Amir Saman Mirjalili

(+98) 919 533 8794, live in Tehran,Iran | amirsamanmirjalili@gmail.com | Github | Google Scholar | Linkedin |
A.Saman Mirjalili

Education

K. N. Toosi University of Technology (#234 in Robotics)(GPA: 3.3) *Tehran, Iran*

M.Sc. in Mechatronics Engineering *Sep. 2023*

- **Dissertation:** Trajectory Planning and Implementation of a Deployable Underactuated Cable-Driven Parallel Robot (**Thesis grade : A**)
- **Supervisor:** Prof. Hamid D. Taghirad [Scholar]

Shahid Beheshti University *Tehran, Iran*

B.Sc. in Mechanical Engineering *Aug. 2019*

- **Dissertation:** Design and Implementation of a Dual Axis Solar Tracker (**Thesis Grade : 20/20**)
- **Supervisor:** Dr. Vahid Fakhari [Scholar]

Research Interests

- **Robotics:**
  - Modeling and Designing Robots
  - Localization & Pose Estimation
  - Factor Graphs & Optimization
  - Design & Embedded Hardware
  - Optimal Control & Model Predictive Control (MPC)
  - 3D CAD Design
- **Artificial Intelligence:**
  - Machine Learning: Supervised & Unsupervised Learning, Physics Informed Machine Leaning
  - Reinforcement Learning: Deep Deterministic Policy Gradient (DDPG)
  - Computer Vision: Convolutional Neural Networks (CNN), YOLO, Pose Detection, Transfer Learning
- **Machine Vision:**
  - 3D Reconstruction: Triangulation, Stereo-vision, Bundle Adjustment
  - Visual Odometry (VO) , Simultaneous localization and mapping (SLAM)

Publications

Accepted but havent Indexed yet

- **A Graph-Based Self-Calibration Technique for Cable-Driven Robots with Sagging Cable -IROS (2024)[Link]**

Conference Papers

- **Kinematic Calibration of a Spherical Parallel Robot.**
  - M. R. Dindarloo, **A. S. Mirjalili**, R. Khorrambakht, S. A. Khalilpour, P. Cardou and H. D. Taghirad, "Kinematic Calibration of a Spherical Parallel Robot," 2023 11th RSI International Conference on Robotics and Mechatronics (ICRoM), Tehran, Iran, Islamic Republic of, 2023, pp. 669-674, doi: 10.1109/ICRoM60803.2023.10412613. [PDF File] [DOI]
- **Experimental evaluation of the open-loop control method for a dual-axis solar tracker (In Persian).**
  - Gitifar, Siavash, **Amir Saman Mirjalili**, Ali Jamali, Saeed Pirvalizadeh, and Vahid Fakhari. "Experimental evaluation of the open-loop control method for a dual-axis solar tracker." Modares Mechanical Engineering (2023): n. pag. [PDF File] [DOI]

September 14, 2024

Patents

- **US20230402961A1**: Dual-axis solar tracker with hybrid control and the possibility of full rotation - Patent details available at: US Patent.
- **2021346299**: Dual-axis solar tracker with hybrid control and possibility of full rotation - Patent details available at: IP Australia.
- **WO2022079499**: Dual-axis solar tracker with hybrid control and the possibility of full rotation - Patent details available at: WIPO.

Reasearch Experience

ADVANCED ROBOTICS AND AUTOMATED SYSTEMS (ARAS) [Website] *Tehran,Iran*

Robotics Researcher *Dec 2022 to Present*

- **Motion Planning for a Deployable Under-Actuated Cable-Driven-Parallel-Robot (M.Sc. Final Project) [Github]**
  - Designed a novel, lightweight, and compact CDPR mechanism with a focus on easy deployment.
  - Validated the design and performance of the CDPR through simulations and experimental studies.
  - Performed kinematic and dynamic formulation analysis.
  - Currently developing a motion planning algorithm for the mechanism.
- **Kinematic Calibration of a Spherical Parallel Robot With An Application to Eye Surgery [Github]**
  - Collaborated in proposing a novel kinematic calibration method for spherical parallel robots, utilizing relative pose measurements with formulations on the SE(3) manifold.
  - we successfully calibrated a spherical parallel robot for eye surgery applications. This project involved integrating pose measurements from camera images processed using a Raspberry Pi (RPI).
- **A Novel Graph-based Calibration Method for Large Scale Suspended CDPRs Considering Cable-Sag[Github]**
  - Collaborated in proposing a kinematic calibration method for suspended and large-scale cable-driven parallel robots, leveraging factor graphs.
  - Verified the proposed method using the Finite Element (FE) approach in Recurdyn software.
  - Contributed to the development of a C++ and Python-based framework for the implementation of the calibration method.

Projects *Tehran,iran*

Mechatronics Student *Dec. 2023 - present*

- **Yoga Pose Detection [Github]**
  - This project encompasses two main components: human detection using YOLOv3 and performing the correct movement in yoga poses using MediaPipe and machine learning models. The goal is to detect humans in images and videos accurately and to analyze and correct yoga poses in real-time.
- **KukaTools: Calibraiton tools for Kuka-iiwa14 in mujoco [Github]**
  - This ongoing project aims to provide Kuka robot users with calibration tools developed in MuJoCo, allowing them to verify and implement effective calibration procedures before deployment on physical robots.
- **Training A Biped Robot to Walk Using Reinforcement Learning [Github]**
  - Trained a biped robot to walk using Deep Deterministic Policy Gradient (DDPG) reinforcement learning. This project involved creating a simulation environment, designing the reward function, and training the agent to walk in a straight line
- **Diabetic Retinopathy Detection Using Deep Learning [Github]**
  - This project replicates a published paper's research on developing a deep learning-based diabetic retinopathy detection system using the Inception-v3 model with transfer learning. The project entails gathering and preprocessing medical images, training the Inception-v3 model, and rigorously assessing its performance on a dedicated test dataset.
- **Aras IR Tracker [Github]**
  - This project is a DIY localization system that works by detecting infrared markers (active or passive) in the camera images and triangulating their 3D positions from the intersections of the rays corresponding to the marker observations from multiple cameras. my responsibility in this project is to solve the bundle adjustment problem using a graph-based technique

Shahid Beheshti Uni *Tehran,iran*

Mechanic Student *Dec 2019*

- **A dual-axis solar tracker with hybrid control [Github]**
  - Developed and implemented a dual-axis solar tracker that increased energy output by 20% compared to a stationary tracker.
  - implementing a hybrid control on the mechanism: fusing Astronomical
  - developing the embedded framework in C/C++

Work Experience

SYNAPSE IVD Accelerator[Website] *Tehran,Iran*

Mechatronic Eingineer *Jul 2020 to Nov 2021*

- **Designed a HBA1C Diagnostic Device Under Supervisor Amir Roham Kazazi[linkedin]**
  - Embedded Programmer(C/C++)
  - 3d Cad Designer

Skills

Programming Languages	Python, C/C++(GTSAM,Eigen,CasADi), Matlab
Embedded systems	Arduino IDE, STM32, Soldering and Assembling
Engineering Softwares	Simulink, Maple, Recurdyn(MBD Simulation)
CAD Softwares	Solid-Works
Robotic Softwares	MuJoCo, Ros
Languages	English (TOEFL score: 96) , Farsi

Honors And Workshops

- **Best BS.c. dissertation award (2019)**

- **Medical Robot Workshop At ICROM2023 [Link]**
  - Delivered insights on ”Design Requirements and Mechanical Perspectives in Medical Robotics” and ”Kinematic and Dynamic Analysis of ARASH:ASiST” at ICRoM 2023.

Courses

- Advanced Robotics (CMU Robotic Exploration Lab)
- Bio-mechatronics
- Parallel robots (at KNTU)
- Machine Learning Specialization (on Coursera)
- Robotics Specialization (on Coursera)
- Model Predictive Control (CMU Robotic Exploration Lab)
- Reinforcement Learning (at KNTU)
- Linear Control
- Computer Vision
- Game Theory
- Mechanical Engineering Design
- Machine Learning

References

Prof. Hamid D. Taghirad [scholar] [Webpage] *Tehran,Iran*

Professor and the Director of Advanced Robotics and Automated Systems (ARAS), Department of Systems and Control, Faculty of Electrical Engineering, K. N. Toosi University of Technology.

Email: taghirad@kntu.ac.ir

September 14, 2024

João Cavalcanti Santos **[scholar]** *Montpellier,France*

Associate Professor, University of Montpellier/LIRMM.

Email: joao.cavalcanti-santos@lirmm.fr

Dr. V. Fakhari **[Webpage]** *Galway, Ireland*

Former Assistance Professor, Faculty of Mechanical and Energy Engineering, Shahid Beheshti University | Currently: Research Fellow, University of Galway

Email:vahid.fakhari@universityofgalway.ie

September 14, 2024