# Shahab Nikkhoo

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## INTEREST

- **Robotics** — Space Robotics, learning-based control, Multi-Robot Systems
- **Machine Learning** — Deep Reinforcement Learning, Adversarial Machine learning
- **Cyber-Physical systems** — Real-time Embedded Systems

## EDUCATION

- **University of California, Riverside** — California, USA
  *M.S., Electrical Engineering (Robotics, Reinforcement Learning)* — *Sep 2022 - Jan 2024*

  ***Selected Courses:*** *Secure Autonomous System and CPS, Advanced OS, Theory of Computation, Advanced Robotics, Pattern Recognition, Introduction to DeepRL*

- **University of Tehran** — Tehran, Iran
  *B.S., Electrical Engineering (Control, Robotics)* — *Sep 2016 - Jul 2021*

  ***Selected Courses:*** *Advanced Robotics, Real-Time Embedded Systems, Mechatronics, Modern Control, Digital Control Systems, Industrial Control*

## PUBLICATIONS

- **PIMbot: Policy and Incentive Manipulation for Multi-Robot Reinforcement Learning in Social Dilemmas** (Accepted at IROS 2023)
  **Shahab Nikkhoo**, Zexin Li, Aritra Samanta, Yufei Li, Cong Liu

- **MIMONet: Multi-Input Multi-Output On-Device Deep Learning** (arXiv)
  Zexin Li, Xiaoxi He, Yufei Li, **Shahab Nikkhoo**, Wei Yang, Lothar Thiele, Cong Liu

- **An Intelligent Toy Car for Autism Screening using Multi-Modal Features** (MDPI Sustainability)
  Bijan Mehralizadeh, Bahar Baradaran, **Shahab Nikkhoo**, Pegah Soleiman, Hadi Moradi

- **Pareto-Secure Machine Learning (PSML): Fingerprinting and Securing Inference Serving Systems** (arXiv)
  Debopam Sanyal, Jui-Tse Hung, Manav Agrawal, Prahlad Jasti, **Shahab Nikkhoo**, Somesh Jha, Tianhao Wang, Sibin Mohan, Alexey Tumanov

## SUMMER SCHOOL

- **Attendee,** Differential Privacy Summer School — Boston, USA
  *Boston university* — *2022*
- **Assistant,** Global Summer School — Barcelona, Spain
  *Institute for advance architecture of Catalonia (Iaac)* — *2019*

## TEACHING EXPERIENCE

- **Advanced Robotics** — Tehran, Iran
  *University of Tehran* — *2021*
- **Mechatronics** — Tehran, Iran
  *University of Tehran* — *2021*
- **Real-Time Embedded Systems** — Tehran, Iran
  *University of Tehran* — *2020*

## WORK EXPERIENCE

- **FarmSense:** Smart insect monitoring and pest management company — California, USA
  *Software & Hardware Engineer* — *Summer 2023*
  - Developed software and hardware for nrf9160 with Zephyr OS

- **Persia 3D Printer:** 3D printer manufacturer — Tehran, Iran
  *R&D Team Member* — *2016 - 2021*
  - Embedded Designer
  - PCB Designer
  - C++ and Python Programmer
  - Research Fellow

## PROJECTS

- **Learning How to Fly: Training Two Connected Quadcopters**
  *Reinforcement Learning - Robotics*
    - Trained 9000 agents simultaneously in Nvidia Isaac Gym to learn how to fly
    - Developed a DDPG + HER algorithm to solve the control problem

- **Python Quadcopter Simulator**
  *Robotics*
    - Designed a Python simulator to model quadcopter dynamics
    - Implemented an A* algorithm to find paths on a static map and followed them with a minimum jerk trajectory

- **Multi Agent Reinforcement Learning**
  *Reinforcement Learning*
    - Implemented DQN, A2C, DDPG, SAC, and PPO algorithms to solve a multiplayer game and compared their performance
    - Developed a teacher-student framework to train a simpler model for the game based on a more complex model

- **WellOGraph**
  *Digital Art - Robotics*
    - An Omni directional drawing machine that raises awareness on water crisis
    - ROS base robot with Visual Odometry for positioning and a drawing system for plotting points on a canvas

- **Autonomous Quadcopter**
  *Robotics*
    - A ROS base autonomous Drone for doing automated task like auto takeoff - window detection
    - Designed the board, modified the control system for position holding, visualized the 2D map given by LIDAR

- **Mobile Robot Localization**
  *Robotics*
    - Developed a particle filter algorithm in Python for localizing a mobile robot in gazebo
    - Creating the map with SLAM algorithm

- **Ball and Plate**
  *Robotics*
    - A 4 DOF parallel robot to control the position of a ball
    - Developed a code to position a ball and estimate the velocity with image processing algorithms
    - Designed a PD controller on an arduino base board

## HONORS AND AWARDS

- **Dean's Distinguished Fellowship,**
  *University of California at Riverside, school of Electrical and Computer Engineering*          *2022*

- **Best undergraduate project,**
  *University of Tehran, school of Electrical and Computer Engineering*          *2021*

- **$1^{st}$ Place RoboCup** UAV – Indoor (autonomous UAV)
  *Iran Open International Robotic Competitions*          *2018*

- **$2^{nd}$ Place AUTCUP** Fira Drone (autonomous UAV)
  *International Robotic Competitions*          *2018*

## SKILLS

- **Languages**      Python, C++, C#, Bash, Embedded C
- **Frameworks**      PyTorch, TensorFlow, Isaac Gym
- **Platforms**      Arduino, Raspberry, STM32, Zephyr
- **Software**      3D Printing Softwares, Altium Designer, Solid Works

## LANGUAGE

English(Fluent), Farsi(Native)

## NON-ACADEMICAL ACTIVITIES

Agriculture, Camping, Hiking, Tennis

## REFERENCES

- **Konstantinos Karydis,** Associate Professor at University of California, Riverside, School of ECE          M.S. advisor
  *Email: kkarydis@ece.ucr.edu*          *2022*

- **Sibin Mohan,** Associate Professor at George Washington University, School of SEAS          advisor
  *Email: sibin.mohan@gwu.edu*          *2022*

- **Hadi Moradi,** Associate Professor at University of Tehran, School of ECE          B.S. advisor
  *Email: moradih@ut.ac.ir*          *2018 - 2021*