ARASH KALANTARI

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SUMMARY

- Over 10 years of industry experience as Robotics Mechanical Engineer.
- Over 19 years of hands-on experience in mobile robotics research (mechanical and mechanisms design, kinematics and dynamics modeling, path planning, and control of robotic systems).

EDUCATION

PhD in Mechanical Engineering, *Illinois Institute of Technology | Chicago, IL* *May 2015*

MSc in Mechatronics Engineering, *K. N. Toosi University of Technology | Tehran, Iran* *July 2008*

BSc in Mechanical Engineering, *K. N. Toosi University of Technology | Tehran, Iran* *July 2005*

WORK EXPERIENCE

Robotics Mechanical Engineer, *NASA JPL | Pasadena, CA* *March 2017-Present*

- Extreme Environment Robotics Group Lead
- Mars Sample Return Mission
    - Mars Sample Recovery Helicopter (Manipulation Lead System Engineer)
    - Sample Transfer Arm End Effector (Mechanical Engineer)
- Mars Rover 2020 (Mechanical Engineer)
    - Flight qualification of robotic arm force torque sensors
- DARPA Subterranean Challenge (Hardware Lead)
- Ultra-light weight perching system for sloped or vertical surfaces on Mars (Principal Investigator)
- Deployable self-anchoring sensor payload for future Mars helicopter (Principal Investigator)
- Robotic inspection of distillation columns (Task Manager)
- Asteroid redirect mission (Mechanical Engineer)

Mechanical Design Engineer, *DAQRI | Los Angeles, CA* *April 2015-March 2017*

- Designed mechanical hardware of DAQRI Smart Helmet, the world's first wearable human machine interface (complete product development cycle system experience).
    - Mechanical design of camera and optical subsystems.
    - Thermal management system design, FEA, and experimental validation
    - DFM, DFA, and tolerance stack up analysis of system components
    - Collaborating with EE team to design and integrate electronics
    - Design of assembly, test, and calibration fixtures

Research Assistant, *The Robotics Lab @ IIT |Chicago, IL* *May 2011 – April 2015*

- Designed, prototyped, and assessed the performance of a hybrid terrestrial and aerial robot
- Programmed autonomous flight of a quadcopter using Microsoft Kinect and OpenCV
- Designed and prototyped a novel walking and flying robot

Research Assistant, *Design & Manufacturing Lab @ IIT | Chicago, IL* *August 2009 - May 2011*

- Operated atomic force microscope (AFM) for Nano-Imaging, Nano-manipulaiton, and Nano-fabricaiton
- Planned algorithms and programed scripts for automated AFM-based Nanomanipulation using C++ and OpenCV

Mechanical Engineer, *Booria CAD/CAM Systems | Tehran, Iran* *September 2008 - August 2009*

- Collaborated in design, development, and manufacturing of Robotuft, a carpet tufting machine
- Designed the machine components and modeled the system in SolidWorks
- Performed strength and modal analysis of the system using Ansys
- Fabricated, tested, and debugged the machine

Mechanical Engineer, *Resquake Robotics Group | Tehran, Iran* *September 2003 - September 2008*

- Designed and fabricated several mobile robots for operation on rough terrain
- Implemented robot localization and mapping algorithms for missions on uneven terrain
- Planned and programmed autonomous stair climbing algorithm for ResQuake robot

PATENTS

- "Hybrid Aerial and Terrestrial Vehicle", US 20140131507 A1, A. Kalantari and M. Spenko
- "Headwear", D801587, D. Rieck, B. Mullins, R. Ries, H. Nguyen, A. Kalantari, T. Leahy
- "Portable computing device", D850444, B. Mullins, R. Lawrence Ashok Inigo, D. Hayes, R. Ries, D. Rieck, A. Kalantari, S. Sepahram, C. Li

SKILLS

Programing: C++, Matlab, OpenCV, ROS

CAD: Solidworks (EPDM, Simulation, Circuitworks), Inventor, AutoCad, GD&T

FEA: MSC Patran, MSC ADAMS, Ansys

Tools: NC & CNC machining, Lathe Machining, Laser cutting, 3D printing

Electrical: experience with ATMEL and PIC microcontrollers (implementation and programming), Experienced with actuators and sensors (Ultrasound, IR, LIDAR, Accelerometer, Gyro, Shaft encoder)

Languages: English, German, Farsi

HONORS AND AWARDS

- **JPL team award for delivering Mars 2020 flight robotic arm,** Sep 2019
- **1st place at DARPA Subterranean Challenge Urban Circuit,** Elma, WA, Feb 2020
- **2nd place at DARPA Subterranean Challenge Tunnel Circuit,** Pittsburgh, PA, Aug 2019
- **JPL award for outstanding technology development in underground exploration robotics,** Aug 2019
- **IIT Sigma Xi Research Award** for Outstanding Graduate Student, April 2014, Chicago, IL
- **2nd place, Best Research Poster Award at IIT**, April 2010
- **3rd place, Rescue Real League of RoboCup 2008**, Suzho, China
- **Best Operator Interface Award**, Rescue real league of RoboCup 2006, Bremen, Germany
- **2nd Place, Best Mechanical Design Award**, Rescue real league of RoboCup 2005, Osaka, Japan

PUBLICATIONS (TOTAL CITATIONS: 1108)

JOURNAL PAPERS:

- E. Sihite, A. Kalantari, R. Nemovi, A. Ramezani, M. Gharib, **Multi-Modal Mobility Morphobot (M4) with appendage repurposing for locomotion plasticity enhancement**, *Nature Communications*, Vol. 14, Issue 1, June 2023
- T. G. Molnar, K. Tighe, W. Ubellacker, A. Kalantari, and A. D. Ames, **Mechanical Design, Planning, and Control for Legged Robots in Distillation Columns,** *Journal of Computational and Nonlinear Dynamics*, Vol. 18, No. 6, April 2023
- A. Kalantari and M. Spenko, "**Design and Performance Assessment of HyTAQ, A Hybrid Terrestrial and Aerial Quadrotor**", *IEEE Transactions on Robotics, September 2014, Vol. 30, Issue 5*
- A. Kalantari, K. Xu, and X. Qian, "**Automated Nanoparticle Manipulation through Sequential Parallel Pushing***", IEEE Transactions on Nanotechnology, July 2011, Vol. 11, No. 4*, S. A. A. Moosavian, A. Kalantari, H. Semsarilar, E. Aboosaeedan, and E. Mihankhah, "**ResQuake: A Tele-Operative Rescue Robot**", *ASME Journal of Mechanical Design, August 2009, Vol 131, Issue 8*

CONFERENCE PAPERS AND PRESENTATIONS:

- A. Kalantari, A. Brinkman, K. Carpenter, M. Gildner, J. Jenkins, D. Newill-Smith, J. Seiden, A. llen Umali, R. McCormick, "**Design, Prototype, and Performance Assessment of an Autonomous Manipulation System for Mars Sample Recovery Helicopter",** *IEEE Int. Conference on Intelligent Robots and Systems (IROS), Abu Dhabi , UAE, Oct 2024 (Accepted)*
- P. Spieler, S. X. Wei, M. Li, A. Galassi, K. Uckert, A. Kalantari, J. W. Burdick, "**PARSEC: An Aerial Platform for Autonomous Deployment of Self-Anchoring Payloads on Natural Vertical Surfaces**," *2023 IEEE International Conference on Robotics and Automation (ICRA)*, London, United Kingdom, 2023, pp. 5331-5337
- *E. Sihite, F. Slezak, I. Mandralis, A. Salagame, M. Ramezani, A. Kalantari, A. Ramezani, M. Gharib,* "**Demonstrating autonomous 3d path planning on a novel scalable ugv-uav morphing robot"**, *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, USA, 2023*
- A. Kalantari, T. Touma, L. Kim; R. Jitosho, K. Strickland, B. Lopez, and A. Agha, "**Drivocopter: A Hybrid Aerial/Ground Vehicle for Long-Endurance Mobility",** *IEEE Aerospace Conference, March 2020, MT, USA*
- S. Backus, J. Izraelevitz, J. Quan, R. Jitosho, E. Slavick, and A. Kalantari, **"Design and Testing of an Ultra-Light Weight Perching System for Sloped or Vertical Rough Surfaces on Mars",** *IEEE Aerospace Conference, March 2020, MT, USA*
- A. Kalantari, K. Mahajan, D. Ruffatto, and M. Spenko, "**Autonomous Perching and Take-off on Vertical Walls for a Quadrotor Micro Air Vehicle**," *IEEE International Conference on Robotics and Automation (ICRA) 2015, Seattle, USA*
- A. Kalantari and M. Spenko, "**Design and Experimental Validation of HyTAQ, a Hybrid Terrestrial and Aerial Quadrotor***", IEEE International Conference on Robotics and Automation (ICRA), Germany, May 2013*
- A. Kalantari and M. Spenko, "**Design and Manufacturing of a Walking Quadrotor Aerial Vehicle**", *ASME International Design Engineering Technical Conferences (IDETC), Chicago, IL, August 2012*
- A. Kalantari., E. Mihankhah, and S. A. A. Moosavian, "**Safe Autonomous Stair Climbing for a Tracked Mobile Robot Using a Kinematics based Controller**", *Proc. Of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) 2009, Singapore*
- E. Mihankhah, H. Taghirad, A. Kalantari, E. Aboosaeedan and H. Semsarilar, "**Line matching localization and map building with least square**," I*EEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) 2009, Singapore*
- S. A. A. Moosavian and A. Kalantari, "**Experimental Slip Estimation for Exact Kinematics Modeling and Control of a Tracked Mobile Robot**", *IEEE Int. Conference on Intelligent Robots and Systems (IROS), Nice, France, September 2008*
- E. Mihankhah, A. Kalantari, H.D. Taghirad, S. A. A. Moosavian, and E. Aboosaeedan, "**Autonomous Staircase Detection and Stair Climbing for a Tracked Mobile Robot using Fuzzy Controller**", *IEEE Int. Conference on Robotics and Biomimetics (ROBIO), Bangkok, Thailand, December 2008*
- S. A. A. Moosavian, H. Semsarilar, and A. Kalantari, "**Design and Manufacturing of a Mobile Rescue Robot**", *IEEE Int. Conference on Intelligent Robots and Systems (IROS), Beijing, China, October 2006*