

Mohammad Mahdavian

Mechatronic Engineering, MSc.
Simon Fraser University

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Interests

Control System Design

- ◇ Control Theory
 - Model identification and parameter estimation
- ◇ Modern Control (Robust, Optimal, Nonlinear, ...)
- ◇ Mechatronics

Robotics and Bioengineering

- ◇ BioRobotics and BioMechanics
 - Gait Analyzes
 - Robotic Prosthesis
 - Rehabilitation & Exoskeleton Robotics
 - Haptic & Robotic Surgery
 - ◇ Robotics
 - Bio-Inspired Robots
 - Quad rotors
 - Space Robotics
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Education

MSc. Mechatronic Engineering | Simon Fraser University 2016-Present

Thesis subject: "Control and Balancing of a Lower Limb Exoskeleton"
Advisor: Dr.Arzanpour

B.Sc. Mechanical Engineering | University of Tehran GPA: 3.3/4 2010-2015

Thesis subject: "Trajectory Generation, Optimization and Control of a Robotic Arm"
Advisor: Prof. Yousefi-Koma

Work & Research Experience

◇ RESEARCH ASSISTANT

Center of Advanced Systems and Technologies (CAST) | Dr. A. Yousefi-Koma March 2012 — present

*For more interactive contents about my projects please visit my website

Projects:

Project Engineer

SURENAIII National Humanoid Robot

- Head of upper body control and "Dynamic and Control" team member
- Generated Trajectory and Controlled SURENA III humanoid robot arm for "Gripping" and "Aerobic Motions"
- Acquainted with robotics kinematic and dynamic
- Redesigned the arm's structure
- Expert in using CNC and fabrication tools
- Manager of design documentation report

Project Engineer

Modeling and Control of a Wing Mechanism with Shape Memory Alloy (SMA) Actuators

- Modeled a System with Hysteresis Behavior for SMA wire
- Controlled SMA springs actuation

Project Manager

Design, Fabrication and Control of a Robotic Hand Using Shape Memory Alloy Actuators

- Managed design procedure
- Fabricated robot using 3D printers, CNC and tools
- Controlled SMA springs actuation
- Managed 6 person group in design and fabrication procedure

Lead Project Engineer

Rehabilitation Exoskeleton Robot

- Designed and Fabricated a novel 3DoF upper limb exoskeleton

Proposals:

- Developed several proposals like “Data Acquisition Card”, “Cooling Tower” for Iranian research/industrial companies

◇ RESEARCH ASSISTANT

Mechatronic Circle of University of Tehran | Dr. M. Mahjoob

April 2011 — March 2012
February 2014 — Present

Lead Project Engineer

Inertial Sensing for Rehabilitation

- Utilized **Opensim** program to compare muscle activity results with experimental data

Project Engineer

Rescue Robot

- Designed and Fabricated a rescue robot

◇ RESEARCH ASSISTANT

Dr. M. A. Nazari

September 2014 — September 2015

Project Engineer

Comparing Hill and Feldman’s Model Using Opensim

- Utilized **Opensim** program to compare Hill and Feldman’s muscle models

Publications

◇ JOURNAL PAPERS

1. M. Oveysi, M. Nazari, **M. Mahdavian**. “Equivalent linear damping characterization in linear and nonlinear force-stiffness muscle models”
Published in Journal of Biological Cybernetics
2. **M.Mahdavian**, A.Yousefi-Koma, M.Shariat-Panahi, M.Khadiv, A.Ghasemi-Toudeshki. “Optimal Trajectory Generation for Energy Consumption Minimization and Moving Obstacle Avoidance of SURENA III Robot’s Arm”
Published in International Journal of Robotics (Theory and Application)
3. M. Sadedel, A.Yousefi-Koma, M.Khadiv, **M.Mahdavian**. “Adding Low Cost Passive Toe Joints to the Feet Structure of SURENA III Humanoid Robot”
Published in Robotica Journal
4. H.Basaeri, M.Zakerzadeh, A.Yousefi-Koma, **M. Mahdavian**, N.Faridi-Rad. “Fuzzy PID Control of a Morphing Wing Mechanism Actuated by Shape Memory Alloy Actuators Based on Generalized Prandtl-Ishlinskii Model with Experimental Validation”
Submitted to Journal of Smart Materials and Structures

◇ COFERENCE PAPERS

5. **M.Mahdavian**, A.Yousefi-Koma, M.Shariat-Panahi, A.Ghasemi-Toudeshki. “Optimum Trajectory Generation for Energy Consumption Minimization and Moving Obstacle Avoidance of a 4DOF Robot Arm”. ICROM2015 **IEEE** conference.
6. **M.Mahdavian**, A.Yousefi-Koma, M.Khadiv. “Trajectory Planning and Minimum-Norm Inverse Kinematics Solution for a Humanoid Redundant Arm”. X-Mech conference 2014
7. **M.Mahdavian**, A.Yousefi-Koma, A.Ghasemi-Toudeshki. “Design and fabrication of a 3DoF upper limb exoskeleton”. ICROM2015 **IEEE** conference
8. **M. Mahdavian**, A. Yousefi-Koma. M. Karimian. “Analysis and optimization of Propulsion of a fish robot and the tail effect”. (Persian). ISME 2014 conference
9. A.Ahmadi, A.Yousefi-Koma, **M.Mahdavian**, F.AliDoost, N.Faridi-Rad, Ali Bazrafshan. “Design and fabrication of a Robotic Hand Using Shape Memory Alloy”. ICROM2015 **IEEE** conference
10. A.Ghasemi-Toudeshki, A.Yousefi-Koma, **M.Mahdavian**, A.Taherifar. “Kinematics of an exoskeleton robot in variant working situations”. (Persian). ISME 2014 conference.
11. A.Ghasemi-Toudeshki, A.Yousefi-Koma, **M.Mahdavian**, M.Imani, N.Jamali. “A micro UAV trajectory generation in 3D space considering obstacles by a new and optimum potential function”. AI & Robotics 2015 **IEEE** Conference.
12. A.Shahrokshahi, A.Yousefi-Koma, M.Khalili, **M.Mahdavian**. “System Identification of a Humanoid Robot Power Transmission System”. ICROM 2014 **IEEE** conference.

13. H. Keshavarz, A. Yousefi-Koma, S. S. Mohtasebi, A. Nikkhah, **M. Mahdavian**. "Design, Dynamic Modeling and Offline Path Planning of a 3D Quadraped Robot". ICE2015 Conference, Turkey.

Teaching and Mentoring Experiences

◇ TEACHER ASSISTANT

Principles of Automatic Control | Dr. Ayati

Fall 2013

Principles of Automatic Control | Dr. Yousefi-Koma

Winter 2014

Theory of Mechanical Measurement Systems | Dr. Mahjoob

Fall 2014

◇ LABVIEW PROGRAM TUTORING

◇ STUDENT ACADEMIC MENTORING

Mentored undergraduate students for Modeling and Implementation Shape Memory Alloys

Honors & Awards

The Nationwide University Entrance Exam: **214** among **277820**

Fully funded bachelor at the University of Tehran for Undergraduate Program

Semi-Finalist of High School **Mathematics** Nationwide Olympiad

Semi-Finalist of High School **Physics** Nationwide Olympiad

Participated in High School Khwarizmi Nationwide Scientific Competition

Selected Academic Projects

Series Elastic Actuators

- Designed and fabricated a Series Elastic Actuator as Haptic course project

Developing a Novel Hospital Bed

- Designed and developed a novel hospital bed as Product Design and Development (R&D) project
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Skills

Advanced user of **LABVIEW**: General Coding, Data acquisition toolboxes, Robotics Module, Mathematics, Vision, etc.

Advanced user of MS Office package with the aim of **generating technical reports**.

Proficient in:

- Labview**
- MATLAB**
- SolidWorks**
- MS Office**
- Opensim**

Experienced in:

- C++**
 - AutoCAD**
 - Abaqus**
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Selected Courses

ROBOTICS	(18.0 /20)
BIOMECHANICS	(19.5 /20)
PRINCIPLES OF AUTOMATIC CONTROL	(18.6 /20)
Mechanical Optimization	(17.5 /20)

Language Skills

English (Fluent) TOEFL:94 (R: 23, L: 27, S: 23, W: 21)

References

Dr. S. Arzanpour
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Dr. M. A. Nazari
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