

CURRICULUM VITAE

Dr. Peiman Naseradinmousavi

Associate Professor
E-323C, Mechanical Engineering Department
College of Engineering
San Diego State University
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Research Interests

Nonlinear Dynamics, Control, and Optimization with Applications to **Robotics**, Smart Flow Distribution Network, Electromechanical Systems, Magnetic Bearings, and Multiphysics Systems.

Education

Villanova University, Villanova, 19085, PA, USA August 2008 - May 2012
PhD in Mechanical Engineering, Dynamics and Control

<https://www1.villanova.edu/villanova/engineering/newsevents/newsarchives/2013/commencement2013.html>

University of Tabriz, Iran 2004 - 2006
M.Sc in Mechanical Engineering-Robotics and Control

University of Tabriz, Iran 1998 - 2003
B.Sc in Mechanical Engineering-Solid Design

Positions:

August 2020-Present

Associate Professor of Mechanical Engineering Department
College of Engineering
San Diego State University

August 2014-August 2020

Assistant Professor of Mechanical Engineering Department
College of Engineering
San Diego State University

August 2012-May 2014

Visiting Assistant Professor of Mechanical and Electrical Engineering Departments
Purdue University
Departments of Engineering

2006-2008

Senior Design Engineer
AZARAB ENERGY CO.

2003-2006

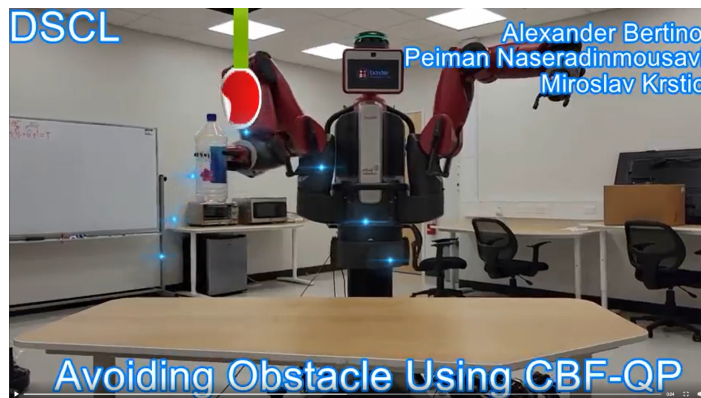
Design Engineer
POTKCO Company

2001-2003

Head of Production Line
AIDA PLASTIC CO.

Refereed Articles

1. Bo Wang, Sergey Nersesov, Hashem Ashrafiuon, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Underactuated Source Seeking by Surge Force Tuning: Theory and Boat Experiments”, *IEEE Transactions on Control Systems Technology*, Under Review, 2022.
2. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Prescribed-Time Safety Filter for a 7-DOF Robot Manipulator: Experiment and Design”, *IEEE Transactions on Control Systems Technology*, Accepted, To Appear, 2022.



3. Vahid Tavakol Aghaei, Arda Agababaoglu, **Peiman Naseradinmousavi**, Sinan Yildirim, Serhat Yesilyurt, and Ahmet Onat, “Energy Optimization of Wind Turbines via a Neural Control Policy Based on Reinforcement Learning Markov Chain Monte Carlo Algorithm”, *Applied Energy*, Under Review, 2022.
4. Jafar Keighobadi, Hadi Mohammadian KhalafAnsar, and **Peiman Naseradinmousavi**, “Adaptive neural dynamic surface control for uniform energy exploitation of floating wind turbine”, *Applied Energy*, Vol. 316, p. 119132, 2022.

5. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Delay-Adaptive Control of a 7-DOF Robot Manipulator: Design and Experiments”, *IEEE Transactions on Control Systems Technology*, Accepted, In Press, 2022.
6. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Design and Experiment of a Prescribed-Time Trajectory Tracking Controller for a 7-DOF Robot Manipulator”, *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 144, Issue 10, p. 101005, 2022.
7. Shae T. Hart, Mohammad A. Ayoubi, and **Peiman Naseradinmousavi**, “Comparative Study of Pseudospectral Methods for Spacecraft Optimal Attitude Maneuvers”, *Journal of Spacecraft and Rockets*, Vol. 59:1, pp. 178189, 2022.
8. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Experiment and Design of Prescribed-Time Safety Filter for a 7-DOF Robot Manipulator Using CBF-QP”, *IFAC-PapersOnLine*, 2022.
9. Bo Wang, Sergey Nersesov, Hashem Ashrafioun, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Source Seeking for Planar Underactuated Vehicles by Surge Force Tuning”, *The IEEE Conference on Decision and Control*, 2022.
10. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Experimental and Analytical Prescribed-Time Trajectory Tracking Control of a 7-DOF Robot Manipulator”, *the American Control Conference (ACC)*, pp. 1941-1946, 2022.

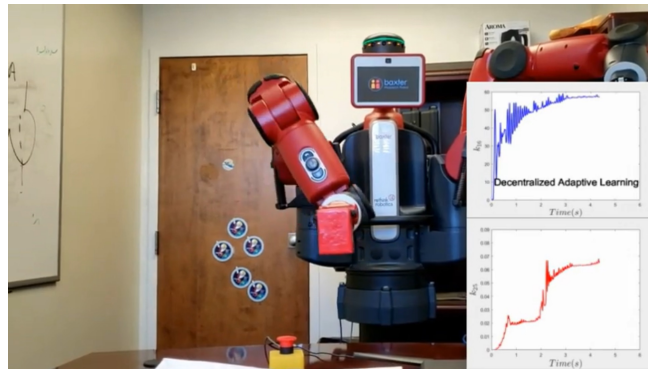


11. Alexander Bertino, Hashem Ashrafioun, and **Peiman Naseradinmousavi**, “Disturbance Attenuation Through Real-Time Optimization of PD Gains for a Two-Link Robot”, *IFAC-PapersOnLine*, Volume 54, Issue 20, Pages 84-89, 2021.
12. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Experimental and Analytical Delay-Adaptive Control of a 7-DOF Robot Manipulator”, *the American Control Conference (ACC)*, pp. 72-77, 2021.
13. Alexander Bertino, **Peiman Naseradinmousavi**, and Atul Kelkar, “Analytical and Experimental Decentralized Adaptive Control of a High-Degrees-of-Freedom Robot Manipulator”, *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 143, Issue 7, p. 071007,

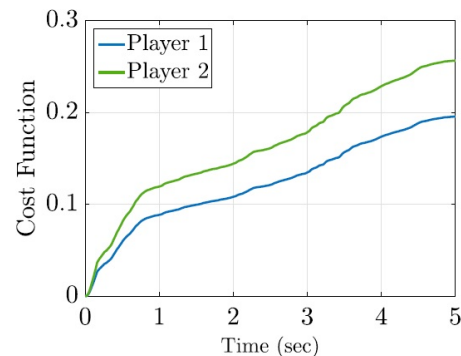
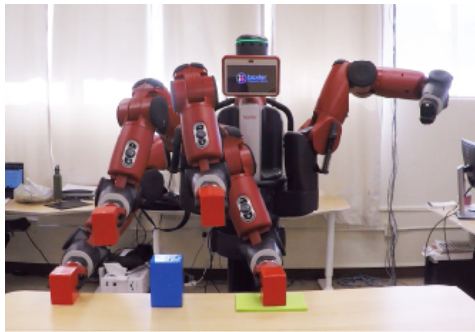
2021.

- Alexander Bertino, **P. Naseradinmousavi**, and Atul Kelkar, “*Experimental and Analytical Decentralized Adaptive Control of a 7-DOF Robot Manipulator*”, the ASME 2020 Dynamic Systems and Control Conference (DSCC), Paper No: DSCC2020-20867, p. V001T05A004, Pittsburgh, USA, 2020.

This work won the Prestigious Award for Best Student Paper of DSCD Robotics at DSCC 2020 Conference, by my former PhD student Dr. Alexander Bertino.



- Mostafa Bagheri and **Peiman Naseradinmousavi**, “*Analytical and experimental nonzero-sum differential game-based control of a 7-DOF robotic manipulator*”, Journal of Vibration and Control, Vol. 28(5-6), pp. 707-71, 2021.



- Mostafa Bagheri, Iasson Karafyllis, **P. Naseradinmousavi**, Miroslav Krstić, “*Adaptive Control of a Two-Link Robot Using Batch Least-Square Identifie*”, IEEE/CAA Journal of Automatica Sinica, Vol. 8, No. 1, January 2021.
- Luca Parrinello, Panagiotis Dafnakis, Edoardo Pasta, Giovanni Bracco, **Peiman Naseradinmousavi**, Giuliana Mattiazzo, and Amneet Pal Singh Bhalla, “*An adaptive and energy-maximizing control optimization of wave energy converters using an extremum-seeking approach*”, Physics of Fluids, 32, 113307, 2020.
- Mostafa Bagheri, Alexander Bertino, and **P. Naseradinmousavi**, “*Experimental and Analytical Nonzero-Sum Differential Game-Based Control of a 7-DOF Robotic Manipulator*”, the ASME 2020 Dynamic Systems and Control Conference (DSCC), Paper No: DSCC2020-

23518, p. V001T04A001, USA, 2020.

19. Mostafa Bagheri, **P. Naseradinmousavi**, and Miroslav Krstić, “*Feedback Linearization Based Predictor for Time Delay Control of a High-DOF Robot Manipulator*”, *Automatica*, Vol. 108, No. 108485, October, 2019.

This paper was featured in **KPBS news**:

<https://www.kpbs.org/news/2019/jul/08/san-diego-researchers-robots-parkinsons-disease/>

<https://www.youtube.com/watch?v=OHabNEHrfFk>

https://www.youtube.com/watch?list=PL2BEE055A0FBFA666time_continue=1506v=sjlgN44f6V0



20. Mostafa Bagheri, Miroslav Krstić, and **P. Naseradinmousavi**, “*Multivariable Extremum Seeking for Joint-Space Trajectory Optimization of a High-Degrees-of-Freedom Robot*”, *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 140, Issue 11, pp: 111017-111017-13, 2018,
21. **P. Naseradinmousavi**, Hashem Ashrafioun, and Mostafa Bagheri, “*A Decentralized Neuro-Adaptive Control Scheme to Suppress Chaotic/Hyperchaotic Dynamics of Smart Valves Network*”, *ASME Journal of Computational and Nonlinear Dynamics*, Vol. 13, Issue 5, pp: 051008-1-051008-1, 2018.
22. **P. Naseradinmousavi**, Hashem Ashrafioun, and M. A. Ayoubi, “*An Adaptive Centralized Approach to Control Chaotic and Hyperchaotic Dynamics of Smart Valves Network*”, *ASME Journal of Computational and Nonlinear Dynamics*, Vol. 13, Issue 1, pp: 011002-011002-11, 2018.
23. Karthikeyan Rajagopal, Serdar Cicek, **P. Naseradinmousavi**, Abdul Jalil M. Khalaf, Sajad Jafari, and Anitha Karthikeyan, “*A Novel Parametrically Controlled Multi-Scroll Chaotic Attractor Along With Electronic Circuit Design*”, *The European Physical Journal Plus*, Vol. 133, No. 354, pp: 1-8, DOI 10.1140/epjp/i2018-12168-9, 2018.
24. Mostafa Bagheri and **P. Naseradinmousavi**, “*Novel Analytical and Experimental Trajectory Optimization of a 7-DOF Baxter Robot: Global Design Sensitivity and Step Size Analyses*”,

The International Journal of Advanced Manufacturing Technology, Vol. 93, Issue 9-12, pp: 4153-4167, 2017.

25. David B. Segala and **P. Naseradinmousavi**, “*On the Inclusion of Time Derivatives of State Variables for Parametric Model Order Reduction for a Beam on a Nonlinear Foundation*”, ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 139, Issue 8, pp: 081009-081009-7, 2017.
26. **P. Naseradinmousavi**, Sahar Ghanipoor Machiani, Mohammad A. Ayoubi, and C. Nataraj, “*Coupled Operational Optimization of Smart Valve System Subject to Different Approach Angles of a Pipe Contraction*”, Journal of Structural and Multidisciplinary Optimization, Vol. 55, Issue 3, pp: 1001-1015, 2017.
27. **P. Naseradinmousavi**, Miroslav Krstić, and C. Nataraj, “*Design Optimization of Dynamically Coupled Actuated Butterfly Valves Subject to a Sudden Contraction*”, ASME Journal of Mechanical Design, Vol. 138, Issue 4, pp: 041402-041402-11, 2016.
28. **P. Naseradinmousavi**, David Segala, and C. Nataraj, “*Chaotic and Hyperchaotic Dynamics of Smart Valves System Subject to a Sudden Contraction*”, ASME Journal of Computational and Nonlinear Dynamics, Vol. 11, Issue 5, pp: 051025-051025-9, 2016.
29. B. Safaei, **P. Naseradinmousavi**, and A. Rahmani, “*Development of an accurate molecular mechanics model for buckling behavior of multi-walled carbon nanotubes under axial compression*”, Journal of Molecular Graphics and Modelling, Vol. 65, pp: 43-60, April, 2016.
30. **P. Naseradinmousavi**, “*A Novel Nonlinear Modeling and Dynamic Analysis of Solenoid Actuated Butterfly Valves Coupled in Series*”, ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 137, Issue 1, pp: 014505-014505-5, January, 2015.
31. **P. Naseradinmousavi** and C. Nataraj, “*Optimal Design of Solenoid Actuators Driving Butterfly Valves*”, ASME Journal of Mechanical Design, Vol. 135, Issue 9, pp: 094501-094501-5, September, 2013.
32. **P. Naseradinmousavi** and C. Nataraj, “*Transient Chaos and Crisis Phenomena in Butterfly Valves Driven by Solenoid Actuators*”, Journal of Communications in Nonlinear Science and Numerical Simulation, Vol. 17, Issue 11, pp: 4336-4345, 2012.
33. D. Lee, **P. Naseradinmousavi**, and C. Nataraj, “*Nonlinear Model-Based Adaptive Control of a Solenoid-Valve System*”, Journal of Control Science and Engineering, Vol. 2012, 2012.
34. **P. Naseradinmousavi** and C. Nataraj, “*Nonlinear Mathematical Modeling of Butterfly Valves Driven by Solenoid Actuators*”, Journal of Applied Mathematical Modelling, Vol. 35, Issue 5, pp: 2324-2335, 2011.

35. **Mousavi, P. N.**, Bagheri, A., and Miripour-Fard, B., “*Mathematical Modeling and Simulation of Combined Trajectory Paths of a Seven Link Biped Robot*”, Climbing and Walking Robots, ISBN 978-953-307-030-8, pp: 165-184, March 2010.
36. **Peiman N. Mousavi**, C. Nataraj, Ahmad Bagheri, and Mehdi Alizadeh Entezari, “*Mathematical Modeling of Combined Trajectory Paths of a Seven Link Biped Robot*”, Journal of Applied Mathematical Modelling, Vol. 32, Issue 7, pp: 1445-1462, 2008.
37. **Peiman N. Mousavi** and Ahmad Bagheri, “*Mathematical Modeling of a Seven Link Biped Robot and ZMP Considerations*”, Journal of Applied Mathematical Modelling, Vol. 31, Issue 1, pp: 18-37, 2007.
38. **Peiman N. Mousavi** and Ahmad Bagheri, “*Dynamical Simulation of Single and Combined Trajectory Path Generation and Control of a Seven Link Biped Robot*”, Humanoid Robots: New Developments, ISBN 978-3-902613-00-4, pp: 89-120, June 2007.
39. Alexander Bertino, Mostafa Bagheri, M. Krstić, and **P. Naseradinmousavi**, “Experimental Autonomous Deep Learning-based 3D Path Planning for a 7-DOF Robot Manipulator”, *the ASME 2019 Dynamic Systems and Control Conference (DSCC)*, Paper No: DSCC2019-8951, p. V002T14A002, Oct. 8 - Oct. 11, Park City, Utah, USA, 2019.
40. Mostafa Bagheri, **P. Naseradinmousavi**, and M. Krstić, “Time Delay Control of a High-DOF Robot Manipulator Through Feedback Linearization Based Predictor”, *the ASME 2019 Dynamic Systems and Control Conference (DSCC)*, Paper No: DSCC2019-8915, p. V003T16A001, Oct. 8 - Oct. 11, Park City, Utah, USA, 2019.
41. Mostafa Bagheri, Miroslav Krstić, and **P. Naseradinmousavi**, “Joint-Space Trajectory Optimization of a 7-DOF Baxter Using Multivariable Extremum Seeking”, *the American Control Conference (ACC)*, Paper No. WeC16.4, Milwaukee, USA, June 27-29, 2018.
42. **P. Naseradinmousavi**, Hashem Ashrafioun, and Mostafa Bagheri, “Suppressing Chaotic and Hyperchaotic Dynamics of Smart Valves Network Using A Centralized Adaptive Approach”, *the 2018 American Control Conference (ACC)*, Paper No. WeC03.1, Milwaukee, USA, June 27-29, 2018.
43. Mostafa Bagheri, M. Krstić, and **P. Naseradinmousavi**, “Analytical and experimental predictor-based time delay control for Baxter robot”, *the ASME 2018 Dynamic Systems and Control Conference (DSCC)*, Paper No. DSCC2018-9101, pp: V001T04A011, Sept. 30-Oct. 3, Atlanta, USA, 2018.
44. M. A. Ayoubi and **P. Naseradinmousavi**, “Open-Loop Minimum-Energy Maneuver of a Solar- Sail Using Magnetic Torques and Reaction Wheels”, *the ASME 2018 Dynamic Systems and Control Conference (DSCC)*, Paper No. DSCC2018-9093, pp: V003T40A010, Sept. 30-Oct. 3, Atlanta, USA, 2018.

45. **P. Naseradinmousavi**, Mostafa Bagheri, Hashem Ashrafiuon, Marcello Canova, and David B. Segala, “Suppressing Chaotic/Hyperchaotic Dynamics of Smart Valves Network Using Decentralized and Centralized Schemes”, *the ASME 2017 Dynamic Systems and Control Conference (DSCC), Invited Session: Control of Smart Buildings and Microgrids*, Volume 3, pp: V003T42A001, Paper No: DSCC2017-5006, Oct. 11-13, Virginia, USA, 2017.
46. Mostafa Bagheri, **P. Naseradinmousavi**, and Rasha Morsi, “Experimental and Novel Analytical Trajectory Optimization of a 7-DOF Baxter Robot: Global Design Sensitivity and Step Size Analysis”, *the ASME 2017 Dynamic Systems and Control Conference (DSCC)*, Volume 1, pp: V001T30A001, Paper No: DSCC2017-5004, Oct. 11-13, Virginia, USA, 2017.
47. **P. Naseradinmousavi**, Miroslav Krstić, Mostafa Bagheri, and C. Nataraj, “Coupled Chaotic and Hyperchaotic Dynamics of Actuated Butterfly Valves Operating in Series”, *the ASME 2016 Dynamic Systems and Control Conference (DSCC)*, Volume 2: Mechatronics; Mechatronics and Controls in Advanced Manufacturing; Modeling and Control of Automotive Systems and Combustion Engines; Modeling and Validation; Motion and Vibration Control Applications; Multi-Agent and Networked Systems; Path Planning and Motion Control; Robot Manipulators; Sensors and Actuators; Tracking Control Systems; Uncertain Systems and Robustness; Unmanned, Ground and Surface Robotics; Vehicle Dynamic Controls; Vehicle Dynamics and Traffic Control, Paper No. DSCC2016-9601, pp: V002T17A001, October 12-14, Minneapolis, 2016.
48. **P. Naseradinmousavi**, Mostafa Bagheri, and C. Nataraj, “Coupled Operational Optimization of Smart Valve System Subject to Different Approach Angles of a Pipe Contraction”, *the ASME 2016 Dynamic Systems and Control Conference (DSCC)*, Volume 1: Advances in Control Design Methods, Nonlinear and Optimal Control, Robotics, and Wind Energy Systems; Aerospace Applications; Assistive and Rehabilitation Robotics; Assistive Robotics; Battery and Oil and Gas Systems; Bioengineering Applications; Biomedical and Neural Systems Modeling, Diagnostics and Healthcare; Control and Monitoring of Vibratory Systems; Diagnostics and Detection; Energy Harvesting; Estimation and Identification; Fuel Cells/Energy Storage; Intelligent Transportation, Paper No. DSCC2016-9627, pp: V001T02A001, October 12-14, Minneapolis, 2016.
49. **P. Naseradinmousavi**, “*Optimal Design of Solenoid Actuated Butterfly Valves Dynamically Coupled in Series*”, Proceedings of the ASME 2015 International Mechanical Engineering Congress & Exposition (IMECE), Volume 4A: Dynamics, Vibration, and Control, pp: V04AT04A032, Paper No. IMECE2015-50094, November 13-19, Houston, USA, 2015.
50. **P. Naseradinmousavi** and C. Nataraj, “*Design Optimization of Solenoid Actuated Butterfly Valves Dynamically Coupled in Series*”, ASME Dynamic Systems and Control Conference (DSCC), Volume 2: Diagnostics and Detection; Drilling; Dynamics and Control of Wind Energy Systems; Energy Harvesting; Estimation and Identification; Flexible and Smart Structure Control; Fuels Cells/Energy Storage; Human Robot Interaction; HVAC Building Energy Management; Industrial Applications; Intelligent Transportation Systems; Manufacturing; Mechatronics; Modelling and Validation; Motion and Vibration Control Applications, pp: V002T33A001, October, 2015.

51. **P. Naseradinmousavi**, “*An Operationally Optimized Seven Link Biped Robot Moving on Slopes*”, Proceedings of ASME 2013 International Mechanical Engineering Congress & Exposition, Volume 4A: Dynamics, Vibration and Control, November 15-21, pp: V04AT04A018, November, 2013.
52. **P. Naseradinmousavi**, C. Nataraj, and M. Frank, “*Nonlinear Modeling and Analysis of Electromagnetic Bearings with Permanent Magnets for bias*”, ASME 2012 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Volume 1: 24th Conference on Mechanical Vibration and Noise, Parts A and B, August 12-15, 2012, CHICAGO, USA.
53. **P. Naseradinmousavi** and C. Nataraj, “*A Chaotic Blue Sky Catastrophe of Butterfly Valves Driven by Solenoid Actuators*”, ASME 2011 International Mechanical Engineering Congress and Exposition, vol. 7: Dynamic Systems and Control; Mechatronics and Intelligent Machines, Parts A and B, Paper No. IMECE2011-62608, pp: 25-31, November 11-17, 2011, Denver.
54. **P. Naseradinmousavi** and C. Nataraj, “*Nonlinear Dynamic Analysis of Valves with Solenoid Actuators for Shipboard Applications*”, Intelligent Ships Symposium IX, Drexel University, Philadelphia, 2011.
55. Lee, D., Nataraj, C., and **Mousavi, P. N.**, “*Nonlinear Model-Based Adaptive Control of a Solenoid–Valve System*”, 3rd Annual Dynamic Systems and Control Conference, Volume 2, pp: 437-444, September 13-15, 2010.
56. C. Nataraj and **P. Naseradinmousavi**, “*Nonlinear Analysis of Solenoid Actuators and Butterfly Valve Systems*”, 14th International Ship Control Systems Symposium, Ottawa, Canada, 2009.
57. Ahmad Bagheri, Mohamad Felezi, and **Peiman N. Mousavi** “*Adaptive Control and Simulation of a Seven Link Biped Robot For a Combined Trajectory Motion and Stability Investigations*”, Proceedings of the 5th WSEAS International Conference on Applications of Electrical Engineering, Prague, Czech Republic, pp: 232-240, March 12-14, 2006.

Textbooks

1. Developed *Solution Manual* for Vibration of Mechanical Systems (Prof. C. Nataraj), ISBN 8131516245, 2012.

See page xix, “Acknowledgments” section.

2. Developed *Solution Manual* for Engineering Mechanics – Dynamics, Meriam, in Farsi, 3rd edition, Ashna, ISBN 9645964571, 2001.

<http://fipak.areeo.ac.ir/site/catalogue/18466319>

Invited papers: Non-refereed Proceedings

1. Alexander Bertino, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Experimental Deep Learning-Based Obstacle Avoidance Path Planning for a High-DOF Robot Manipulator”, *ASME DSCD Newsletter Summer 2019*.

<https://mechanical.sdsu.edu/news/news>

2. Mostafa Bagheri, **Peiman Naseradinmousavi**, and Miroslav Krstić, “Analytical and Experimental Predictor-Based Time Delay Control of a High-DOF Robot Manipulator”, *ASME DSCD Newsletter Winter 2018*.

<https://mechanicalengineeringsdsu.wordpress.com/2019/01/11/dr-naseradinmousavi-research-featured-in-dscd-newsletter/>

Publications in Process

1. **Peiman Naseradinmousavi**, “Prescribed-Time Control of Smart Valves System Subject to Chaotic Dynamics”, *ASME Transactions*, *Submitted*, 2022.

Scholarly Awards

1. **The Recipient of the John J. Gallen Memorial Alumni Award, 2021:**

The John J. Gallen Memorial Award was instituted in 1977 in honor of John J. Gallen, Dean of the College of Engineering from 1961 to 1975. Dean Gallen oversaw the expansion of the college to include the renovation of John Barry Hall to house engineering laboratories and built the Chemical Engineering building (now White Hall) on campus.

The Gallen Award recognizes the achievements of those whose technical efforts yield advances in the engineering profession. ***The emphasis is on technical contributions rather than administrative or management leadership, although the recipient may demonstrate these qualities as well.*** *The recipient must have graduated from the College of Engineering less than fifteen years ago and must have maintained a positive interest in promoting the name and programs of Villanova's College of Engineering.*

<https://www1.villanova.edu/villanova/engineering/alumnisociety/awards/recipients/bios2021.html#peim>

2. **The College of Engineering Outstanding Doctoral Student Award, 2012, Villanova University.**

<https://www1.villanova.edu/villanova/engineering/newsevents/newsarchives/2013/commencement2013.html>

3. Full scholarship, Villanova University (Office of Naval Research), 2008–2012.

Citations

Google Scholar: <https://scholar.google.com/citations?user=IN9UIZAAAAAJ&hl=en>

- Total Number of Citations: 651.
- h-index Since 2009: 14.
- i10-index Since 2009: 24.

External Grants

1. An NSF Awarded # **1823951**, “Collaborative Research: Decentralized Adaptive and Extremum Seeking Control of Robot Manipulators Using Image Processing”, Total Budget: \$410,377, MY SHARE AS LEAD PI: \$230,377; UCSD PI Miroslav Krstić.

Duration: 4 years (September 15, 2018-August 31, 2022), Date Awarded: September 15, 2018.

https://www.nsf.gov/awardsearch/showAward?AWD_ID=1823951

Courses

1. Nonlinear Dynamics
2. Nonlinear Control
3. Advanced Dynamics
4. Advanced Control
5. Rotor Dynamics
6. Advanced Vibrations
7. Advanced Mathematics
8. System Identification
9. Computational Intelligence
10. Robotics

Work Experience

AZARAB ENERGY CO.: 2006-2008

Design Engineer: Increasing the engineering power and project management of Azarab in the mine industries EPC projects was the main goal of establishing the company. In current condition the

company and its relation with holding has promoted to a level of maturity, validity, and advantage that can act according the market condition, and directly participate in tenders. I provided technical drawings and data for several components used in plants such as gears, springs, ball bearings, and shafts. I was responsible for writing technical contracts including general and specific terms for 470 MW Shahid Rajaie power plant. I also served as a translator.

POTKCO : 2003-2006

Design Engineer and Technical Support: POTKCO was an agency for well-known industrial brands including Hertz and Atlas Copco. The company was supplier for factories such as Iran piston, Traktoursazi, Iran ball bearing, and Charkheshgar. I provided technical support and consultant for consumers based on their requirements and priorities.

AIDA PLASTIC CO: 2001-2003

Manager of production line: I had a valuable experience to develop my engineering knowledge earned in a complex production line for extruding ABS sheets used in many industries. The line was composed of a main hub containing ABS grains. The grains were directed to a high-tech and accurate cast with thickness of 0.5mm operating at almost 500° to melt them to an acceptable viscosity. Two round cylinders rotating with constant angular velocities were utilized to extrude the material melted as a thin film. The film was needed to be cooled up in the ambient temperature for final finishing. I had several duties including technical support, checking and repairing actuators and sensors, and designing some broken parts.

Software

1. Matlab/Simulink
2. COMSOL: 3D, Electromagnetics, Fluid Mechanics
3. Ansys: 3D, Modal Analysis, Stress Analysis, Fluid Mechanics
4. Visual Studio
5. Visual C++
6. Windows and Linux
7. Latex, Word, Excel, and Powerpoint
8. Web design

List of Students Supervised and Currently Supervising

1. **Hired and Graduated Second Ph.D. Student (After Tenure) on 05/17/2022:** I also hired 2nd Ph.D. student, *Dr. Alexander Bertino*, funded by my recent NSF grant. He formulated and experimentally verified four state-of-the-art control strategies on Baxter, a 7-DOF redundant robot manipulator. The control strategies examined in his work are the subject of active research in the field of non-linear control, and have the potential to significantly improve the performance of robot manipulators when they operate in unstructured environments. The first control strategy he investigated is model-free decentralized-adaptive control. The purpose of this control strategy is to achieve consistent performance across a wide range of joint configurations and end-effector inertias, while having a similar computational efficiency

as PID approaches. The second control strategy he investigated is delay-adaptive control. The purpose of this control strategy is to simultaneously estimate and compensate for an unknown long actuator delay. The third control strategy he investigated is prescribed-time control. A key feature of this control strategy is that the settling time is explicitly assigned by the control designer to a value desired, or “prescribed” by the user, and that the settling time is independent of the initial conditions and of the reference signal.

The fourth control strategy he investigated is the prescribed-time safety filter. This formation yields a filter that is capable of avoiding multiple obstacles in a minimally invasive manner with bounded joint torques, while simultaneously allowing a nominal controller to converge to positions located on the boundary of the safe set by the end of a fixed-duration task. Through the formulation and experimental verification of each control strategy he presented, we demonstrated that our proposed methods perform well in both theory and in practice.

One of his conference papers won the Prestigious Award for Best Student Paper of DSCD Robotics at Dynamic Systems and Control Conference (DSCC) 2020. [Please see the conference paper.](#)

2. **Hired and Graduated First Ph.D. Student on 05/09/2019:** *Dr. Mostafa Bagheri* was my 1st PhD student. One of the main contributions of his dissertation is focusing on the development of robust techniques for achieving optimal operation and control of the arm to attain perfect tracking. For the operational optimization, he examined a discrete-time multi-variable gradient-based Extremum Seeking (ES) scheme enforcing operational time and torque saturation constraints to minimize the lumped amount of energy consumed for a path given. Finally, the optimal trajectory is experimentally implemented to be thoroughly compared with the inefficient one.

Precise control of manipulators in the presence of delay or uncertainty and variation in their environments is also a prerequisite to feasibly utilize robot manipulators. Nonlinear control theorems for nonlinear systems (e.g. robotic systems) have been developed for a long period, however, implementing them, in reality, is one of the most challenging problems in engineering applications. Therefore, formulating novel robust and computationally efficient control approaches is still a necessity.

Another significant contribution of his work is a practical implementation of various control theories, with verifying all the necessary assumptions, for high-DOF manipulators. He formulated different computationally efficient control laws to implement real-time controllers for a high Degree-of-Freedom manipulator with uncertainties or in the presence of delay to move toward implementing those control laws in other engineering applications.

Dr. Bagheri is Senior Robotic Engineer at Johnson & Johnson.

3. **Rohan Padalghare, Current MSc student; Will Defend on 05/14/2023:**
He will develop robust deep learning and control algorithms for a quadruped robot.
4. **Alexander Bertino, former MSc student; Defended Successfully on 05/14/2019:**
He investigated a pick-and-place task where the position and orientation of an object, an obstacle, and a target pad are initially unknown and need to be autonomously determined. In

order to complete this task, he employed a combination of computer vision, deep learning, and control techniques. Through the results of his research, he demonstrated that a combination of techniques has minimal error, is capable of running in real-time, and is able to reliably perform the task.

5. **Shane Allison, former MSc student; Defended Successfully on 2016:**

He developed a comprehensive nonlinear mathematical model for n interconnected solenoid actuated butterfly valves operating in series and then carried out nonlinear dynamic analysis using some powerful tools of power spectrum, Poincare map, and Lyapunov exponents.

6. **Ryan Tandy, current MSc student; Graduated on 10/15/2020:**

He was working on “Deep Learning-Based Path Planning for Humanoid Robots”.

7. ***Non-thesis based MSc Student: Nina Amiri.***

She is working of a robotic project.

8. Emily Bidgood, Undergraduate Assistant

9. Ryan Toca, Undergraduate Assistant

10. Samuel Espinoza, Undergraduate Assistant

11. Anas Khafagi, Undergraduate Assistant

12. Alex Peraza, Undergraduate Assistant

13. Aubrey Appelbaum, Undergraduate Assistant

14. Carlos Antonio Cabrera, Undergraduate Assistant

Curriculum Development and Teaching Innovations:

I developed an undergraduate course **ME 430: SYSTEM MODELNG & ANALYSIS** and taught from Fall 2019.

Service for the Department

1. A Member of Search Committee of ME Robotics and Control Position, 2019.
2. A Member of Search Committee of ME Automation and Control in Advanced Manufacturing position, 2018.
3. A Member of Search Committee of ME Chair Position, 2015.
4. A Member of Search Committee of ME Design Position, 2015.
5. Official Advisor of ASME Student Chapter 2017-2018.
6. Serving as a committee member of 22 graduate students, **2014-present** .

Service for the College

- A Member of Scholarship Intramural Grants Committee, 2019-2021.
- A Member of Scholarship & Awards Committee, 2014-May, 2017.

Service for the University

- Developing a Student Robotic Club “Aztec Robotic Technologies”: I was the club official advisor, 2016-2018.

Service for the Community

1. **Associate Editor for the ASME Letters in Dynamic Systems and Control; 2020-2023:**

This publication will publish the state of the art in dynamic systems and control research, with a focus on topics of interest to the dynamic systems and control community. ASME Letters in Dynamic Systems and Control will provide the global engineering community with a forum to communicate the emerging research ideas that will shape the future efforts in dynamic systems and control.

<https://journaltool.asme.org/home/Mastheads.cfm?JournalID=35>

2. **Associate Editor for 2022 9th IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob) (BioRob 2022)**

3. **Associate Editor for 2020 8th IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob) (BioRob 2020)**

4. **Associate Editor for the Journal of Vibration and Control (JVC); June 2019-June 2022:**

The Journal of Vibration and Control is a peer-reviewed journal of analytical, computational and experimental studies of vibration phenomena and their control. The scope encompasses all linear and nonlinear vibration phenomena and covers topics such as: vibration and control of structures and machinery, signal analysis, aeroelasticity, neural networks, structural control and acoustics, noise and noise control, waves in solids and fluids and shock waves.

<https://us.sagepub.com/en-us/nam/journal/journal-vibration-and-control-editorial-board>

5. **Serving as an NSF Panelist on November, 2017, EFRI.**

6. **Serving as an NSF Panelist on April, 2017, DCSD.**

7. **Serving as an NSF Panelist on January, 2017, DCSD.**

8. **Chair of “Motion Planning and Tracking Control” session for the ASME DSCC, 2019.**
<https://event.asme.org/DSCC/Program//DSCC2019/sessions/68>

9. **Chair of “Advances in Robotics I” session for the ASME DSCC, 2017.**
<http://asme.sheridancommunicationsinc.com/DSCC2017/Program/index.html>

10. **Co-Chair of “Advances in Nonlinear and Optimal Control” session for the ASME DSCC, 2016.**
<http://online.flipbuilder.com/alic/ttqz/mobile/index.html#p=15>

11. Reviewer for **ASME Journal of Mechanisms and Robotics**
12. Reviewer for **ASME Journal of Dynamic Systems, Measurement and Control**
13. Reviewer for **ASME Journal of Computational and Nonlinear Dynamics**
14. Reviewer for **ASME Journal of Mechanical Design**
15. Reviewer for **IEEE/ASME Transactions on Mechatronics**
16. Reviewer for **International Journal of Control, Automation and Systems**
17. Reviewer for **Journal of Artificial Organs**
18. Reviewer for **Journal of Process Mechanical Engineering**
19. Reviewer for **Journal of Micromachines**
20. Reviewer for **Journal of The Science of Intelligent Machines**
21. Reviewer for **Journal of Applied Mathematical Modelling**
22. Reviewer for **IEEE Transactions on Instrumentation & Measurement**
23. Reviewer for **the ASME IMECE, 2015.**
24. Reviewer for **the ASME IMECE, 2013.**
25. Reviewer for **ASME DSCC 2013-2017 and 2019.**
26. Referee for the regional MATE underwater robotics competition, 2010-2013.