Niloofar Zendehdel

573-466-2017 nzx9d@mst.edu linkedin.com/niloofar-zendehdel/ nildel.com

Education

Missouri University of Science and Technology October 2021 - Present

PhD in Mechanical Engineering (GPA: 4.00 / 4.00) *Rolla, MO*

- **Honors:** Awarded Kummer Innovation and Entrepreneurship Doctoral Fellowship, First place for best research at Missouri S&T 2023 graduate research showcase
- **Thesis:** Human-Robot Collaboration in Manufacturing
- **Relevant Coursework:** Deep Learning (CNN, LSTM, GPU, Python, Matlab), 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, ...)

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, Mazandaran*

- **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

Experience

Parstronic Jul 2019 – Oct 2019; ended due to receiving U.S. visa

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.

Technical Skills

Languages: Python, C/C++, Matlab

Technologies: Embedded Systems (Arduino, Jetson Developer Kit, AVR Microcontroller), IMU, Encoder, Motors (DC, Servo, Stepper), Electrooculography (EOG), Electroencephalography (EEG), Serial Communication protocols (I2C, UART, SPI), Range Finders (IR, Ultrasonic), Altium Designer, Autonomous Unerwater Vehicles, Unmannned Aerial Vehicle, Ardupilot, Cube Flight Controller, Intel D434 RGBD Camera, Marvelmind indoor positioning system, Pytorch, Tensorflow, ROS2, CAD

Concepts: Linear and Nonlinear Control, Adaptive and Modern Control, State Estimation, Robotics Kinematics and Dynamics, Artificial Intelligence, Machine Learning, Neural Networks, Deep Learning, Multi-Layer Perceptron (MLP), Convolutional Neural Networks (CNN), Sequence Models, Long-Short Term Memory (LSTM), Object Detection (YOLO), Signal Processing, Human-Robot Collaboration (HRC), Human-Computer Interaction (HCI), Brain-Computer Interaction (BCI), Threading and Parallel Computing

Publications

- N. Zendehdel, H Chen, SY Song, MC Leu, "Implementing Eye Movement Tracking for Unmanned Aerial Vehicle (UAV) Navigation", Accepted at *International Symposium on Flexible Automation*, Seattle, WA, (2024).
- N. Zendehdel, H Chen, MC Leu, "Real-Time Tool Detection in Smart Manufacturing Using You-Only-Look-Once (YOLO)v5", *Manufacturing Letters 35*, (2023): 1052-1059. [Ref]
- H Chen, N. Zendehdel, MC Leu, Z Yin, "Fine-grained activity classification in assembly based on multi-visual modalities", *Journal of Intelligent Manufacturing*, 2023. [Ref]
- H Chen, N. Zendehdel, MC Leu, Z Yin, "Real-Time Human-Computer Interaction Using Eye Gazes", *Manufacturing Letters 35* (2023): 883-894.[Ref]
- N. Zendehdel, J. Sadati, A. Ranjbar Noei, "Adaptive robust control for trajectory tracking of Autonomous Underwater Vehicle on the horizontal plane", *Journal of AI and Data Mining*, 7(3), 2019, 475-486. [Ref]

Projects

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

* Implemented an end-to-end eye-gaze controlled UAV navigation system using the NVIDIA Jetson Orin Nano, resulting in a hands-free interaction model.
* Designed a scenario for accurate eye gaze dataset collection, matched with pixel coordinates on the monitor.
* Trained and deployed an LSTM model to accurately classify blink events and focus of attention coordinates.
* Developed a graphical user interface (GUI) with text-to-speech module to interpret eye-gaze inputs for drone commands.
* Leveraged parallel computing to ensure robust, real-time performance with minimal latency.

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

* Implemented preprocessing steps including W-ICA filtering to denoise the EEG signals.
* Designed and trained a Convolutional Neural Network (CNN) for classifying six motor tasks, achieving a training and validation accuracy of 93.76%.

Tool Detection Using Yolov5 | *Python, Object Detection, YOLOv5*

* Leveraged YOLOv5 to develop a precise tool detection system for smart manufacturing, achieving high accuracy and efficiency.
* Collected and annotated over 3,000 images of various tools for training the YOLOv5 model.
* Achieved a 98.3% accuracy rate in tool detection, optimizing the model for manufacturing environments.

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

* Designed and assembled a custom hexacopter UAV tailored for indoor environments.
* Integrated the Marvelmind Indoor Positioning System for accurate location tracking and navigation.
* Conducted preplanned flight missions, demonstrating the system's effectiveness in controlled environments.

Design and Construction of a ROV | *AVR, IMU, Servo Motors, Motor Driver*

* Designed and assembled ROV with four motors for horizontal and vertical propulsion, controlled by a joystick.
* Integrated a camera and a custom-built camera and gimbal system for angle control and live footage streaming.
* Developed a high voltage DC driver to power the motors, ensuring reliable and robust operation.

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, demonstrating superior performance over finite-time tracking methods.