Surgery for Objective Laparoscopic Skill Assessment – Co-PI (Primary) with Mika Sinanan (Co Director of the Center of Video Endoscopic Surgery) – The Research was funded as part of the a gift to the Department of Surgery by US Surgical / Tyco – Jan 2000 – Jan 2004

- High Altitude Platforms Mobile Robotic Telesurgery – Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – 65K (to the UW)– Co-PI with Timothy Broderick (Surgery – University of Cincinnati) PI and Blake Hannaford Co-PI– January 2006
- Mini Robot design for Military Telesurgery in the Battlefield: Breaking the Size Barrier for Surgical Manipulators - Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity - \$ 1.2 M - Co-PI (Primary) with PI - Blake Hannaford Ph.D. (EE), Co-PI - Mika Sinanan MD, Ph.D. (Surgery), Richard Satava MD (Surgery) - May 2002 - May 2006
- Patient Safety Center Organization - Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – 267K – Co-PI with Mika Sinanan (Surgery) PI – June 2004-June 2007
- Developing a Generalized Algorithms for Objectively Assessing Medical and Surgical Skill with Various Modalities - Data Mining Using Markov Models – Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – 151K – PI – June 2004- January 2008
- Trauma Pod – The operating room of the Future (Phase 1) – Defense Advanced Research Projects Agency DARPA - 940K – PI – February 2005 – January 2008 (Phase 1)
- The Red Dragon – A multi-modal Experimental System for Objectively Assess Minimally Invasive Surgical Skills, Starting date Sep. 2005, 10K, Simulab Corporation, Seattle WA.
- Development Virtual Environment with Haptics for Upper Limbs Exoskeletons Utilizing Microsoft Robotics Studio, Microsoft Research – 54K – PI - July 2007- June 2008
- Lightweight Wearable Lower Limb Exoskeleton, 6 months, 112K, PI, US Army, Department of Defense.
- The surgical Cockpit, 100K (STTR – Phase 1 with SPI Inc.) Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – PI with Co-PI Blake Hannaford Ph.D. (UW) and Laligam N. Sekhar, MD (UW)- 9.2009 – 4. 2010
- NOTES – Surgical Robot for Brain Surgery, 100K (STTR Phase 1 with SPI Inc.) Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – Co-PI with PI Blake Hannaford Ph.D. (UW) and Laligam N. Sekhar, MD (UW) - 9.2009 – 4. 2010
- The Myoprocessor – Muscle Modeling for Neural Control of Upper Limb Powered Prosthetics and Orthotics, 375K –PI Jacob Rosen, Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity, 2007-2011
- Automated Support of Robotic Surgical Training, Operations, and Outcomes, 100K (STTR – Phase 1 with SPI Inc.) Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – Co-PI with PI Thomas Landvey MD. (UW)
- Paradigm Shift for Neurorehabilitation of Stroke Patients Using Wearable Robotics, CITRIS, PI Jacob Rosen with Co-PIs Nancy Byl Ph.D. and Gary Abrams MD (UCSF), \$75K, 2010-2011
- A Network of Open Testbeds for Surgical Robotics Research, NSF, Co-PI Jacob Rosen with PI Blake Hannaford (UW), \$800K (250K for UCSC), 2010-2011
- Robot-Assisted Tele-Surgery for Tele-Health: Proof-of-Concept for Robot Learning of Subtasks in Pediatric Appendectomy, CITRIS, Co-PI Jacob Rosen with PI Ken Goldberg (Berkeley) CO-PIs Peter Abbeel (Berkeley) Walter Douglas Boyd MD (UC Davis), \$75K (25K for UCSC), 2011-2012
- Raven II – Open Source Surgical Robotic System – Co-PI, with Blake Hannaford PI UW, 800K, (400K for UCSC) Sub Contract – Contact from 3 different resources including: University of

Western Ontario (200K), University of Central Florida (100K), French National Center for Scientific Research (100K).

- The surgical Cockpit, (STTR – Phase 2 with SPI Inc.) Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity – PI with Co-PI Blake Hannaford Ph.D. (UW) and Laligam N. Sekhar, MD (UW) - 750K (350K for UCSC) 2010 - 2012
- Enabling Surgical Care through Autonomous Robotics Co-PI, with PI Pablo Garcia SRI, DARPA, 275K 2014-2015

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## WRITINGS AND CREATIVE ACTIVITIES IN PROGRESS

<b>SUMMARY:</b>	Book Co-Authored	<b>0</b>
	Book Chapters	<b>0</b>
	Journal Papers	<b>3</b>
	Conference Papers	<b>0</b>

### Book (Edited) in Review

### Book Chapters in Review

- None

### Conference Papers in Review

### Journal Papers in Review

- Changyeob Shin, Sahba Aghajani Pedram, **Jacob Rosen**, “Autonomous Control of Cable-driven Surgical Robots With Online Residual Learning”, IEEE/ASME Transactions on Mechatronics, 2020. (Accepted - In press)
- Sahba Aghajani Pedram, Peter W. Ferguson, Matt J. Gerber, Jean-Pierre Hubschman, **Jacob Rosen** A Novel Tool Localization Framework in Cataract Surgery using an Integrated Probe and Machine Learning Algorithms, IEEE Robotics and Automation Letters 2020. (Accepted - In press)
- Haoran Wang, Eric C. Sung, and **Jacob Rosen**, Real-Time Position/Force Switching Control for Automated Dental Implant Surgery, IEEE Robotics and Automation Letters 2020. (Submitted)

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## PUBLISHED WRITINGS AND CREATIVE ACTIVITIES

<b>SUMMARY:</b>	Book Co-Edited	<b>3</b>
	Book Chapters	<b>16</b>
	Journal Papers	<b>50</b>
	Conference Papers	<b>71</b>
	Patent Issued	<b>3</b>
	Patent (Applications)	<b>5</b>

### Edited Books



- Peter Ferguson, Jacob Rosen, *Wearable Robotics*, Academic Press (Elsevier) November 2019  
ISBN: 9780128146590  
<https://www.elsevier.com/books/wearable-robotics/rosen/978-0-12-814659-0>  
<https://www.sciencedirect.com/book/9780128146590/wearable-robotics>
- Dejan Milutinovic, and **Jacob Rosen** (Editors), *Redundancy in Robot Manipulators and Multi-Robot Systems*, 1<sup>st</sup> edition 2013 by Springer. ISBN 978-3-642-33970-7  
<https://www.springer.com/gp/book/9783642339707>
- **Jacob Rosen**, Blake Hannaford, Richard Satava, *Surgical Robotics – Systems Applications and Visions*, 1st edition 2011 by Springer US, ISBN 978-1-4419-1126-1  
<https://www.springer.com/us/book/9781441911254>

### Book Chapters

- [BC16] Yang Shen, Peter Ferguson, **Jacob Rosen**, *Upper Limb Exoskeletons – Overview*, Chapter 1 In *Wearable Robotics* (Peter Ferguson, Jacob Rosen, editors), Academic Press (Elsevier) November 2019 ISBN: 9780128146590
- [BC15] Yang Shen and **Jacob Rosen**, *EXO-UL Upper Limb Robotic Exoskeleton System Series: From 1 DOF Single-Arm to (7 + 1) DOFs Dual-Arm*, Chapter 5 In *Wearable Robotics* (Peter Ferguson, Jacob Rosen, editors), Academic Press (Elsevier) November 2019 ISBN: 9780128146590
- [BC14] Peter Walker Ferguson, Yang Shen and **Jacob Rosen**, *Hand Exoskeleton Systems—Overview*, Chapter 8 In *Wearable Robotics* (Peter Ferguson, Jacob Rosen, editors), Academic Press (Elsevier) November 2019 ISBN: 9780128146590
- [BC13] Peter Walker Ferguson, Brando Dimapasoc and **Jacob Rosen**, *Optimal Kinematic Design of the Link Lengths of a Hand Exoskeleton*, Chapter 10 In *Wearable Robotics* (Peter Ferguson, Jacob Rosen, editors), Academic Press (Elsevier) November 2019 ISBN: 9780128146590
- [BC12] Hao Lee, Peter Walker Ferguson and **Jacob Rosen**, *Lower Limb Exoskeleton Systems—Overview*, Chapter 11 In *Wearable Robotics* (Peter Ferguson, Jacob Rosen, editors), Academic Press (Elsevier) November 2019 ISBN: 9780128146590
- [BC11] Yang Shen and **Jacob Rosen**, *Upper Limb Wearable Exoskeleton Systems for Rehabilitation: State of the Art Review and a Case Study of the EXO-UL8—Dual-Arm Exoskeleton System*, In Raymond Kai-Yu Tong, *Wearable Technology in Medicine and Health Care*, Academic Press (Elsevier) July 2018 ISBN: 9780128118108
- [BC10] **Jacob Rosen**, Dejan Milutinović, Levi M. Miller, Matt Simkins, Hyunchul Kim, and Zhi Li, *Unilateral and Bilateral Rehabilitation of the Upper Limb Following Stroke via an Exoskeleton*. Chapter 15 In *Neuro-robotics: From brain machine interfaces to rehabilitation robotics* Panagiotis Artemiadis (Editor), pp. 405-446, Springer Netherlands 2014, ISBN: 978-94-017-8931-8
- [BC9] Zhi Li, Hyunchul Kim, Dejan Milutinovic and **Jacob Rosen**, *Synthesizing Redundancy Resolution Criteria of the Human Arm Posture in Reaching Movements*, Chapter 12 in: *Redundancy in Robot Manipulators and Multi-robot systems*, Springer-Verlag Berlin Heidelberg 2013, ISBN: 978-3-642-33970-7  
<http://www.springer.com/us/book/9783642339707>
- [BC8] **Jacob Rosen**, *Surgical Robotics – Chapter 5*, In “*Medical Devices - Surgical and Image-Guided Technologies*” edited by Martin Culjat, Rahul Singh, and Hua Lee, John Wiley & Sons Nov. 2012 pp. 63-97. ISBN: 978-0-470-54918-6  
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470549181.html>

- [BC7] Thomas S. Lendvay, **Jacob Rosen**, Blake Hannaford, Chapter 44: Telerobotics – Its Future in Clinical Application in Pediatric Robotic and Reconstructive Urology: A Comprehensive Guide, Mohan S. Gundeti (Editor), Wiley, March 2011, ISBN: 9781444335538  
<http://onlinelibrary.wiley.com/doi/10.1002/9781444345292.ch44/summary>
- [BC6] L.N. Sekhar, D. Ramanathan, **J. Rosen**, L.J. Kim, D. Friedman, D. Glozman, K. Moe, T. Lendvay, and B. Hannaford, Robotics in Neurosurgery, Chapter 30 in Surgical Robotics, Systems, Applications, and Visions, Jacob Rosen, Blake Hannaford, Richard M. Satava (Editors), 1 ed. Springer 2011.
- [BC5] **Jacob Rosen**, Mika Sinanan, and Blake Hannaford, Objective Assessment of Surgical Skills, Chapter 25 in Surgical Robotics, Systems, Applications, and Visions, Jacob Rosen, Blake Hannaford, Richard M. Satava (Editors), 1 ed. Springer 2011.
- [BC4] **Jacob Rosen**, Jeff Brown, Smita De, and Blake Hannaford, Macro and Micro Soft-Tissue Biomechanics and Tissue Damage: Application in Surgical Robotics, Chapter 24 in Surgical Robotics, Systems, Applications, and Visions, Jacob Rosen, Blake Hannaford, Richard M. Satava (Editors), 1 ed. Springer 2011.
- [BC3] **Jacob Rosen**, Mitchell Lum, Mika Sinanan, and Blake Hannaford, Raven: Developing a Surgical Robot from a Concept to a Transatlantic Teleoperation Experiment, Chapter 8 in Surgical Robotics, Systems, Applications, and Visions, Jacob Rosen, Blake Hannaford, Richard M. Satava (Editors), 1 ed. Springer 2011.
- [BC2] Perry Joel C., **Jacob Rosen**, Chapter 8: Case Study: An Upper-Limb Powered Exoskeleton, Wearable Robots: Biomechatronics Exoskeleton (Ed. Jose L. Pons) pp. 259-269, Wiley, 2008, ISBN: 978-0-470-51294-4
- [BC1] John E. Speich and **Jacob Rosen**, Medical Robotics, In Encyclopedia of Biomaterials and Biomedical Engineering, Gary Wnek and Gary Bowlin (Editors), pp. 983-993, Marcel Dekker, Inc, NY, 2004

## Papers

### Journal Papers (Peer Reviewed)

- [JP50] Sahba Aghajani Pedram, Changyeob Shin, Peter Walker Ferguson, Ji Ma, Erik P. Dutton, **Jacob Rosen**, "Autonomous Suturing Framework and Quantification Using a Cable-driven Surgical Robot", IEEE Transactions on Robotics (T-RO) Vol. 37, No.2 April 2021.
- [JP49] Changyeob Shin, Matthew J. Gerber, Yu-Hsiu Lee, Mercedes Rodriguez, Sahba Aghajani Pedram, Jean-Pierre Hubschman, Tsu-Chin Tsao, and **Jacob Rosen**, "Semi-Automated Extraction of Lens Pieces in ex vivo Pig Eyes using Semantic Segmentation of OCT Images with Deep Learning", IEEE Robotics and Automation Letters Vol. 6 No. 3 pp. 5261-5268, July 2021,
- [JP48] Jianwei Sun;Yang Shen;**Jacob Rosen**, Sensor Reduction, Estimation, and Control of an Upper-Limb Exoskeleton, IEEE Robotics and Automation Letters, Volume: 6, Issue: 2, pp.1012-1019, April 2021
- [JP47] Farshid Alambeigi, Sahba Aghajani Pedram, Jason L. Speyer, **Jacob Rosen**, Iulian Iordachita, Russell H. Taylor, and Mehran Armand. "SCADE: Simultaneous Sensor Calibration and Deformation Estimation of FBG-Equipped Unmodeled Continuum Manipulators." IEEE Transactions on Robotics 36, no. 1 (2019): 222-239.
- [JP46] Yangming Li, Blake Hannaford, and Jacob Rosen, Raven: Open Surgical Robotic Platforms, Acta Polytechnica Hungarica, Vol. 14, No. 12, 2019.

- [JP45] Ahmad Abiri, Jake Pensa, Anna Tao, Ji Ma, Yen-Yi Juo, Syed J. Askari, James Bisley, **Jacob Rosen**, Erik P. Dutton & Warren S. Grundfest, Multi-Modal Haptic Feedback for Grip Force Reduction in Robotic Surgery, *Nature, Scientific Reports*, March 2019.
- [JP44] Anibal Francone; Jason Mingyi Huang; Ji Ma; Tsu-Chin Tsao; **Jacob Rosen**; Jean-Pierre Hubschman, The Effect of Haptic Feedback on Efficiency and Safety During Preretinal Membrane Peeling Simulation. *Translational Vision Science & Technology (tvst)*, Vol.8, Issue 4, July 2019.
- [JP43] Zhi Li, Dejan Milutinovic and **Jacob Rosen**, From Reaching to Reach-to-grasp: the Arm Posture Difference and its Implications on Human Motion Control Strategy. *Experimental Brain Research*, 235(5), pp.1627-1642, May 2017.
- [JP42] Zhi Li, Dejan Milutinović and **Jacob Rosen**, Design of a Multi-Arms Surgical Robotic System for Optimized Manipulability, *ASME Journal of Mechanisms and Robotics*, Vol. 8, Dec 2016
- [JP41] Jay Ryan U. Roldan, Dejan Milutinović, Zhi Li and **Jacob Rosen**, A Low-Dimensional Dissimilarity Analysis of Unilateral and Bilateral Stroke-Impacted Hand Trajectories, *ASME Journal of dynamic systems, measurement, and control*, 138(11), Nov, 2016
- [JP 40] Matt Simkins, Nancy Byle, Hyunchul Kim, Gary Abrams, **Jacob Rosen**, Upper limb bilateral symmetric training with robotic assistance and clinical outcomes for stroke *International Journal of Intelligent Computing and Cybernetics* 9(1):83-104 · March 2016
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- [CP69] Yang Shen, Jianwei Sun, Ji Ma, **Jacob Rosen**, Admittance Control Scheme Comparison of EXO-UL8: A Dual-Arm Exoskeleton Robotic System, 2019 IEEE 16th International Conference on Rehabilitation Robotics (ICORR) Toronto, Canada, June 24-28, 2019
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- [CP66] Yang Shen, Ji Ma, Bruce Dobkin, and **Jacob Rosen**, Asymmetric Dual Arm Approach in for Post Stroke Recovery of Motor Functions Utilizing the EXO-UL8 Exoskeleton System: A Pilot Study, 40th International Engineering in Medicine and Biology Conference (EMBC), Hawaii from July 17-21, 2018
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- [CP 10] **Rosen J.**, J. D. Brown, L. Chang, M. Barreca, M. Sinanan, B. Hannaford, The Blue DRAGON - A System for Measuring the Kinematics and the Dynamics of Minimally Invasive Surgical Tools In-Vivo, *Proceedings of the 2002 IEEE International Conference on Robotics & Automation*, Washington DC, USA, May 11-15, 2002.
- [CP 09] Brown D. J., **J. Rosen**, M. Moreyra, M. Sinanan, B. Hannaford, 'Computer-Controlled Motorized Endoscopic Grasper for In Vivo Measurements of Soft Tissue Biomechanical Characteristics,' *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, vol. 85, pp. 71-73, IOS Press, January 2002. PMID: 15458062.
- [CP 08] **Rosen J.**, J. D. Brown, M. Barreca, L. Chang, B. Hannaford, M. Sinanan, The Blue DRAGON - A System for Monitoring the Kinematics and the Dynamics of Endoscopic Tools in Minimally Invasive Surgery for Objective Laparoscopic Skill Assessment, *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, Vol. 85, pp.412-418, IOS Press, January 2002. PMID: 15458124
- [CP 07] **Rosen J.**, M. Solazzo, B. Hannaford, M. Sinanan, Objective Laparoscopic Skills Assessments of Surgical Residents Using Hidden Markov Models Based on Haptic Information and Tool/Tissue Interactions, *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, Vol. 81, pp.417-423, IOS Press, January 2001. PMID: 11317782
- [CP 06] Longnion J., **J. Rosen**, M. Sinanan, B. Hannaford, Effects of Geared Motor Characteristics on Tactile Perception of Tissue Stiffness, *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, Vol. 81, pp. 286-292, IOS Press, January 2001. PMID: 11317757
- [CP 05] **Rosen J.**, M. Solazzo, B. Hannaford, M. Sinanan , Objective Evaluation of Laparoscopic Surgical Skills Using Hidden Markov Models Based on Haptic Information and Tool/Tissue Interactions, *American College of Surgeons Annual Meeting - Washington State Chapter*, Lake Chelan, June 2000.
- [CP 04] **Rosen J.**, C. Richards, B. Hannaford, M. Sinanan, Hidden Markov Models of Minimally Invasive Surgery, *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, Vol. 70 pp. 279-285, IOS Press, January 2000. PMID: 10977557
- [CP 03] **Rosen J.**, M. MacFarlane, C. Richards, B. Hannaford, C. Pellegrini, M. Sinanan, Surgeon/Endoscopic Tool Force-Torque Signatures In The Evaluation of Surgical Skills During Minimally Invasive Surgery, *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, Vol. 62, pp. 290-296, IOS Press, January 1999. PMID: 10538374
- [CP 02] Hannaford B., J. Trujillo, M. Sinanan, M. Moreyra, **J. Rosen**, J. Brown, R. Lueschke, M. MacFarlane, Computerized Endoscopic Surgical Grasper, *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality*, Vol. 50, pp. 265-271, IOS Press, January 1998. PMID: 10180551
- [CP 01] **Rosen J.** and M. Arcan, Modeling a Sitting Human Body/Chair System in a Vibration Environment, *Recent Advances in Experimental Mechanics*, *Proceedings of the 10th International Conference on Experimental Mechanics*, Lisbon, Portugal, July 1994.

## Abstracts

- MacFarlane M., **J. Rosen**, B. Hannaford, C. Pellegrini, M. Sinanan, Biological and Simulated Soft Tissue Force Profiles Generated From a Force Feedback Grasper System, Society of American Gastrointestinal Endoscopy meeting, SAGES, Seattle, WA, April 1998.
- Richards C., **J. Rosen**, B. Hannaford, M. MacFarlane, C. Pellegrini, M. Sinanan, Skills Evaluation in Minimally Invasive Surgery Using Force/Torque Signatures, Proceedings SAGES-99, Society of American Gastrointestinal Endoscopic Surgeons, San Antonio, TX, March 1999.
- Sinanan M, **Rosen J**, Richards C, Hannaford B. Hidden Markov models of minimally invasive surgery. Annual Meeting of the Seattle Surgical Society, Seattle, WA, January 14, 2000.
- Solazzo M, Sinanan M, **Rosen J**, Hannaford B. Evaluation of laparoscopic skills based on haptic information and tool/tissue interaction. Washington State Chapter of the American College of Surgeons, Lake Chelan, June 23-25, 2000.
- Brown J. D., **J. Rosen**, B. Hannaford, M. Sinanan, A Passive Mechanical Pantograph System for Measuring Tool Position During Minimally Invasive Surgery, BMES 2000, Biomedical Engineering Society, Annual Meeting, October 2000 Seattle, WA - Annals of Bioengineering Vol. 28 Supplement 1.
- *Solazzo M., **J. Rosen**, B. Hannaford, M. N. Sinanan, D. Oleynikov, C. Pellegrini, Task Decomposition of Minimally Invasive surgery for Objective Evaluation of Laparoscopic skill, SAGES - 2001, April, 2001, St. Louis, Missouri. [A10]*
- Oleynikov D, **Rosen J**, Solazzo M, Hannaford B, Sinanan M Objective computer based skills assessment of laparoscopic surgery, Seattle Surgical Association Meeting, 2001 Seattle WA
- Brown J. D., **J. Rosen**, J. Longnion, M. Sinanan, B. Hannaford, Design and Performance of a Surgical Tool Tracking System for Minimally Invasive Surgery, International Mechanical Engineering Conference and Exposition Nov 11-16 2001 NYC, ASME Advances in Bioengineering BED-Vol. 51, 2001
- Barreca M., **J. Rosen**, L. Chang, J. D. Brown, B. Hannaford, M. Sinanan, The Blue DRAGON - A System for Objective Laparoscopic Skill Assessment, 8th World Congress of Endoscopic Surgery SAGES March 2002, NYC.
- M. J.H. Lum, **J. Rosen**, T. J. Broderick, M. N. Sinanan, B. Hannaford, Raven – A Surgical Robot for Teleoperation, American Telemedicine Association (ATA) Conference, April 6-8 2008, Seattle, WA.
- Daniel Glozman, **Jacob Rosen**, Raven IV – Surgical Robotics System for Collaborative Telesurgery, Israeli Conference on Robotics (ICR), The 3rd Israeli Conference on Robotics 2010, 10-11 November, 2010, Herzlia, Israel

## Patents

### Issued

- **Surgical device, United States Patent 9,775,640, October 3, 2017**, A surgical device that has an external sheath having a proximal end and a distal end for insertion through an opening of a body and a plurality of tool components extending from the distal end of the external sheath. The tool components are independently deflectable with respect to each other and with respect to the external sheath and removable from the device without requiring withdrawal of the sheath through the opening of the body. The external sheath is flexible and deflectable intermediate the distal and

proximal ends. This permits the device to be steered in a curvilinear manner towards a surgical target.

- **Introducer device, United States Patent 9,622,828, April 18, 2017**, An introducer and method provides a surgical tool with a pathway through tissue to a surgical site, wherein the surgical tool includes at least one surgical instrument. The introducer comprises a flexible sheath having a distal portion including a distal end and is arranged for receiving the surgical tool. A tissue separation tip at the distal portion of the sheath advances the sheath into the tissue towards the surgical site. The tissue separation tip is arranged to form a tissue gap and provide the at least one surgical instrument access to the tissue gap for performing a medical procedure consonant with the formation of the tissue gap or the performance of work at the surgical site.
- **Surgical cockpit comprising multisensory and multimodal interfaces for robotic surgery and methods related thereto United States Patent 9,474,580, October 25, 2016**, Local surgical cockpits comprising local surgical consoles that can communicate with any desired remote surgical module (surgical robot), for example via a shared Transmission Control Protocol/Internet Protocol (TCP/IP) or other unified open source communication protocol or other suitable communication system. The systems and methods, etc., herein can also comprise a modular approach wherein multiple surgical consoles can network supporting collaborative surgery regardless of the physical location of the surgeons relative to each other and/or relative to the surgical site. Thus, for example, an operator operating a local surgical cockpit can teleoperate using a remote surgical module on a patient in the same room as the surgeon, or surgeons located in multiple safe locations can telemanipulate remote multiple surgical robots on a patient in or close to a war zone.

### Applications

- Device for Mobilizing Cortical Material at Lens Equator during Cataract Surgery, Converted to a patent 3.4.2021 , - UCLA Assigned Case Number 2020-483-1
- Electrical Impedance Based Probe for Identification of Ocular Tissue, Patent Disclosure, - UCLA Assigned Case Number 2020-851-1
- Virtual Reality Training Tasks Used for Stroke Rehabilitation, U.S. Provisional Application No. 62/732,736, Our Ref: R4-05490.PRO; Your Ref.: UCLA 2017-798
- Full Body Haptic Exoskeleton Device, U.S. Provisional Application No. 62/565,447, Filed 9.27.2017 (Filed by UCLA)
- An Exoskeleton for Physical Therapy – Patent Application No. 2008/0009771, Filed on April 8 2006 to the U.S. Patent and Trademark Office.
- SKILL EVALUATION USING SPHERICAL MOTION MECHANISM Patent Application No. 20110020779 Filed: June 28, 2010
- SKILL EVALUATION Patent Application No. 20060243085 Filed: April 25, 2005
- Spherical motion mechanism, Patent Application No. 20110020779 Filed: June 28, 2010

### Research Reports

- [RR 01] Austin Chang, Brandon Hsiao, Hao Lee, Simon Hoadley, Jacob Rosen, Kinematics of the Athlete's Body and the Oar in Rowing – Nominal Performance and Stereotypical Errors - Research Report, Bionica Lab, University of California, Los Angeles, 2021

### Project Reports

- **Rosen J.**, Human Engineering - Analysis of Human Exposure to Acceleration, Military Standard No. 3208 Automotive Section, Test and Evaluation Unit, Ordnance Headquarters IDF, Mach 1990.

- Pruchi D., **J. Rosen**, and M. Arcan, " Natural Activation of a Powered Exoskeleton - Development of a Practical Myoprocessor Based on Voluntary Muscle Control Principles", Research Supported by the Israel Ministry of Defense, January 1993.
- **Rosen J.** and M. Arcan, "Development of an Human Arm/Exoskeleton System Simulation Integrating a practical Muscle Model", Research Report, MAFAT Ministry of Defense Israel, February 1994.
- **Rosen J.** and M. Arcan, " Spine Instrumentation - Ilio-Lumbar Fixation device, Intra vertebral Implant", NAYOT ORTIM, February 1995.
- **Rosen J.**, "Modular Pelvis Replacement System - Structural and Biomechanical Analysis ", NAYOT MPRS, April 1997
- Arcan M., M. B. Fuchs, **J. Rosen**, M. Brand, Natural Integration of a Human Arm / Powered Exoskeleton System, Research Report, MAFAT Ministry of Defense Israel, November 1998.
- Neural Control of Upper Limb Powered Exoskeleton - NSF  
Annual Progress Report 2003 (Authored)  
Annual Progress Report 2004 (Authored)  
Annual Progress Report 2005 (Authored)  
Final Report 2006 (Authored)  
PI Meeting Grant Report
- Mini Robot design for Military Telesurgery in the Battlefield: Breaking the Size Barrier for Surgical Manipulators - Department of Defense, Department of the Army, US Army Medical Research Acquisition Activity  
Annual Progress Report 2002 (Authored)  
Annual Progress Report 2003 (Co-Authored)  
Annual Progress Report 2004 (Co-Authored)
- Developing a Generalized Algorithms for Objectively Assessing Medical and Surgical Skill with Various Modalities - Data Mining Using Markov Models  
Annual Progress Report 2004 (Authored)
- The Myoprocessor – Muscle Modeling for Neural Control of Upper Limb Powered Prosthetics and Orthotics, Annual Progress Report 2008 (Authored)
- Lightweight Wearable Lower Limb Exoskeleton, US Army, Department of Defense.  
Annual Progress Report 2008 (Authored)

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## UNIVERSITY SERVICE

### UCLA (2014 - Current)

#### School of Medicine

- Center for Advanced Surgical and Interventional Technology (CASIT) – Executive committee member (2014 - Current)

#### Department (MAE)

- Design, Robotics & Manufacturing – Head of the Study Field (2016 – Current)

- ASME Student Advisor (2015 - Current)
- MAE Industrial Advisory Board – Hosting a lab tour – Feb 19, 2016
- Graduate student's admission committee (2014 - 2016)
- Merit Increase Committee member (2015 – 2016)
- Merit Increase Ad-Hoc committee member (2016-2017)
- Search committee member (2017)
- Space Committee 2018-2019
- Award Committee 2019-Current

## **UCSC (2008 - 2013)**

### **School of Engineering**

- Space Committee – committee member (CE) – 2013 - 2014
- Baskin School of Engineering - Research Review Day – presentation
  - When a Human Meets a Robot - Three Close Encounters – 10.2012
  - Medical Robotics – 10.2009
- UC LEADS Faculty Mentor (Mentor one students from UC Merced) – 10 weeks Summers 2012
- Presentation and Lab Tour, Adept Technologies – 9/2012
- Presentation and Lab Tour, Toyota Motor Corp.- 7/2012
- Presentation and Lab Tour, Nissan Motors – 6/2012
- Presentation and Meeting, General Motors Research, Palo Alto, CA. – 4/2012
- Presentation and Lab Tour, Hosting, Honda Research – 2/2012
- SOE Graduation Ceremonies – 6/2012
- UC LEADS Faculty Mentor (Mentor one students from UCSD) – 10 weeks Summers 2009

### **Department**

- Bioengineering – Curriculum Development Committee – 2008 – 2014
- UCSC Extensions Silicon Valley – Medical Devices – Curriculum Reviewer – 2011 – 2014
- NSF SURF-IT Mentor (3 undergraduates in my lab for summer) – Summer 2011
- NSF SURF-IT Mentor (3 undergraduates in my lab for summer) –Summer 2010
- NSF SURF-IT Mentor (4 undergraduates in my lab for summer) –Summer 2009
- CMPE123A/B Faculty Advisor (various projects) – 2008-2012
- Robotics & Control – Curriculum Committee – Chair – 2008 – 2014  
Assist in developing and maintaining all the academic aspects related to the undergraduate degree in Robotics Engineering (offered for the first time in Fall 2011) along with the graduate degree in Robotics and Control.
- CE Outreach Committee - Member – 2008
- Internal departmental review of tenure and promotion cases – 3 Cases – 2008 - 2014

### **Outreach K-12 Elementary and Secondary Education**

- Hosting a lab visit for elementary school students (Westlake Elementary) –2014
- Hosting a lab visit for middle school students – Middle School Summit - 2013
- Hosting a lab visit for elementary school students (Westlake Elementary) –2013
- Hosting a lab visit for high school students (PCT) - 2011
- Hosting a lab visit for elementary school students (Westlake Elementary) –2009

## **University of Washington (2000 - 2008)**

### **School of Engineering**

- UW - Collage of Engineering representative and the co-director of research of ISIS – Institute of Surgical Intervention and Simulation – School of Medicine – 2004 - 2008

#### Office of the President

- UW - Washington Research Foundation – Grant Review – 2 Panels 2003, 2006

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### OUTSIDE PROFESSIONAL ACTIVITIES

<b>SUMMARY:</b> Invited Lectures (listed below)	<b>42</b>
Papers Presented at Professional Meetings (see conference list )	<b>67</b>

#### Public Lecture or Forum Participation

##### Invited Lectures

- Medical Robotics, Joint Efforts on Smart Precision Machinery and Robotics, UCLA, University of Toronto, NTHU & NYU (Taiwan) – Webinar, June 12, 2021
- Stroke & Motor Control - Technology for Rewiring the Brain, Healthy Aging Workshop Launches UC Partnership with Nanyang Technological University, Singapore, UCLA Dec. 9, 2019
- Advanced Research Efforts Changing the Way Medtech Uses Robotics, Medical Device & Manufacturing Convention (MD&M) - February 5-7, 2019, Anaheim Convention Center, Anaheim, CA
- Medical Robotics, 2018 USC Orthopedic Surgery – Sports Medicine Football Injury Symposium, August 25, 2018
- Wearing a Robot Strike Stroke, **TEDx Palo Alto**, April 29, 2018
- Surgical Robotics, University of Sydney, Sydney Australia Oct. 13 2017
- Surgical Robotics & Wearable Robotics, Everting IoT Leadership Summit, 11-12 Oct. 2017, Sydney Australia
- Roboscope the Surgical Cockpit and Automation in Neurosurgery, Canadian Neurosurgical Innovation Meeting, Toronto, ON Spt. 10-11, 2016
- Surgical Robotics – USC, LA Oct. 19, 2016
- Exoskeleton & Stroke, Assistive Robotic Tech to Navigate the World, Swissnex, San Francisco CA, April 7, 2016
- Exoskeletons – Shaping Body and Mind, Metamorphosis, Human Animal Armor, An international Conference, UCSB, Santa Barbara, Dec. 3-5, 2015
- When a Human Meets a Robot – A tale of Close Encounters – Institute of Green and Intelligent Technology, Chinese Academy of Science, Chongqing, China, August 27, 2015.
- Medical Robotics, ASME - The Los Angeles Chapter, UCLA, May 21, 2015
- Surgical Robotics – Robo Madness West, Xconomy, SRI, Menlo Park, April 7, 2015.



- Spotlight Talks: Robots for Rehab – Robo Madness Boston, Xconomy, Google Campus, Boston, March. 11, 2015
- Medical Robotics – Bioengineering Dept. Seminar Winter 2015, UCLA
- Surgical Robotics – 6th Summer European University, September 3-11, 2013, Montpellier, France.
- Medical Robotics – 2012 Korea – US Green Technology Symposium, Seoul Korea, Nov. 29, 2012
- Upper Limb Exoskeleton - Korea Institute of Industrial Technology (KITECH), Seoul Korea, Nov. 28, 2012
- Medical Robotics – Science Table at Crown Collage, Hosted by Joel Ferguson, Crown College Provost , UCSC, Oct. 11, 2012
- Medical Robotics – Human Centered Robotics, Baskin School of Engineering Research Day, UCSC, Oct. 18, 2012
- Raven – Open Source Robotic Platform for Research in Surgical Robotics, The 3ed Annual Open Science Summit, Sunnyvale, Oct. 23-24, 2012
- Raven – Developing A surgical Robotic System – Robotic Summer School, August 13-17, London Ontario CA,
- Surgical Robotics – 5th Summer European University, September 7-14, 2011, Montpellier, France.
- Medical Robotics – Guest Lecture, Robot Renaissance: The Future of Human-Machine Interaction Institute for the Future (IFTF), Berkeley CA, Nov. 10, 2010
- Medical Robotics – The Human Machine Interface, Guest Lecture IEEE International Conference of Robotics and Automation, Anchorage, Alaska, May, 2010
- Medical Robotics – Bioports to the human Body , Guest Lecture IEEE Robotics and Automation Society, Santa Clara Valley Chapter December 10, 2009
- Medical Robotics – Bioports to the human Body , CITRIS – Center for Information Technology Research in the Interest of Society, UC Berkley, October 28, 2009
- Medical Robotics Center for Applied Biomechanics and Rehabilitation Research, National Rehabilitation Hospital, and the Catholic University of America, Washington D.C., March 2009.
- Use of Robotics for Physical Rehabilitation, Military Collaboration: Bioengineering Challenges of Brain Trauma, American Institute for Medical and Biological Engineering (AIMBE), National Academy of Sciences, Washington DC, Feb 20 , 2008
- Medical Robotics – Bioports to the Human Body, The Robotic Institute, School of Computer Science, Carnegie Melon University, Pittsburgh, PA, October 2007.
- Medical Robotics, School of Science and Engineering, Oregon Graduate Institute, Oregon Health and Science University, Portland, Oregon, September 2007
- Telesurgery: Healthcare Delivered through Wired and Wireless Communication, Medical Automation, Washington DC, November, 2006

- Human Centered Approach in Surgical and Rehabilitation Robotics, Robotics Based Medicine Workshop, International Conformance of Robotics and Automation, ICRA 2006, Orlando FL, May 2006
- Surgical Robotics and The operating Room of the Future – Seattle Robotic Society, December 15, Renton, WA
- Robotic Exoskeletons for Physical Rehabilitation, November 16, 2005, 590W Compute & Disabilities, Department of Computer Science and Engineering, University of Washington
- Surgical Robotics - 2nd Summer European University, September 7-14, 2005, Montpellier, France.
- A Surgical Robot as an Information System Integrated into the Operating Room of the Future – Control and Robotics Seminar Series (EE 591), University of Washington, April 2005.
- Multimode Approach for Objective Skill assessment in Medicine – Product Line Review – Telemedicine and Advanced Technology Research Center (TATRC), Department of the Army, DoD, February 2005, Marina Del Ray, CA
- The Operating Room of the Future - New Generation of Surgical Robotics, Biomechanics Seminar Series (ME 598), University of Washington, October 2004.
- Neural Control of an Upper Limb Powered Exoskeleton System, Biomechanics Seminar Series (ME 598), University of Washington, December 2002.
- BioRobotics in Rehabilitation, Department of Rehabilitation Medicine, Monthly Rehab Research Seminar, University of Washington, June 2001.
- Workshop: Simulating Minimally Invasive Surgical Procedures in Virtual Environments: MODELING, Human Machine Interfaces in Minimally Invasive Surgery, Medicine Meets Virtual Reality, Newport Beach, CA, January 2001.
- An Upper Limb Myosignal-Based Powered Exoskeleton System, Exoskeletons for Human Performance Augmentation (EHPA) Workshop - DARPA, Washington, D.C., March, 2000.
- Biomechanics and Biorobotics in Minimally Invasive Surgery, Medical Robotics Workshop, Smart System 2000, Huston, TX, September, 2000.

## **Membership or Activities in Professional Associations**

### **Memberships**

- IEEE – Member since 2001
- IEEE Society of Engineering in Medicine & Biology (EMB) – Member since 2009

### **Conference Organizing Committee**

- ICAR2005 Seattle – Organizing Committee - Chair of the Tutorials and Special Sessions - 2003 – 2005
- BioRob Pisa Italy - Organizing Committee - 2006
- EMBC 08 – 30<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Organizing Committee, Co-Chair Theme 08 – Biorobotics Surgical Planning and Orthopedic Biomechanics, 20-24 August 2008
- Biorob 2008, Scottsdale AZ – Surgical Robotics Workshop – Co-Organizer
- EMBC 09 – 31<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Organizing Committee, Workshop Co-Chair, Sept. 2-6 2009

- Surgical Robotics (With Co-Chair Philippe Poignet)
- Frontiers of microrobotics in endo-and transluminal therapy (With Co-Chair Paolo Dario)
- 2010 Surgical Robotics Summer School – Co-Organizer, University of Washington, Seattle WA August 2010.
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2011), Redundancy in Robot Manipulators and Multi-Robot Systems, Workshop, Co-Organizer (with Co-Chair - Dejan Milutinovic – AMS, UCSC)
- **Associated Editor - IEEE International Conference on Robotics and Automation (ICRA) Sun, May 30, 2021 – Sat, Jun 5, Xi'an China, 2021**

#### **Papers Presented at Professional Meetings (Presenter is marked in bold letters)**

- **Rosen J.** and M. Arcan, Modeling a Sitting Human Body/Chair System in a Vibration Environment, Recent Advances in Experimental Mechanics, Proceedings of the 10th International Conference on Experimental Mechanics, Lisbon, Portugal, July 1994.
- **Rosen J.** and M. Arcan, Seat Optimization in Static and Dynamic Conditions - A Numerical and Experimental Approach, Proceedings of the 7th Mediterranean Conference on Medical and Biological Engineering, Jerusalem, Israel, September 1995.
- Hannaford B., J. Trujillo, M. Sinanan, M. Moreyra, **J. Rosen**, J. Brown, R. Lueschke, M. MacFarlane, Computerized Endoscopic Surgical Grasper, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 1998.
- **MacFarlane M.**, J. Rosen, B. Hannaford, C. Pellegrini, M. Sinanan, Biological and Simulated Soft Tissue Force Profiles Generated From a Force Feedback Grasper System, Society of American Gastrointestinal Endoscopy meeting, SAGES, Seattle, WA, April 1998.
- **MacFarlane M.**, J. Rosen, B. Hannaford, C. Pellegrini, M. Sinanan, Force Feedback Grasper Helps Restore the Sense of Touch in Minimally Invasive Surgery, Proceedings SSAT-98, The Society for Surgery of the Alimentary Tract SSAT, New Orleans, LA, May 1998.
- **Rosen J.**, M. MacFarlane, C. Richards, B. Hannaford, C. Pellegrini, M. Sinanan, Surgeon/Endoscopic Tool Force-Torque Signatures In The Evaluation of Surgical Skills During Minimally Invasive Surgery, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 1999.
- **Richards C.**, J. Rosen, B. Hannaford, M. MacFarlane, C. Pellegrini, M. Sinanan, Skills Evaluation in Minimally Invasive Surgery Using Force/Torque Signatures, Proceedings SAGES-99, Society of American Gastrointestinal Endoscopic Surgeons, San Antonio, TX, March 1999.
- **Rosen J.**, C. Richards, B. Hannaford, M. Sinanan, Hidden Markov Models of Minimally Invasive Surgery, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2000.
- Sinanan M, Rosen J, **Richards C**, Hannaford B. Hidden Markov models of minimally invasive surgery. Annual Meeting of the Seattle Surgical Society, Seattle, WA, January 14, 2000.
- Rosen J., **C. Richards**, B. Hannaford, C. Pellegrini, M. Sinanan, Evaluation of Skills in Minimally Invasive Surgery Using Hidden Markov Models, SAGES - 2000, Society of American Gastrointestinal Endoscopic Surgeons, Atlanta, GA, March 2000.
- Rosen J., **M. Solazzo**, B. Hannaford, M. Sinanan, Objective Evaluation of Laparoscopic Surgical Skills Using Hidden Markov Models Based on Haptic Information and Tool/Tissue Interactions, American College of Surgeons Annual Meeting - Washington State Chapter, Lake Chelan, June 2000.

- **Solazzo M.**, M. Sinanan, J. Rosen, B. Hannaford, Objective laparoscopic performance assessment system based on haptic information and tool/tissue interactions, North Pacific Surgeon Association Meeting, Idaho 2000.
- **Solazzo M.**, Sinanan M, Rosen J, Hannaford B. Evaluation of laparoscopic skills based on haptic information and tool/tissue interaction. Washington State Chapter of the American College of Surgeons, Lake Chelan, June 23-25, 2000.
- **Brown J. D.**, J. Rosen, B. Hannaford, M. Sinanan, A Passive Mechanical Pantograph System for Measuring Tool Position During Minimally Invasive Surgery, BMES 2000, Biomedical Engineering Society, Annual Meeting, October 2000 Seattle, WA - Annals of Bioengineering.
- **Rosen J.**, M. Solazzo ,B. Hannaford, M. Sinanan, Task Decomposition of Minimally Invasive Surgery for Objective Evaluation of Laparoscopic Surgical Skills Using Hidden Markov Model, BMES 2000, Biomedical Engineering Society, Annual Meeting, October 2000 Seattle, WA - Annals of Bioengineering Vol. 28 Supplement 1.
- **Longnion J.**, J. Rosen, M. Sinanan, B. Hannaford, Effects of Geared Motor Characteristics on Tactile Perception of Tissue Stiffness, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2001.
- **Rosen J.**, M. Solazzo, B. Hannaford, M. Sinanan, Objective Laparoscopic Skills Assessments of Surgical Residents Using Hidden Markov Models Based on Haptic Information and Tool/Tissue Interactions, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2001.
- **Solazzo M.**, J. Rosen, B. Hannaford, M. N. Sinanan, D. Oleynikov, C. Pellegrini, Task Decomposition of Minimally Invasive surgery for Objective Evaluation of Laparoscopic skill, SAGES - 2001, April, 2001, St. Louis, Missouri.
- **Oleynikov D.**, Rosen J, Solazzo M, Hannaford B, Sinanan M Objective computer based skills assessment of laparoscopic surgery, Seattle Surgical Association Meeting, 2001 Seattle WA
- **Brown J. D.**, J. Rosen, J. Longnion, M. Sinanan, B. Hannaford, Design and Performance of a Surgical Tool Tracking System for Minimally Invasive Surgery, International Mechanical Engineering Conference and Exposition Nov 11-16 2001 NYC.
- **Rosen J.**, J. D. Brown, M. Barreca, L. Chang, B. Hannaford, M. Sinanan, The Blue DRAGON - A System for Monitoring the Kinematics and the Dynamics of Endoscopic Tools in Minimally Invasive Surgery for Objective Laparoscopic Skill Assessment, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, Vol. 85, January 2002.
- Brown D. J., **J. Rosen**, M. Moreyra, M. Sinanan, B. Hannaford, 'Computer-Controlled Motorized Endoscopic Grasper for In Vivo Measurements of Soft Tissue Biomechanical Characteristics,' Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2002
- **Rosen J.**, J. D. Brown, L. Chang, M. Barreca, M. Sinanan, B. Hannaford, The Blue DRAGON - A System for Measuring the Kinematics and the Dynamics of Minimally Invasive Surgical Tools In-Vivo, IEEE International Conference on Robotics & Automation, Washington DC, USA, May 11-15, 2002.
- **Barreca M.**, J. Rosen, L. Chang, J. D. Brown, B. Hannaford, M. Sinanan, The Blue DRAGON - A System for Objective Laparoscopic Skill Assessment, 8th World Congress of Endoscopic Surgery SAGES March 2002, NYC.

- **Rosen J.**, L. Chang, J. D. Brown, B. Hannaford, M. Sinanan, R. Satava, Minimally Invasive Surgery Task Decomposition - Etymology of Endoscopic Suturing, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2003.
- Brown J. D., **J. Rosen**, Y. S. Kim, L. Chang, M. Sinanan, B. Hannaford, In-Vivo and In-Situ Compressive Properties of Porcine Abdominal Soft Tissues, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2003.
- **Brown J. D.** J. Rosen, M. N. Sinanan, B. Hannaford, In-Vivo and Postmortem Compressive Properties of Porcine Abdominal Organs, Lecture Notes in Computer Science, Volume 2878 / 2003, pp. 238 –245, Medical Image Computing and Computer-Assisted Intervention - MICCAI 2003, Toronto, Canada.
- Kowalewski T.M., **J. Rosen**, L. Chang, M. Sinanan, B. Hannaford, Optimization of a Vector Quantization Codebook for Objective Evaluation of Surgical Skill, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2004.
- Brown J. D., J. Rosen, L. Chang, M. Sinanan, **B. Hannaford**, Quantifying Surgeon Grasping Mechanics in Laparoscopy Using the Blue DRAGON System, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, vol. 98, pp. 34-36, IOS Press, January 2004.
- **M.J.H. Lum**, J. Rosen, M. N. Sinanan, B. Hannaford, Kinematic Optimization of a Spherical Mechanism for a Minimally Invasive Surgical Robot, 2004 IEEE International Conference on Robotics & Automation, New-Orleans, LA, USA, April 26-30, 2004.
- **Rosen J.**, M. Lum, D. Trimble, B. Hannaford, M. Sinanan, Spherical Mechanism Analysis of a Surgical Robot for Minimally Invasive Surgery – Analytical and Experimental Approaches, Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, January 2005
- **Cavallaro E.**, J. Rosen, J. C. Perry, S. Burns, B. Hannaford, Hill Based Model as a Myoprocessor for a Neural Controlled Powered Exoskeleton Arm – Parameter Optimization, Proceedings of the 2005 IEEE international Conference on Robotics and Automation, ICRA 2005, pp. 4525 – 4530, Barcelona Spain, April 2005
- Rosen J., **J. C. Perry**, N. Manning, S. Burns, B. Hannaford, The Human Arm Kinematics and Dynamics During Daily Activities – Toward a 7 DOF Upper Limb Powered Exoskeleton, - ICAR 2005 – Seattle WA, July 2005.
- **Mitchell J.H. Lum**, Diana Warden, Jacob Rosen, Mika N. Sinanan, and Blake Hannaford. Hybrid analysis of a spherical mechanism for a minimally invasive surgical (MIS) robot - design concepts for multiple optimizations. Proceedings of Medicine Meets Virtual Reality, Long Beach, CA, USA, January 2006.
- **Thomas Mackel**, Jacob Rosen, Carla Pugh, Data Mining of the E-pelvis Simulator Database A Quest for a Generalized Algorithm for Objectively Assessing Medical Skill Proceedings of Medicine Meets Virtual Reality, Long Beach, CA, USA, January 2006.
- **Kenneth Fodero II**, H. Hawkeye King, Mitchell J.H. Lum, Clint Bland, Jacob Rosen, Mika Sinanan, Blake Hannaford, Control System Architecture for a Minimally Invasive Surgical Robot Proceedings of Medicine Meets Virtual Reality, Long Beach, CA, USA, January 2006.
- Mitchell J.H. Lum, Denny Trimble, Jacob Rosen, Kenneth Fodero II, Hawkeye King, Ganesh Sankarayanaranan, Jesse Doshier, Rainer Leushke, Brandon Martin-Anderson, Mika N. Sinanan, and **Blake Hannaford**. Multidisciplinary approach for developing a new minimally invasive surgical robot system. Proceedings of the 2006 BioRob Conference, Pisa, Italy, February, 2006.

- **Joel C. Perry**, Jacob Rosen, Design of a 7 Degree-of-Freedom Upper-Limb Powered Exoskeleton Proceedings of the 2006 BioRob Conference, Pisa, Italy, February, 2006.
- Smita De, Paul Swanson, Mika Sinanan, Jacob Rosen, Aylon Dagan, and **Blake Hannaford**, Assessment of Tissue Damage due to Mechanical Stresses, Proceedings of the 2006 BioRob Conference, Pisa, Italy, February, 2006.
- **Lum M.J.H.**, J. Rosen, H. King, D.C.W. Friedman, G. Donlin, G. Sankaranarayanan, B. Harnett, L. Huffman, C. Doarn, T. Broderick and B. Hannaford, Telesurgery Via Unmanned Aerial Vehicle (UAV) With a Field Deployable Surgical Robot, Proceedings of Medicine Meets Virtual Reality (MMVR 15) pp. 313-315 , Long Beach CA, Feb. 6-9, 2007
- **Mackel T.**, J. Rosen, C. Pugh, Application of Hidden Markov Modeling to Objective Medical Skill Evaluation, Proceedings of Medicine Meets Virtual Reality (MMVR 15) pp. 316-318, Long Beach CA, Feb. 6-9, 2007
- **De. S.**, A. Dagan, P. Roan, J. Rosen, M. Sinanan, M. Gupta, B. Hannaford, CIELab and sRGB Color Values of in vivo Normal and Grasped Porcine Liver, Proceedings of Medicine Meets Virtual Reality (MMVR 15) pp.109-111, Long Beach CA, Feb. 6-9, 2007
- **Friedman D.**, J. Doshier, T. Kowalewski, J. Rosen, B. Hannaford, Automated Tool Handling for the Trauma pod Surgical Robot, International Conference of Robotics and Automation (ICRA 07), Rome, Italy
- **G. Sankaranarayanan**, B. Hannaford, H. King, S.Y. Ko, M. Lum, D. Friedman, J. Rosen, and B. Hannaford, Portable Surgery Master Station for Mobile Robotic Surgery, ROBOCOMM, the first International, conference on Robot Communication and Coordination, Athens, Greece, Oct 2007.
- **T. Lendvay**, F. J Hseih, B. Hannaford, J. Rosen, The Biomechanics of Percutaneous Needle Insertion, Medicine Meets Virtual Reality (MMVR 16) pp. 245-247, Long Beach CA, Jan. 29 - Feb. 1., 2008
- **M. J.H. Lum**, D. C. W. Friedman, G. Sankaranarayanan, H. King, A. Wright, M. Sinanan, T. Lendvay, J. Rosen, B. Hannaford, Objective Assessment of Telesurgical Robot Systems: Telerobotic FLS, Medicine Meets Virtual Reality (MMVR 16) pp. 263-265, Long Beach CA, Jan. 29 - Feb. 1, 2008.
- **J. Rosen**, A. Wright, B. Hannaford, M. Sinanan, Objective Laparoscopic Skills Assessments of Surgical Residents – Five Years Longitudinal Study, Medicine Meets Virtual Reality (MMVR 16) pp. 263-265, Long Beach CA, Jan. 29 - Feb. 1, 2008.
- **M. J.H. Lum**, J. Rosen, T. J. Broderick, M. N. Sinanan, B. Hannaford, Raven – A Surgical Robot for Teleoperation, American Telemedicine Association (ATA) Conference, April 6-8 2008, Seattle, WA.
- **M. J.H. Lum**, D.C.W. Friedman, G. Sankaranarayanan, H. King, A. Wright, M. Sinanan, T. Lendvay, J. Rosen, B. Hannaford, Objective Assessment of Telesurgical Robot Systems: Telerobotic FLS pp. 263-265, Long Beach CA, Jan. 29 - Feb. 1, 2008
- **T. Lendvay**, F. J Hseih, B. Hannaford, J. Rosen, The Biomechanics of Percutaneous Needle Insertion, Proceedings of Medicine Meets Virtual Reality (MMVR 16) pp. 245-247, Long Beach CA, Jan. 29 - Feb. 1, 2008
- **Mitchell J.H. Lum**, Jacob Rosen, Thomas S. Lendvay, Andrew S. Wright, Mika N. Sinanan, and Blake Hannaford, TeleRobotic Fundamentals of Laparoscopic Surgery (FLS): Effects of Time Delay - Pilot Study, 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society EMBS, Vancouver, British Columbia, Canada, 20-25 Aug. 2008, pp. 5597-5600.

- Mitchell J.H. Lum, Jacob Rosen, Thomas S. Lendvay, Mika N. Sinanan, **Blake Hannaford**, Effect of Time Delay on TeleSurgical Performance, IEEE International Conference on Robotics and Automation, Kobe, Japan, May 12-17, 2009
- **Moshe Brand**, Moshe Ryvkin, Shmuel Einav, and Jacob Rosen, Numerical Models of an Artery with a Net Structured Stent, World Congress of Medical Physics and Biomedical Engineering, Sept. 7-12, 2009, Munich, Germany
- Mitchell J.H. Lum, **Jacob Rosen**, Hawkeye King, Diana C.W. Friedman, Thomas Lendvay, Andrew S. Wright, Mika N. Sinanan, and Blake Hannaford, Teleoperation in Surgical Robotics – Network Latency Effects on Surgical Performance, 31th Annual International Conference of the IEEE Engineering in Medicine and Biology Society EMBS, Minneapolis MN, Sept. 2009.
- H. Hawkeye King, Blake Hannaford, Ka-Wai Kwok, Guang-Zhong Yang, Paul Griffiths<sup>3</sup>, Allison Okamura, Ildar Farkhatdinov, Jee-Hwan Ryu, Ganesh Sankaranarayanan, Venkata Arikatla, Suvranu De, Kotaro Tadano, Kenji Kawashima, Angelika Peer, Thomas Schuß, Martin Buss, Levi Miller, Daniel Glozman, **Jacob Rosen**, Thomas Low, Plugfest 2009: Global Interoperability in Telerobotics and Telemedicine, IEEE International Conference on Robotics and Automation, ICRA May 2010, Alaska, USA
- **Moshe Brand**, Moshe. Ryvkin, Shmuel. Einav, Idit Avrahami, Jacob Rosen, Mircea Teodorescu, Numerical Models of an Artery with Different Stent Types, The 12th Mediterranean Conference on Medical and Biological Engineering and Computing, MEDICON 2010, IFMBE Proceedings 29, pp. 545–548, May 27-30, 2010, Greece.
- **Mircea Teodorescu**, H. Rahnejat, Moshe Brand, Jacob Rosen, Post –Angioplastic Contact mechanism with Different levels of Artherosclerotic Plaque, Proceedings of the STLE/ASME 2010 International Joint Tribology Conference, IJTC 2010, October 17-20, 2010, San Francisco, California, USA
- **Hyunchul Kim**, Jacob. Rosen, Epileptic Seizure Detection - An AR Model Based Algorithm for Implantable Device, 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBC 2010, Buenos Aires, Argentina, August 31 - September 4, 2010
- **Levi Makaio Miller** and Jacob Rosen, Comparison of Multi-Sensor Admittance Control in Joint Space and Task Space for a Seven Degree of Freedom Upper Limb Exoskeleton, 3rd IEEE RAS & EMBS International Conference on Biomedical Robotics and Biomechatronics, September 26-29, 2010 Tokyo, Japan
- **Mircea Teodorescu**, Moshe Brand, Jacob Rosen, Homer Rahnejat, The Influence of Post Angioplasty Stent Implant Profile on Arterial Wall Stress Proceedings of the ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2010 August 15-18, 2010, Montreal, Quebec, Canada
- **Wen Yu** and Jacob Rosen, A Novel Linear PID Controller for an Upper Limb Exoskeleton, Proceedings of the 49th IEEE Conference on Decision and Control (CDC), pp. 3548-3553, Atlanta, GA, USA, December 15-17, 2010
- Daniel Glozman, **Jacob Rosen**, Raven IV – Surgical Robotics System for Collaborative Telesurgery, Israeli Conference on Robotics (ICR), The 3rd Israeli Conference on Robotics 2010, 10-11 November, 2010, Herzlia, Israel
- **Wen Yu**, Jacob Rosen, Xiaou Li, PID Admittance Control for an Upper Limb Exoskeleton, 2011 American Control Conference, 2011 American Control Conference - ACC 2011, San Francisco, California, USA, June 29 - July 1, 2011

- **Hyunchul Kim**, Levi Makaio Miller, Aimen Al-Refai, Moshe Brand, and Jacob Rosen Redundancy Resolution of a Human Arm for Controlling a Seven DOF wearable Robotic System, 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Boston MA, August, 2011
- **Levi Miller**, Hyunchul Kim, Jacob Rosen, Redundancy and Joint limits of a Seven Degree of Freedom Upper Limb Exoskeleton, 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Boston MA, August, 2011
- Barak Kashi, Moshe Brand, Jacob Rosen, Idit Avrahami, Synthesizing Two Criteria for Redundancy Resolution of Human Arm in Point Tasks, IEEE Third World Congress on Nature and Biologically Inspired Computing (NaBIC2011), October 19-21 2011, Salamanca, Spain
- Hyunchul Kim, Levi Makaio Miller, Zhi Li and Jacob Rosen, Admittance Control of Seven-DOF Upper Limb Exoskeleton to Reduce Energy Exchange, ICRA 2012, Saint Paul, MN on May 14-18, 2012
- Hyunchul Kim, Levi Makaio Miller, Zhi Li, **Jay Ryan Roldan** and Jacob Rosen, Admittance Control of an Upper Limb Exoskeleton – Reduction of Energy Exchange, 34th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), San Diego CA, August, 2012
- Hyunchul Kim, **Jay Ryan Roldan**, Zhi Li, and Jacob Rosen, Viscoelastic Model for Redundancy Resolution of the Human Arm via the Swivel Angle: Applications for Upper Limb Exoskeleton Control, 34th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), San Diego CA, August, 2012
- **Matt Simkins**, Irina Fedulow, Hyunchul Kim, Gary Abrams, Nancy Byl, Jacob Rosen, Robotic Unilateral and Bilateral Upper-Limb Movement Training for Stroke Survivors Afflicted by Chronic Hemiparesis, International Conference on Rehabilitation Robotics ICORR 2013, Seattle, 2013
- Zhi Li, Jay Ryan Roldan, Dejan Milutinović and **Jacob Rosen**, Task-relevance of Grasping-related Degrees of Freedom in Reach-to-grasp Movements, 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Chicago IL, August 26-30, 2014
- Zhi Li, Kierstin Gray, Jay Ryan Roldan, Dejan Milutinović and **Jacob Rosen**, The Joint Coordination in Reach-to-grasp Movements, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2014), Chicago IL, Sept. 14-18, 2014
- **Jacob Rosen** (Invited speaker), Raven IV: An open source surgical robotics system, IROS2014 "Medical Robotics" Workshop: Community Consensus Benchmarks for Clinical Translation of Medical Robots, 2014 Chicago IL
- **Zhi Li**, Kris Hauser, Jay Ryan Roldan, Dejan Milutinović, and Jacob Rosen, A Novel Method for Quantifying Arm Motion Similarity, 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Milan Italy, August 25-29, 2015
- Jacob Rosen, Laligam N. Sekhar, Daniel Glozman, Muneaki Miyasaka, Jesse Doshier, Brian Dellon, Kris S. Moe, Aylin Kim, Louis J. Kim, Thomas Lendvay, Yangming Li, Blake Hannaford, Roboscope: A flexible and bendable surgical robot for single portal Minimally Invasive Surgery, IEEE International Conference on Robotics and Automation (ICRA), Singapore, May 2017
- Sahba Aghajani Pedram, **Peter Ferguson**, Ji Ma, Erik P. Dutton, and Jacob Rosen, Autonomous Suturing Via Surgical Robot: An algorithm for Optimal Selection of Needle Diameter, Shape, and Path, IEEE International Conference on Robotics and Automation (ICRA) 2017, Singapore, May 2017
- **Yang Shen**, Brandon Po-Yun Hsiao, Ji Ma, and Jacob Rosen, Upper Limb Redundancy Resolution Under Gravitational Loading Conditions: Arm Postural Stability Index Based on Dynamic Manipulability



Analysis 2017 IEEE-RAS 17th International Conference on Humanoid Robotics (Humanoids) Birmingham, UK, November 15-17, 2017

- **Aaron Feldman**, Yang Shen, Jacob Rosen, Modeling of Joint Synergy and Spasticity in Stroke Patients to Solve Arm Reach Tasks, IEEE Signal Processing in Medicine and Biology Symposium (SPMB17), Philadelphia, Pennsylvania, December 2, 2017
- **Peter Walker Ferguson**, Brando Dimapasoc, Yang Shen, and Jacob Rosen, Design of a Hand Exoskeleton for Use with Upper Limb Exoskeletons, International Symposium on Wearable Robotics, Pisa, Italy. July 2018
- Yang Shen, Ji Ma, Bruce Dobkin, and **Jacob Rosen**, Asymmetric Dual Arm Approach in for Post Stroke Recovery of Motor Functions Utilizing the EXO-UL8 Exoskeleton System: A Pilot Study, 40th International Engineering in Medicine and Biology Conference (EMBC), Hawaii from July 17-21, 2018

## Manuscripts Review

### Conferences

- International Conference on Intelligent Robotic Systems - IROS 1998 Victoria, B.C., Canada, October 13-17, 1998. – 3 Manuscripts
- International Conference on Intelligent Robotic Systems - IROS 2001, Maui, Hawaii October 29- Nov. 3, 2001. - 2 Manuscripts
- IEEE International Conference on Robotics and Automation - ICRA 2002, Washington DC, April 2002 - 4 Manuscripts
- IEEE Virtual Reality 2003 (IEEE-VR2003) -Eleventh Symposium on Haptic Interfaces for virtual Environment and Teleoperator Systems, Mach 22-26, 2002, LA - 1 Manuscript
- IEEE international Conference on Robotics and Automation - ICRA 2005, Barcelona Spain, April 2005 - 2 Manuscripts
- ICAR International Conference of Advanced Robotics, ICAR 2005, Seattle WA, July 2005 - 5 Manuscripts
- International Conference on Intelligent Robotic Systems - IROS 2005, China, 2005. - 1 Manuscript
- BioRob 2006 – The first IEEE RAS –EMBS International Conference on Biomedical Robotics and Biomechatronics, February 2006, Pisa Italy - 6 Manuscripts
- IEEE International Conference on Robotics and Automation - ICRA 2006, Orlando Florida, May 2006 – 1 Manuscript
- IEEE International Conference on Robotics and Automation - ICRA 2007, Rome Italy, May 2007 – 7 Manuscripts
- IEEE Biorob 2008, Scottsdale AZ – 6 Manuscripts
- IEEE EMBC 09 – 31<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society - 6 Manuscripts
- IEEE International Conference on Robotics and Automation - ICRA 2010, Anchorage, Alaska, May 2010 – 3 Manuscripts
- IEEE Biorob 2010, Japan – 3 Manuscripts
- IEEE International Conference on Robotics and Automation - ICRA 2011, Shanghai, China, May 2010 – 6 Manuscripts
- IEEE International Conference on Intelligent Robotic Systems - IROS 2011 San Francisco, CA, September, 2011. – 4 Manuscripts
- IEEE International Conference on Rehabilitation Robotics, June 24 Seattle WA, 2013 – 2 Manuscripts

### Journals

- IEEE Transactions on Robotics and Automation – Ad hoc reviewer - 3 Manuscripts

- IEEE Transactions on Mechatronics – Ad hoc reviewer - 3 Manuscripts
- IEEE Transactions on Education – Ad hoc reviewer - 2 Manuscripts
- IEEE Transactions on Biomedical Engineering – Ad hoc reviewer - 3 Manuscripts
- IEEE Spectrum - Ad hoc reviewer - 1 Manuscript
- International Journal of Robotics Research – Ad hoc reviewer - 1 Manuscript
- Medical & Biological Engineering & Computing - Ad hoc reviewer - 2 Manuscripts
- Ergonomics - Ad hoc reviewer - 1 Manuscript
- Haptic-e - The Electronic Journal of Haptics Research (<http://www.haptics-e.org>) - 2 Manuscripts

### Service to Local, State, or Federal Government

- Federal Drug Administration (FDA) – Panel member - Public Workshop - Robotically-Assisted Surgical Devices: Challenges and Opportunities, July 27-28, 2015
- American College of Surgeons, Curriculum Development Committee, Committee Member (2009-Current)
- Independent Scientific Peer Review Committee Member of Center for Advanced Surgical and Interventional Technology (CASIT)- UCLA, American Institute of Biological Sciences (AIBS) is charged by the US Army Medical Research and Materiel Command (USAMRMC) and Advanced Technology Research Center (TATRC) - 1 panel 2009

### Panel Reviewer - Grant Proposals

- National Science Foundation - Robotics and Human Augmentation CISE – 5 Panels (2003, 2005, 2007, 2012, 2015)
- Doris Duke Charitable Foundation – Clinical Interface Award Advisory Panel – 2 Panels
- National Institutes of Health – 4 Panels (2009, 2011, 2018, March 2019)

### Editorship

- Wearable Robotics and Sensors (TBD)- Cambridge University Press – Associate Editor (Co-Founder) – 2019 – Current

### Promotion Cases (Assessment Letters)

- Full Professor Case – Rice University – Fall 2014
- Associate Professor & Tenure – University of Minnesota - Fall 2019
- Associate Professor & Tenure – Ben Gurion of the Negev, Israel - Fall 2019

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## STUDENTS AND RESEARCH ASSOCIATES

<b>SUMMARY:</b>		
	Ph.D. Students – Graduated	6
	M.Sc. Students – Graduated	9
	Post Doc – Mentored – Completed	4
	Ph.D. Students – Current	8
	M.Sc. Students – Current	2
	Post Doc – Mentored – Current	1
	Undergraduate students (Research – Independent Study)	44
	Chair / Committee Member (Ph.D. Students)	14

<b>Undergraduate Students (Research)</b>	<b>Degree</b>	<b>Years</b>
Mitch Lum (UW – Marry Gates Fellow)	EE	2000
Jeff Longion (UW – Marry Gates Fellow)	EE	2001
Michael K. Louie (UW)	ME	2002
Lillis Taylor	Industrial Design	2003
Teresa Masumoto	Industrial Design	2003
Alex Campbell (U. of Ottawa, CAN) – Summer Fellowship	EE	2003
Tim Kowalewski (UW – Marry Gates Fellow)	EE	2003
Brandon Martin (UW)	ME	2003
John Lu	EE	2003
Linh Tran (UW)	EE	2004
Nathan Manning(UW)	EE	2004
Alan Sledd (Rice)	ME	2004
Ann Sakata (UW)	CS	2005
Lim Fangpin (UW)	EE	2005
Saumil M. Gandhi (UW)	ME	2005
Huang Allen Shen-Wei (UW)	EE	2005
Av Daniel (UW)	EE	2005
Tian Xia (UW – Marry Gates Fellow)	EE	2004-2005
Lisa Oh (UW – Marry Gates Fellow)	EE	2005-2007
Trevor Fowler (UW – Marry Gates Fellow)	BioEngineering	2005-2006
Kelcie Kawamura (UW - Dean of Eng. Fellowship)	EE	2007-2008
Radivoje Jovanovic (UW)	EE	2007-2008
Asis Lopes (UCSC)	CE	2008-2010
Aimen Al-Refai (UCSC)	CE	2008-2010
Jay Rolden (UCSC)	CE	2008-2011
Evan von Lockum (UCSC)	Bioengineering	2008
Samuel Ramirez (UCSC)	CE	2008
Brady Boone (UCSC)	CE	2008
Nolan Lau (UCSC)	CE	2008
Sarah Richardson (NSF SURF-IT Summer Internship)	CS	2008
Ben Farley (NSF SURF-IT Summer Internship)	CS	2008
Pate Motter (NSF SURF-IT Summer Internship)	CS	2008
Tina Nguyen (NSF SURF-IT Summer Internship)	EE	2008
Hector Medina (UC LEADS - Summer Internship)	EE	2008
Joshua Cottrell Schloemer (UCSC)	Psychology	2009-2012
Maria Simbirsky (UCSC)	Math / Biology	2009-2010
Zachary Wells (UCSC)	BioE	2009-2013
Amanda Gentzel (NSF SURF-IT Summer Internship)	CS	2010
Ariel Anders (NSF SURF-IT Summer Internship)	CE	2010 - 2013
Celvin Yoo (UCSC)	BioE	2011 - 2013
Farhad Ighani (UCSC)	CE	2011 - 2013
Kyle Fujisawa (UCSC)	CE	2011 - 2013
Carol Owens (NSF SURF-IT Summer Internship)	EE	2011
Rachel Rieger (NSF SURF-IT Summer Internship)	ME	2011
<b>Graduate Students</b>		
Jeff Brown (UW)	Ph.D. - BioE	1999-2003
Joel C. Perry (UW)	Ph.D. – ME	2001-2006
Mitch Lum (UW)	MS – EE	2002-2004
Denny Trimble (UW)	MS – ME	2003-2005
Tim Ramsey (Stanford - Internship)	MS – ME	2004
Mitch Lum (UW)	Ph.D. – EE	2004-2008
Levi M. Miller (UW )	MS – ME	2004-2006
Robert F. Davis (UW )	MS – EE	2004-2006
Shane Souza Draney (UW )	MS – ME	2004-2006
Tariq Abuhamdia (UW )	MS – ME	2006-2008
Levi M. Miller (UW – UCSC Employee)	Ph.D. – ME	2006 - 2012

Jared Mednick (UCSC)	MS – CE	2008 - 2011
Hyunchul Kim (UCSC)	Ph.D. - EE	2010 - 2012
Matt Simkins (UCSC)	Ph.D. - CE	2009 - 2013
Aimen Al-Refai (UCSC)	MS – CE	2010 - 2012
Zhi (Jane) Li (UCSC)	Ph.D. - CE	2009 - 2014
Yang Shen	Ph.D. - MAE	2014 - 2019
Te Kang Chao	Ph.D. - MAE	2014 - Current
Erik Kramer	Ph.D. - MAE	2015 - Current
Hao Lee	Ph.D. – MAE	2015 – Current
Chang Li	Ph.D. – MAE	2015 – Current
Gautam Suri	MS – MAE	2015 – Current
Changyeob Shin	Ph.D. – MAE	2015 – Current
Peter Ferguson	Ph.D. – MAE	2015 – Current
Haoran Wang	Ph.D. – MAE	2015 – Current
Brando Dimapasoc	MS – MAE	2015 - Current

#### Postdoctoral Associates

Etoe Cvallaro Ph.D. (UW)	Bioengineering	2005-2006
Joel C. Perry Ph.D. (UW)	Mechanical Eng.	2006
Rainer Leuschke Ph.D. (UW)	Mechanical Eng.	2006-2007
Daniel Glozman Ph.D. (UCSC)	Mechanical Eng.	2008-2010
Ji Ma Ph.D. (UCSC / UCLA)	Mechanical Eng.	2010-Current

#### Laboratory Assistants

Brandon Martin	ME	2004-2006
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#### Visiting Scholars

Allert Bosch - Graduate Student - Internship Delft, Netherlands	MS - Bioengineering	2010
Michel Bovy - Graduate Student - Internship Delft, Netherlands	MS - Bioengineering	2008
Riccardo Signoretti - Graduate Student - Internship Polytech of Turin, Italy	MS – EE	2008
Raunak K. Khandelwal – Undergraduate Student – Internship, IIT Bombay, India	ME	2008
Byoung Loh, Ph.D. - Associate Professor – Sabbatical Hansung University, Seoul, Korea	ME	2009
Wen Yu, Ph.D. - Professor – Sabbatical Departamento de Control Automatico CINVESTAV-IPN, Mexico	Control	2009-2010
Choon Young, Associate Professor - Sabbatical School of Mechanical Engineering, Kyungpook National University, Daegu, Korea	Robotics	2011 - 2012
Ofir Shany, Visiting Scholar REFAEL, Israel	Robotics	2013 - 2014
Sahba Aghajani Pedram – Graduate Students – University of Hawaii	Robotics	2015 - 2016

#### Collaborators

Blake Hannaford Ph.D. – University of Washington	EE	1997- Current
Bruce Dubkin MD - UCLA	Neurology	2014 - Current
Robert Bjork PhD - UCLA	Phycology	2018 – Current
Erik Dutson MD – UCLA	Surgery	2014 – Current
Suvranu De Ph.D. - RPI	ME	2018 – Current
Nancy Byl Ph.D. - UCSF	Rehab Medicine	2008 – 2014
Gary Abrams MD - UCSF	Neurology	2008 – 2014
Thomas Lendvey MD - University of Washington	Urology	2006 – 2014
Laligam Sekhar MD – University of Washington	Neurological Surgery	2006 – 2014

Louis Kim MD – University of Washington	Neurological Surgery	2006 – 2014
Howard Chizeck Ph.D. – University of Washington	EE	2005 - 2008
Ken Goldberg Ph.D. – UC Berkley	CSE	2011 – 2016
Peter Abbeel Ph.D.– UC Berkley	CSE	2011 – 2016
Walter Douglas Boyd MD - UC Davis	Surgery	2011 – 2014
Sri Nagarjan Ph.D. – UCSF	Radiology	2010 – 2014
Dejan Milutinovic Ph.D. - UCSC	AMS	2009 – 2014
Mircea Teodorescu Ph.D. - UCSC	CE	2011 – 2014
Mika Sinanan MD Ph.D. - University of Washington	Surgery	1997 - 2008
Richard Satava MD – University of Washington	Surgery	2001 - 2008
Sara Kim Ph.D. – University of Washington	Medical Education	2006 - 2008
Janet Powell Ph.D. - University of Washington	Rehab Medicine	2005 - 2008

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**TEACHING**

Quarter	Course Name	Units	Enrolled
<b>TEACHING Years 2014-15 (UCLA)</b>			
15F	260 Current Topics in Mechanical Engineering		3
15F	182A Mathematics of Engineering		113
15S	182A Mathematics of Engineering		117
15W	263D Advanced Robotics		25
15F	MECH&AE 182A (1) – Advanced Mathematics		110
<b>TEACHING Years 2014-15 (UCLA)</b>			
151	MECH&AE 199 (1) – Research in MAE		1
15S	MECH&AE 182A (1) – Advanced Mathematics		117
15S	MECH&AE 199 (1)		4
15S	MECH&AE 375 (13)		2
15S	MECH&AE 597B (40)		2
15W	MECH&AE 263D (1) - Advanced Robotics	4	25
15W	MECH&AE 597B (40)		3
15W	MECH&AE 99 (1)		1
14F	MECH&AE 597B (40) - Preparation for Ph.D. Preliminary Exam		2
151	MECH&AE 199 (1)		1
15S	MECH&AE 182A (1)		117
<b>TEACHING Years 2013-14 (UCSC)</b>			
Summer	CMPE 198 - 01 – Individual Study Or Research	5	2
Summer	CMPE 198F - 01 - Individual Study Or Research	2	2
Fall	CMPE 141 - 01 - Feedback Control Systems	5	3
Fall	+ EE 154 - 01 - Feedback Control Systems	5	28
Fall	CMPE 198 - 06 - Individual Study Or Research	5	3
Fall	CMPE 241 - 01 - Feedback Control Systems	5	3
Fall	+ EE 241 - 01 - Feedback Control Systems	5	7
Fall	CMPE 297B - 41 - Individual Study	10	1
Fall	CMPE 297C - 22 - Individual Study	15	1
Fall	CMPE 299B - 32 - Thesis Research	10	1
Fall	CMPE 299F - 02 - Thesis Research	2	1
Winter	CMPE 009 - 01 - Statics & Dynamics	5	74
Winter	CMPE 195 - 07 - Senior Thesis Res	5	1
Winter	CMPE 198 - 10 - Individual Study Or Research	5	1
Winter	CMPE 198F - 01 - Individual Study Or Research	2	1
Winter	CMPE 215 - 01 - Model Robot Manipulation	5	8
Winter	CMPE 280C - 02 - Seminar on Control	2	2

Winter	CMPE 299B - 22 - Thesis Research	10	2
Spring	CMPE 195F - 01 - Senior Thesis Research	2	1
Spring	CMPE 198 - 06 - Individual Study Or Research	5	10
Spring	CMPE 198F - 01 - Individual Study Or Research	2	5
Spring	CMPE 280C - 02 - Seminar on Control	2	2
Spring	CMPE 297A - 06 - Individual Study	5	1
Spring	CMPE 299C - 22 - Thesis Research	15	1
Spring	EE 299B - 18 - Thesis Research	10	1

**TEACHING Years 2012-13 (UCSC)**

Summer	CMPE 195F - 01 - Senior Thesis Research	2	1
Summer	CMPE 198F - 01 - Individual Study Or Research	2	2
Summer	CMPE 299 - 01 - Thesis Research	5	1
Summer	EE 198F - 01 - Independent Field Study	2	1
Fall	CMPE 198 - 06 - Individual Study Or Research	5	3
Fall	CMPE 198F - 02 - Individual Study Or Research	2	4
Fall	CMPE 241 - 01 - Feedback Control Systems	5	4
Fall	+ EE 241 - 01 - Feedback Control Systems	5	4
Fall	CMPE 280C - 02 - Seminar on Control	2	1
Fall	CMPE 297C - 22 - Individual Study	15	2
Fall	CMPE 299C - 22 - Thesis Research	15	1
Fall	EE 154 - 01 - Feedback Control Systems	5	36
Fall	+ CMPE 141 - 01 - Feedback Control Systems	5	5
Winter	CMPE 009 - 01 - Statics & Dynamics	5	60
Winter	CMPE 198 - 10 - Individual Study Or Research	5	1
Winter	CMPE 198F - 01 - Individual Study Or Research	2	6
Winter	CMPE 297C - 02 - Individual Study	15	2
Winter	CMPE 299C - 05 - Thesis Research	15	1
Spring	CMPE 198 - 06 - Individual Study Or Research	5	1
Spring	CMPE 198F - 01 - Individual Study Or Research	2	6
Spring	CMPE 215 - 01 - Model Robot Manipulation	5	11
Spring	CMPE 297A - 06 - Individual Study	5	1
Spring	CMPE 297C - 41 - Individual Study	15	1
Spring	CMPE 299C - 22 - Thesis Research	15	1
Spring	EE 299A - 14 - Thesis Research	5	1

**TEACHING Years 2011-12 (UCSC)**

Summer	CMPE 198 - 01 - Individual Study Or Research	5	1
Summer	EE 299 - 02 - Thesis Research	5	1
Fall	CMPE 194 - 03 - Group Tutorial	5	1
Fall	CMPE 198 - 06 - Individual Study Or Research	5	2
Fall	CMPE 198F - 02 - Individual Study Or Research	2	4
Fall	CMPE 280C - 01 - Seminar on Control	2	9
Fall	CMPE 297B - 41 - Individual Study	10	1
Fall	CMPE 299C - 22 - Thesis Research	15	1
Fall	EE 154 - 01 - Feedback Control Systems	5	27
Fall	EE 241 - 01 - Feedback Control Systems	5	7
Fall	+ CMPE 241 - 01 - Feedback Control Systems	5	7
Fall	EE 299B - 17 - Thesis Research	10	1
Winter	CMPE 009 - 01 - Statics & Dynamics	5	58
Winter	CMPE 198 - 10 - Individual Study Or Research	5	2
Winter	CMPE 198F - 01 - Individual Study Or Research	2	4
Winter	CMPE 280C - 01 - Seminar on Control	2	4
Winter	CMPE 297A - 65 - Individual Study	5	2

Winter	CMPE 299B - 22 - Thesis Research	10	1
Winter	CMPE 299C - 05 - Thesis Research	15	1
Spring	CMPE 193F - 02 - Field Study	2	1
Spring	CMPE 195 - 09 - Senior Thesis Res	5	1
Spring	CMPE 198 - 06 - Individual Study Or Research	5	3
Spring	CMPE 198F - 01 - Individual Study Or Research	2	6
Spring	CMPE 215 - 01 - Model Robot Manipulation	5	6
Spring	CMPE 280C - 02 - Seminar on Control	2	6
Spring	CMPE 297A - 06 - Individual Study	5	1
Spring	CMPE 297C - 41 - Individual Study	15	1
Spring	CMPE 299C - 22 - Thesis Research	15	2
Spring	EE 299B - 18 - Thesis Research	10	1

**TEACHING Years 2010-11 (UCSC)**

Fall	CMPE 195 - 08 - Senior Thesis Res	5	2
Fall	CMPE 198 - 06 - Individual Study Or Research	5	1
Fall	CMPE 198F - 02 - Individual Study Or Research	2	2
Fall	CMPE 297B - 41 - Individual Study	10	1
Fall	CMPE 299C - 22 - Thesis Research	15	1
Fall	EE 154 - 01 - Feedback Control Systems	5	30
Fall	EE 241 - 01 - Feedback Control Systems	5	9
Fall	+ CMPE 241 - 01 - Feedback Control Systems	5	9
Fall	EE 299C - 01 - Thesis Research	15	1
Winter	CMPE 009 - 01 - Statics & Dynamics	5	43
Winter	CMPE 198 - 10 - Individual Study Or Research	5	4
Winter	CMPE 198F - 01 - Individual Study Or Research	2	1
Winter	CMPE 299C - 05 - Thesis Research	15	1
Winter	EE 299C - 04 - Thesis Research	15	1
Spring	CMPE 195 - 09 - Senior Thesis Res	5	1
Spring	CMPE 198 - 06 - Individual Study Or Research	5	2
Spring	CMPE 198F - 01 - Individual Study Or Research	2	3
Spring	CMPE 215 - 01 - Model Robot Manipulation	5	7
Spring	CMPE 280C - 01 - Seminar on Control	2	6
Spring	CMPE 297A - 06 - Individual Study	5	1
Spring	CMPE 297B - 02 - Individual Study	10	2
Spring	CMPE 299C - 22 - Thesis Research	15	2

**TEACHING Years 2009-10 (UCSC)**

Fall	CMPE 198 - 06 - Individual Study Or Research	5	2
Fall	CMPE 241 - 01 - Feedback Control Systems	5	5
Fall	+ EE 241 - 01 - Feedback Control Systems	5	5
Fall	CMPE 280C - 01 - Seminar on Control	2	7
Fall	CMPE 297A - 02 - Individual Study	5	1
Fall	EE 154 - 01 - Feedback Control Systems	5	16
Winter	CMPE 009 - 01 - Statics & Dynamics	5	38
Winter	CMPE 195 - 07 - Senior Thesis Res	5	1
Winter	CMPE 198 - 10 - Individual Study Or Research	5	4
Winter	CMPE 198F - 01 - Individual Study Or Research	2	4
Winter	CMPE 280C - 01 - Seminar on Control	2	4
Winter	CMPE 297A - 65 - Individual Study	5	1
Winter	EE 297B - 18 - Independent Study	10	1
Spring	CMPE 198 - 06 - Individual Study Or Research	5	2
Spring	CMPE 198F - 01 - Individual Study Or Research	2	3
Spring	CMPE 215 - 01 - Model Robot Manipulation	5	10

Spring	CMPE 280C - 01 - Seminar on Control	2	3
Spring	CMPE 297A - 06 - Individual Study	5	2
Spring	EE 299B - 18 - Thesis Research	10	1
<b>TEACHING Years 2008-9 (UCSC)</b>			
Winter	CMPE 198 - 10 - Individual Study Or Research	5	1
Winter	CMPE 280C - 01 - Seminar on Control	2	6
Winter	CMPE 297B - 64 - Individual Study	10	1
Winter	EE 154 - 01 - Feedback Control Systems	5	20
Winter	EE 241 - 01 - Feedback Control Systems	5	3
Winter	CMPE 241 - 01 - Feedback Control Systems	5	3
Spring	CMPE 198 - 06 - Individual Study Or Research	5	1
Spring	CMPE 215 - 01 - Model Robot Manipulation	5	8
<b>TEACHING Years 2006-2007 (UW)</b>			
Winter 06	EE543 - UW - Models of Robotic Manipulators	5	11
Spring 06	EE544 - UW - Advanced Robotic Manipulation	5	8
Winter 07	EE543 - UW - Models of Robotic Manipulators	5	15

### Graduate Students Committees – Membership on Degree and Reading Committees

#### UCLA

Student Name	Degree	Role	Year	Advisor
Jinxin Zhao	Ph.D.	Committee Member	2014	Tetsuya Iwasaki
Cheng-Wei Chen	Ph.D.	Committee Member	2014	Tsu-Chin Tsao
Yang Shen	Ph.D.	Chair	2017	Jacob Rosen
Kenneth Gutierrez	Ph.D.	Committee Member	2017	Veronica Santos
Yi Zheng	Ph.D.	Committee Member	2017	Veronica Santos
Changyeob Shin	Ph.D.	Chair	2017	Jacob Rosen
Sahba Aghajani Pedram	Ph.D.	Chair	2017	Jacob Rosen
Haoran Wang	Ph.D.	Chair	2017	Jacob Rosen

#### UCSC

Student Name	Degree	Role	Year	Advisor
Ji-Wung "Karl" Choi	Ph.D.	Committee Member	2009-2010	Gabriel Elkaim
Daniel Garalde	Ph.D.	Chair	2009-	William Dunbar
Brett Gyarfas	Ph.D.	Chair	2009-	William Dunbar
Noah Wilson	Ph.D.	Committee Member	2008	William Dunbar
Levi Miller (UW)	Ph.D.	Chair	2007-2011	Jacob Rosen
Brant Jameson	Ph.D.	Committee Member	2010	Roberto Manduchi
Jiyuan Luan	Ph.D.	Committee Member	2010	Wentai Liu
KuanFu Chen	Ph.D.	Committee Member	2009-	Wentai Liu
Matt Simkins	Ph.D.	Committee Member	2011 - 2013	Jacob Rosen
Zhi (Jane) Li	Ph.D.	Committee Member	2011 -	Jacob Rosen
Nick Carmer	Ph.D.	Chair	2014	Mircea Teorodescu

#### UW

- J. Doshier, 'Detection Thresholds and Performance Gains for Small Haptic Effects,' MSEE Thesis, University of Washington, Department of Electrical Engineering, December 2002.
- G.S. Lee, 'Low Power Haptic Devices: Ramifications on Perception and Device Design,' Ph.D. Thesis, University of Washington, Department of Electrical Engineering, June 2004.



- X. Yu, Control Methods for Automated Surgery, Ph.D. Committee Member, 2006
- Timothy Kowalewski, Objective Assessment of Surgical Skills, Ph.D., Co Committee Member, 2009-2012
- Levi Millar, Control for a 7 Degree of Freedom Powered Upper Limb Exoskeleton Ph.D., Committee Chair 2007

### Other Teaching Experience

- Workshop: Simulating Minimally Invasive Surgical Procedures in Virtual Environments: MODELING, Human Machine Interfaces in Minimally Invasive Surgery, Medicine Meets Virtual Reality, Newport Beach, CA, January 2001.
- Faculty at European Summer School on Surgical Robotics, Montpellier, August 2004.
- Workshop: Robotics Based Medicine Human Centered, Approach in Surgical and Rehabilitation Robotics, International Conformance of Robotics and Automation, ICRA 2006, Orlando FL, May 2006
- Developing Cognitive Simulator for performing the Central Venous Catheter (CVC) Procedure – Version 1 release 2008, Version 2 release 2010. The CVC module includes multimedia content and available on-line at <http://bionics.soe.ucsc.edu/research/CVC/CVC.html>
- Faculty at European Summer School on Surgical Robotics, Montpellier, August 2009.
- Workshop: Medical Robotics - The Human Centered Approach, Medical Cyber-Physical Systems, International Conformance of Robotics and Automation, ICRA 2010, Anchorage Alaska May 2010
- Faculty and Co-Organizer, North American Summer School on Surgical Robotics and Simulation, Seattle, August 2010.
- Faculty at European Summer School on Surgical Robotics, London Ontario Canada, 2012.
- Medical Robotics Workshop (Invited Speaker): Raven IV: An open source surgical robotics system, IROS2014 Community Consensus Benchmarks for Clinical Translation of Medical Robots, 2014 Chicago IL

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### Media Exposure

- ***TEDx Palo Alto – Wear a Robot Strike Stroke May 2018***  
<https://youtu.be/bzSbktTPrGE>
- ***Silicon Valley Business Journal - Healthcare Hero 2012***

UCSC Site

<http://news.ucsc.edu/2012/05/health-care-hero.html>

Silicon Valley Business Journal

<http://www.bizjournals.com/sanjose/blog/2012/05/health-care-heroes-award-winners-named.html?page=all>

- **Surgical Robotics – Raven**

The Economist - The kindness of strangers

<http://www.economist.com/blogs/babbage/2012/01/surgical-robots>

Cnet -Paging Raven II, the open-source surgery robot

[http://news.cnet.com/8301-17938\\_105-57362450-1/paging-raven-ii-the-open-source-surgery-robot/](http://news.cnet.com/8301-17938_105-57362450-1/paging-raven-ii-the-open-source-surgery-robot/)

- **Exoskeleton**

Erico Guizzo and Harry Goldstein, The Rise of the Body Bots, Oct. 2005, IEEE Spectrum

<http://spectrum.ieee.org/biomedical/bionics/the-rise-of-the-body-bots>

[http://bionics.soe.ucsc.edu/publications/Spectrum\\_Body\\_Bot.pdf](http://bionics.soe.ucsc.edu/publications/Spectrum_Body_Bot.pdf)

Getting Your Robot On: Wearable Machines' Intimate Interface

CITRIS Newsletter, August 2009

<http://citris->

[uc.org/news/2009/08/18/getting\\_your\\_robot\\_wearable\\_machines%E2%80%99\\_intimate\\_interface](http://citris-uc.org/news/2009/08/18/getting_your_robot_wearable_machines%E2%80%99_intimate_interface)

Turbo Power Physical Therapy - The future of Medicine

Popular Science Magazine, July, 2009

<http://www.popsci.com/scitech/article/2009-06/turbo-powered-physical-therapy>

Armada International, The Incredible Hulks, Thomas Withington

pp. 31-35, Issue 5, Nov/Dec 2010

[http://www.armada.ch/Flip/issue5\\_2010/pageflip.html](http://www.armada.ch/Flip/issue5_2010/pageflip.html)

Robots to aid stroke patients with physical therapy - Smart Planet

Aug 31, 2010

<http://www.smartplanet.com/business/blog/smart-takes/robots-to-aid-stroke-victims-with-physical-therapy/10346/?tag=content;col1>

Masters Of Innovation: Biological Frontiers – Palm TV, Jan 19, 2011

<http://www.plumtv.com/videos/masters-of-innovation-biological-frontiers>

- **Trauma Pod**

USA Today

[http://www.usatoday.com/tech/news/2005-03-28-trauma-pod-pentagon\\_x.htm?csp=34&POE=click-refer](http://www.usatoday.com/tech/news/2005-03-28-trauma-pod-pentagon_x.htm?csp=34&POE=click-refer)

- **Surgical Robotics / Raven Missions**

NASA Extreme Environment Mission Operations (NEEMO 12)

[http://www.nasa.gov/mission\\_pages/NEEMO/NEEMO12/mission\\_journal\\_2.html](http://www.nasa.gov/mission_pages/NEEMO/NEEMO12/mission_journal_2.html)

USA Today

[http://www.usatoday.com/tech/news/techinnovations/2007-04-19-nasa-robot-surgeon\\_N.htm](http://www.usatoday.com/tech/news/techinnovations/2007-04-19-nasa-robot-surgeon_N.htm)

Science Daily

<http://www.sciencedaily.com/releases/2007/04/070418170041.htm>

Fox News

<http://www.foxnews.com/story/0,2933,270530,00.html>

The American Association for the Advancement of Science

[http://www.eurekalert.org/pub\\_releases/2006-08/udod-rbs082106.php](http://www.eurekalert.org/pub_releases/2006-08/udod-rbs082106.php)

Science Daily - New Simulator Technology To Give Surgeons 'Feel' Of Really Operating

<http://www.sciencedaily.com/releases/1997/11/971119072155.htm>

Mechanized Medicine, The Intersecting Roles of Human Doctors and Medical Robotics  
Singapore Sessions, Wired Magazine Jan. 2011

[http://www.sedb.com/future\\_ready/singapore\\_sessions/sessions/medicalrobotics.html](http://www.sedb.com/future_ready/singapore_sessions/sessions/medicalrobotics.html)

Raven 2 - A Robo-Surgeon That Does the Work of Two Doctors

Popular Science Magazine, August, 2010

<http://www.popsci.com/technology/gallery/2010-07/gallery-rise-helpful-machines>