Kamran Shamaei, PhD

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US Permanent Resident

Work Experience

1. Auris Surgical Robotics, Inc. Senior *Robotics Software Engineer*, Software Group**,** May 2017, San Carlos
Focus: Design of software platforms for surgical robots, algorithms, c++ and python, state machines, workflow design, registration, etc.

2. Think Surgical, Inc. Senior *Robotics Systems Engineer*, Software Group**,** Nov 2015- May 2017, Fremont, CA
Focus: Design of orthopedic surgical robots for knee and hip replacement
Work Domain: Robot software development, serial manipulators calibration and path planning, high-precision motion control, system integration analysis, design requirement development, electromechanical system design, high precision measurement and localization

3. Stanford University,*Postdoctoral Associate*, Robotics, withProf. Allison Okamura, 2014-15
Surgical Robotics: Trilateral teleoperated robotic system for training and automating surgical tasks
Haptics: Neurophysiology of haptic communication in human pairs, multimodal sensory integration
Medical Robotics: Magnetically driven catheters, automation of lab culture systems for cell treatments

Education

- **Yale University, *PhD, MS, MPhil***, Robotics, with Prof. Aaron Dollar, 2009-14
  - Medical Robotics: Knee complaint exoskeletons, lower limb orthoses and prostheses
  - Biomechanics: Gait biomechanics in interaction with exoskeletons, statistical modeling of human leg joints
  - System Design: Quasi-passive knee exoskeletons for gait augmentation
  - Electromechanical Design: Real-time embedded systems, controller design
- **ETH Zurich, *MS***, Micro Robotics, with Prof. Bradley Nelson, 2008-9
  - Medical Robotics: Vision-based imaging & localizing of intraocular devices,
  - Micro Robotics: Intraocular surgeries by microrobots
  - Optics: Miniaturized fundus camera for retinal imaging
- **Iran University of Science and Technology, *BS***, Mechanical Engineering with Prof. Hamid Jahed, 2004-5
  - Robot Manipulators: Maximum dynamic load carrying capacity of flexible link manipulators
  - Control: Feedback linearization control of robot manipulators
  - Electromechanical Design: Full design of a water-droplet 3D printer for tissue scaffold fabrication

Software Skills

- **Programming:** C++ (Momentics, Visual Studio, Eclipse, and Qt), MATLAB and Simulink, C, Assembly , Delphi
- **Operating Systems:** RTOS QNX, Linux, Windows, Mac
- **Advanced C++ Skills:** Multithreading, templates, iteration, messaging, memory management, data structures, matrix manipulation, queues, stacks, mutexes, semaphores, inheritance…
- **Agile Teamwork:** Stash, Smart Sheet, Coverity, Jira, Git, Redmine
- **3D Modeling:** Solidworks, Catia, Mechanical Desktop and Autocad, Comsol (FEA)
- **Analytical Packages:** Visual3D, Minitab (Statistics), LabView, Mathematica, Maple, PROTEUS and PSpice, OSLO Optics, Mechanical Desktop (and Autocad), LaTeX, Microsoft Office
- **Electronics:** Altium Designer (Circuit Simulation and Design)

Technical Skills

- **Embedded Systems:** Freescale (C and Codewarrior), PIC (in C), Atmel (in C and Assembly)
- **Electronics:** PCB design, strain gauges, infrared (IR), foot sensitive resistors (FSR), load cells, EMG systems, VO2 sensors, potentiometers, accelerometers, serial, bluetooth
- **RTOS:** QNX, EtherCat, cascaded PID controllers, messaging
- **Calibration and System Identification:** Kalman filter, optimization, EM algorithms, FARO laser systems
- **Control Systems:** PID controller design and simulation, commutation, hall effect sensors, encoders, DC and AC motors, brushless and brushed motors, piezoelectric actuators
- **Automation:** Hydraulics, Pneumatic, PLC (degrees from Festo Company)
- **Mechanical Design and Fabrication Skills:** CNC mill and Lathe, 3D printer and laser cutter, Silicon and epoxy molding, waterjet and spark cutters, all methods in regular machine shops
- **Micro fabrication:** MEMS cleanroom processes such as mask design, photolithography, dry etching, dicing, die and wire bonding, electrical readout, sensor characterization
- **Statistics:** Minitab, regression analysis, experiment design, multivariate statistics
- **Gait Biomechanics:** Gait lab, Visual3D, EMG, data collection and analysis, VO2 measurement
- **Medical/Surgical Systems:** Orthotics and prosthetics, daVinci, Raven
- **Others:** OpenHaptic Toolbox, Chai3D, Kinematics and Dynamics Library (KDL), Eigen

Patents	• ***Licensed:*** Friction-Based Orthotic Impedance Modulation Device, U.S. Application Serial No. 14/211,246. • Ophthalmoscopy Using Direct Sensing of the Flat Aerial-Image Created by an Aspheric Lens", EP 08 016979.0. • Method and Apparatus for Solid Freeform Fabrication of Bone Tissue Engineering Scaffolds", IR, 38,211,121.
Honors & Awards	• ASME Graduate Robot Design, First Place Award, Portland, Oregon, August 2013. • Fonds Marc Birkigt Fellowship, ETH Zurich, 2009. Awarded to top ranked international students of ETH Zurich • Scholarship for Foreign Students, ETH Zurich, 2007. Awarded to top ranked international students of ETH Zurich • National Elite Recognition, Iran National Organization of Elites, 2005. • Honor Student of the Year, Iran University of Science and Technology, Mechanical Engineering, 2003-4 • Khwarizmi National First Award (The most prestigious engineering academic award of Iran), 2003
Clinical Experience	**Providence Veterans Affairs Medical Center, Rhode Island** Research Associate, Without Compensation (WOC) (Fall 2011 – Spring 2016) • Human subject experiments: Spinal cord injury and Spina Bifida patients • Gait laboratory experiments, marker placement, data collection, EMG data collection • Preparation of experiments protocols for Institutional Review Board **US Army, Natick Soldier Systems Center, Biomechanics Team, Massachusetts** Research Collaborator, Fall 2011- Spring 2013 • Gait laboratory experiments, marker placement, data collection, and analysis, EMG data collection • Preparation of experiments protocols for Institutional Review Board
Selected Journal Papers	• Biomechanical Effects of Stiffness in Parallel with the Knee Joint during Walking, IEEE TBME, 2015, **Monthly Featured Story**. • Design and Evaluation of a Quasi-Passive Knee Exoskeleton for Investigation of Motor Adaptation in Lower Extremity Joints, IEEE TBME, 2014, **Monthly Highlights**. • Design and Functional Evaluation of a Quasi-Passive Compliant Stance Control Knee–Ankle–Foot Orthosis, IEEE TNSRE, 2014. • Estimation of quasi-stiffness of the human hip in the stance phase of walking. PLoS One, 2013. • Estimation of quasi-stiffness of the human knee in the stance phase of walking. PLoS One, 2013. • Estimation of Quasi-Stiffness and Propulsive Work of the Human Ankle in the Stance Phase of Walking. PLoS One, 2013. • Single-Camera Focus-Based Localization of Intraocular Devices, IEEE TBME, 2008.
Selected Conference Papers	• A Paced Shared-Control Teleoperated Architecture for Supervised Automation of Multilateral Surgical Tasks, IEEE IROS 2015. • Design and Evaluation of a Trilateral Shared-Control Architecture for Teleoperated Training Robots, IEEE EMBC 2015. • Effects of Exoskeletal Stiffness in Parallel with the Knee on the Motion of the Human Body Center of Mass during Walking, IEEE ICRA 2015. • Preliminary Investigation of Effects of a Quasi-Passive Knee Exoskeleton on Gait Energetics, IEEE EMBC 2014. • A Quasi-Passive Compliant Stance Control Knee-Ankle-Foot Orthosis, IEEE ICORR 2013. • On the Mechanics of the Ankle during the Stance Phase of the Gait, IEEE EMBC 2011. • On the Mechanics of the Knee during the Stance Phase of the Gait, IEEE ICORR 2011. • Wide-Angle Localization of Intraocular Devices from Focus, IEEE IROS 2009. • Wide-Angle Intraocular Imaging and Localization, MICCAI 2009. • On Imaging and Localizing Untethered Intraocular Devices with a Stationary Camera, IEEE BIOROB 2008, **Finalist** for **Best Conference** and **Best Student Paper Awards**.