Fatemeh (Negin) Heiran

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Summary

Fatemeh (Negin) Heiran received her MSc (2021) and BSc (2018) in Mechanical Engineering from Shiraz University in Iran. Her research interests include the development of novel mechanical mechanisms and robotic systems, controller design, and data analysis. She served as the head of the Robotics team at Medis Studio in Iran, primarily working on the Painverse tele-robotic system and Estella humanoid robot.

Education

- **Master of Science in System Dynamics, Control and Vibration, 2018 – 2021, Shiraz University, Shiraz, Iran,** "Thesis: The effect of geometric and environmental parameters on scanning earth horizon sensor modeling and error analysis in satellite attitude determination" (Thesis Grade: Excellent)
- **Bachelor of Science in Mechanical Engineering, 2014–2018, Shiraz University, Shiraz, Iran,** "Final Project: Kinematics and workspace analysis of a novel parallel mechanism with kinematic redundancy".

Research Interests

Robotics and Mechanical Design

Controller Design

Kinematics and Dynamics Analysis

Optimization and Bio-Inspired Learning Models

Data Analysis

Publications

[1] B. Rahnama, F. Heiran, "Estella: A Humanoid Robot for Enhanced Human-Robot Interaction.", 6th Shiraz International Congress on Mobile Health, 2025. (Abstract Paper)

[2] B. Rahnama, F. Heiran, A. Karimi, M. Radmehr, H. Zakeri, "Revolutionizing telemedicine with Painverse: The Role of Telerobotics in Addressing the Physician Shortage", 6th Shiraz International Congress on Mobile Health, 2025. (Abstract Paper)

A. Khakpour Komarsofla, F. Heiran, J. Kodaei-Mehr, R. Vatankhah, "Hybrid Control of Immune Response and HCMV Infection of Renal Transplant Recipient.", IEEE Transactions on Systems, Man, and Cybernetics: Systems, 53 (4), 2399 – 2409, 2022.

[3] A. Mirahmadizadeh, A. Heiran, K.B. Lankarani, M. Serati, M. Habibi, O. Eilami, F. Heiran, M. Moghadami, "Effectiveness of COVID-19 Vaccines in preventing Infectiousness, Hospitalization and Mortality: A Historical Cohort Study Using Iranian Registration Data During Vaccination program", Open Forum Infectious Diseases, 9(6), 2022.

[4] F. Heiran, B. Raeisy, R. Vatankhah, S. Taghvaei, "Investigating the effects of geometric and environmental parameters on the governing equations of scanning earth horizon sensor and attitude determination error analysis", Journal of Solid and Fluid Mechanics of Shahroud University, 12(5), 73-91, 2022. Doi: 10.22044/jsfm.2022.11309.3487. (In Persian)

[5] F. Heiran, B. Raeisy, R. Vatankhah, S. Taghvaei, "Earth Oblateness Effect on Satellite Attitude Determination with Dual Cone Scanning Earth Horizon Sensor Modeling", 6th National Conference on Mechanical and Aerospace Engineering", 2022, Iran.

[6] F. Heiran, J. Khodaei-Mehr, R. Vatankhah and M. Sharifi, "Nonlinear adaptive control of immune response of renal transplant recipients in the presence of uncertainties", Biomedical Signal Processing and Control Journal, Volume 63, January 2021.

[7] B. Rahnama, F. Heiran, L. Rahnama, "Estella Humanoid Robot: An Anatomical Replicant", 2nd World Congress on Rheumatology and Orthopedics, Paris, France, pp 48, September 2019.

[8] F. Heiran, B. Nouri Rahmat Abadi, S. Taghvaei, R. Vatankhah, "Kinematics and workspace analysis of a novel parallel mechanism with kinematic redundancy", 5th International Conference on Control, Instrumentation, and Automation (ICCIA), Shiraz, Iran, November 2017.

Award

Top BSc Student in Shiraz School of Mechanical Engineering, Solid Mechanics Department, 2018.

Skills

Technical Skills

- **Software**: MATLAB, Simulink, C, SolidWorks

- **Hardware**: Modular Electronics Circuiting, 3D Printing (FDM, SLS), Sheet Metal, Laser Cutting, Lathe & Drilling Machines

- **Robotics**: Mechanical Design, Humanoid Robot Design, Kinematics, Dynamics, Motion Control, Prototyping, Robot Manipulation Systems

- **Other**: Product Prototyping, Arduino Programming, Satellite Toolkit (STK), NASA PSG, Office Suite, Excel VBA

Soft Skills

- Collaborative in interdisciplinary teams
- Strategic problem-solving and innovative thinking
- Leadership and project management experience
- Adaptability to emerging technologies

Patents

[1] B. Rahnama and F. Heiran, Multi-purpose Expandable Computing Case with Detachable Enclosure, National Patent (ipm.ssaa.ir), Application No. 140150140003005180, Apr. 5, 2023.

Certificates

[1] The non-degree program DBA (Business Administration) (2022 – 2023), University of Tehran, Iran.
[2] Artificial Intelligence Fundamentals (2025), IBM.

Experiences

Senior Robotics Engineer and Project Manager - Medis Studio (Iran): 01/2019 – 12/2024
- Project Management
- Developing Mechanical Design by Considering the Feasibility of Production
- Designing and Analyzing of Mechanical Systems
- Trajectory and Path Planning Algorithms by Considering Obstacle Avoidance
- Design, Prototyping and Manufacturing Products

Robotics Teacher – Saran Academy (Iran): 07/2019 – 07/2021
- Teaching robotics to kids and teenagers in 3 levels of Saran Academy

Research & Development Member - **Medis Studio (Iran):** 08/2018 – 12/2024
Focused on market research and writing proposals:
- Research & Development of Business Model, Feasibility Study and Business Plan
- Market Research for developing products
- Financial analysis of projects
- Designing company administration systems

Junior Robotics Engineer - **Medis Studio (Iran):** 06/2017 - 01/2019
- Designing Mechanical Parts Especially for Robotics Purposes
- Involve with the Manufacturing Process
- Prototyping Robotics Parts Especially 3D Printing

Robotics Intern - **Medis Studio (Iran):** 10/2015 - 06/2017
She started her part-time internship to learn mechanical design and prototyping and on the other hand, learning electronics, programming and robotics.

Main Projects
Painverse Tele-robotics System (2023-Present)
www.painverse.org

- **Role**: Lead Robotistic
- **Objective**: Develop a robotic solution aimed at transforming pain management and rehabilitation through advanced technology.
- **Technologies**: Robotics, AI, machine learning, therapeutic devices, data analysis, mechanical design.
- **Ownership**: 5%
- **Video**: https://www.linkedin.com/posts/medisstudio_painverse-ugcPost-7307661343472427010-STn7?utm_source=share&utm_medium=member_desktop&rcm=ACoAAChme9sBF7lkOKP8_kNpg81v3FEEBljhQ2E

Project Abstract
Painverse is a telemedicine project designed to enable remote examination and consultation from anywhere in the world. In this system, the doctor and patient can be in different locations, yet communicate and interact effectively. The system involves direct communication between the physician, two robots, and the patient. It consists of two main robots:
1. Vira: Located on the patient side, responsible for assessment and consultation in place of the doctor.
2. Hira: Controlled by the doctor, this robot operates and directs Vira to perform medical tasks.
The Painverse telerobotic system offers a cutting-edge approach to patient examination, featuring an expandable architecture, an intuitive user interface, and flexible configuration options. Vira, the humanoid robot, is equipped with two six-degree-of-freedom (6-DOF) arms and humanoid hands to replicate human motions. Its neck is a novel parallel robot, allowing it to move according to the doctor's commands.

Estella Humanoid Robot (2018 – Present)
www.medis.land

- **Role**: Lead Robotistic
- **Objective**: Develop a highly realistic humanoid robot that have flexible spine and can simulate human facial expressions and engage in natural, dynamic conversations.

- **Technologies**: Robotics, mechanism design, facial expression simulation, mechanical design, human-robot interaction.
- **Ownership**: 100%

Project Abstract

Estella is a humanoid robot designed and developed by Medis Studio, modeled to correspond closely to human anatomy. Currently, the robot's spine, face, and hands have been designed, and a prototype has been created. The development draws inspiration from the human body's anatomy, muscle structure, and movement types. Estella's motor organs and joints—including the spinal cord, hands, face, and neck—are designed to not only conform to human movement angles but also to allow for a full range of motion in various directions.

Estella's spinal cord mimics the natural S-shape of the human spine and consists of four vertebrae. Each vertebra is a parallel robot that simulates three degrees of freedom, enabling the full range of spinal movement. Additionally, Estella's neck mirrors the spinal structure and provides three degrees of freedom, allowing the head to move in smooth, curved directions.

Each of Estella's hands is equipped with eleven servo motors, providing precise, delicate control, designed for finer movements. Lastly, Estella's face incorporates thirty-five motors, enabling it to simulate a wide range of human facial expressions, allowing for an incredibly lifelike appearance.