Niloofar Zendehdel

U.S. Permanent Resident | Austin, TX | 573-466-2017 | niloofar.zendehdel@gmail.com
niloofar-zendehdel | www.nildel.com | Niloofar Zendehdel

Professional Summary

Robotics engineer with hands-on experience in **deploying, integrating, and troubleshooting robotic and electro-mechanical systems**. Skilled in **hardware/software integration and system deployment**, with a proven ability to lead cross-functional teams and deliver complex robotics projects. Currently completing a PhD focused on **autonomous robotic systems in smart manufacturing**.

Experience

Missouri University of Science and Technology Oct 2021 – Present
Graduate Research Assistant *Rolla, MO*

- Developed and deployed drone control systems driven by brain and eye signals, integrating embedded hardware, signal processing, and real-time control for advanced human-robot interaction in manufacturing.
- Designed, integrated, and tested a custom UAV equipped with an RGBD camera and a Marvelmind ultrasound-based positioning system, enabling reliable navigation in constrained indoor environments.
- Built and validated a motor intention detection system using brain signals and deep learning, improving classification accuracy for robotic task prediction.
- Authored technical documentation and mentored a team of four students in robotics integration projects, providing guidance in troubleshooting and system deployment.

Parstronic Automotive Control Systems Jul 2019 – Oct 2019; ended due to receiving U.S. visa
Electrical-Control Engineer *Tehran, Iran*

- Simulated various approaches, including Field-Weakening Control (FWC), for controlling speed and torque of Permanent Magnet Synchronous Motors (PMSM) using MATLAB Simulink.

Education

Missouri University of Science and Technology October 2021 - Present
*PhD in Mechanical Engineering (Focus: **Electrical & Robotics**, GPA 4.0/4.0)* *Rolla, MO*

- **Honors:** Awarded **Kummer Innovation and Entrepreneurship Doctoral Fellowship**
  First place for best research at Missouri S&T 2023 graduate research showcase-Poster Session [link]
  First place at Missouri S&T 2024 Startup Challenge [link]
  Finalist in 3MT (Three Minute Thesis) competition 2024 at Missouri S&T [link]
- **Thesis:** Human-Robot Collaboration in Manufacturing
  Deployed a drone-based tool delivery system, integrated an eye-signal interface for UAV navigation, and tested a brain-signal motor intention detection method for application in robotic collaboration.
- **Relevant Coursework:** Adaptive Dynamic Programming (Python, Reinforcement Learning), Mechatronics (Python, Matlab, Arduino, Nvidia Jetson Nano, Parallel Computing & Threads, Linear Control, Sensors & Actuators: IMU, Encoders, Servo & Stepper motors), Deep Learning (CNN, LSTM, GPU, Python, Matlab)

Babol Noshirvani University of Technology September 2011 - February 2018
Bachelor and Master of Science in Electrical Engineering (GPA: 18.08 & 18.30 / 20.00) *Babol, Iran*

- **Honors: First place** undergraduate student in department of electrical engineering
- **Thesis:** Adaptive Sliding Mode control for trajectory tracking control of Autonomous Underwater Vehicle (AUV)
- **Relevant Coursework:** Robotics (Matlab, Kinematics & Dynamics of Robotic Arm), Adaptive Control (Matlab), Robust Control (Matlab), System Identification (Matlab), Nonlinear Control, Modern Control (Matlab, Kalman Filters & State Estimation), Digital Control, Linear Algebra

Technical Skills

- **Robotics & Systems:** UAVs, ROVs, ground vehicles, robotic arms, autonomous robots, hardware & sensor integration, electro-mechanical troubleshooting
- **Control & Modeling:** System modeling and simulation, feedback & adaptive control, robust control, state estimation (Kalman filters), real-time implementation with multi-threading
- **Mechanical Design:** Siemens NX CAD, SolidWorks, 3D printing
- **Programming:** Python, C/C++, MATLAB
- **Hardware & Electronics:** Embedded systems (Arduino, Jetson, AVR), IMU, encoders, RGBD cameras, range finders, motors (DC, Servo, Stepper), PCB design (Altium)
- **Software & Tools:** ROS2, Ardupilot, Simulink, TensorFlow, PyTorch, V-REP, Proteus
- **Other:** Technical documentation, cross-functional collaboration

Projects

Tool Detection for Smart Manufacturing (YOLOv5) | *Python*, *Object Detection*, *YOLOv5*

- Deployed YOLOv5 to have a precise tool detection system for smart manufacturing with $> 98\%$ accuracy.
- Collected and annotated over 3,000 images of various tools for training the YOLOv5 model.

Design and Construction of a Hexacopter UAV | *Flight Controller*, *Ardupilot*, *RGBD camera*, *Indoor positioning System*

- Assembled and deployed a hexacopter UAV integrated with RGBD camera and indoor positioning for autonomous navigation.
- Conducted flight tests and validated system performance in lab environment.

Design and Construction of a ROV (Remotely Operated Vehicle) | *AVR*, *IMU*, *Servo Motors*, *Motor Driver*

- Designed and assembled ROV with four motors for horizontal and vertical propulsion, controlled by a joystick.
- Designed custom PCB using Altium Designer for a high voltage, high-current DC motor driver using HIP4081 MOSFET driver in H-bridge configuration.
- Integrated a camera and a custom-built gimbal system for angle control and live footage streaming.

Adaptive Robust Control for AUV Trajectory Tracking | *AUV*, *Trajectory Tracking*, *Disturbance Estimation*

- Employed adaptive sliding mode control for robustness against uncertainties and disturbances.
- Utilized a dual-layer adaptive law independent of disturbance boundaries to minimize chattering.
- Validated the control scheme via **simulations using Simulink**, demonstrating superior performance over finite-time tracking methods.

Eye-controlled UAV navigation | *EOG*, *UAV*, *Jetson Orin Nano*, *LSTM*, *Signal Processing*

- Deployed an EOG-based UAV control system achieving $> 97\%$ accuracy in real-world testing, outperforming vision-based alternatives.
- Designed an experimental protocol for collecting high-quality eye movement data paired with precise screen coordinates for training purposes.
- Deployed the system on resource-constrained NVIDIA Jetson Orin Nano hardware, achieving 38.87 FPS with only 0.69 MB of memory, representing a 13.9× improvement in processing speed and 319× reduction in memory usage compared to vision-based alternatives.
- Created an intuitive user interface with text-to-speech feedback that enabled fully hands-free UAV operation through eye movements alone.

Grasp and Lift Classification Using EEG Signals | *EEG*, *Pytorch*, *CNN*, *LSTM*, *MLP*

- Utilized EEGLAB for artifact removal and signal preprocessing, ensuring clean EEG data for reliable classification analysis.
- Conducted systematic analysis to determine optimal channel configuration (18 channels), frequency bands (delta and theta), and sampling window (250 samples).
- Designed an EEGNet+Transformer model that improved classification accuracy by 4% over the standard EEGNet baseline.