Swapnil Meshram

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|https://swapnilm30.github.io/portfolio.github.io/

Education

Master of Science, Robotics and Autonomous Systems (Electrical Engineering) **December 2024**
Arizona State University, Tempe, Arizona GPA: 3.71/4.00
Relevant Coursework: Introduction to Deep Neural Networks, Embedded Machine Learning, Realtime Digital Signal Processing, Power Electronics & Power Management, Connected and Automated Vehicles

Bachelor of Engineering, Electronics Engineering **May 2020**
K. K. Wagh Institute of Engineering Education and Research, Nashik, India CGPA: 6.48/10
Relevant Coursework: Electronic Devices & Circuits, Advanced Power Electronics, Embedded Processors, Electromagnetics & Wave Propagation, Automotive Electronics

Technical Skills

Hardware and Software Development Tools: Altium Designer, Autodesk Eagle, KiCAD, LTspice, Simulink, Ansys Maxwell, Google Colab, Anaconda, Jupyter Notebook, Visual Studio Code, Git
Programming Languages: Python, C, Embedded C, MATLAB
Libraries & Frameworks: NumPy, Pandas, Matplotlib, Seaborn, Scikit-learn, PyTorch, TensorFlow, ROS1/ ROS2

Work Experience

Miniaturized and Advanced Power Electronics Laboratory: Research Aide **February 2023 - September 2023**
Arizona State University, Tempe, Arizona
- Developed Printed Circuit Boards for planar transformers with medium-voltage isolation ratings of 26 kV, 35 kV, and 48 kV.
- Engineered multi-layer PCB designs (2, 4, 6, 10, 12, 14 layers), optimizing for project specifications.
- Partnered with Ph.D. students to evaluate and optimize designs, ensuring alignment with project goals.
- Analyzed and resolved technical challenges in PCB design, contributing to successful project completions.

Aerospace Engineers Private Limited: Electrical & Electronics Engineer **June 2021 - December 2022**
Autonomous & Undersea Systems Division, Tamil Nadu, India
- Spearheaded research and development for unmanned marine vehicles (AUVs, ROVs, ASVs), designing advanced electrical architectures for the Neerakshi AUV capable of operating at a depth of 300-meters, and achieving 15% cost reduction through optimized designs and efficient project management practices.
- Engineered embedded electronic systems from concept to prototype, covering hardware selection, schematic design, PCB layout, and system integration.
- Designed and optimized the Power Distribution and Sensor Suite for unmanned marine vehicles, increasing endurance by 10%, compacting wiring length by 30%, and improving overall system efficiency.
- Developed the Propulsion Power Drive for unmanned marine vehicles by optimizing the efficiency of multiple ESCs and minimizing thermal losses, increasing endurance by 5% and eliminating active cooling requirements.

Academic Projects

Deep Learning Approaches to Audio Classification **January 2024 - April 2024**
Arizona State University, Tempe, Arizona
- Explored multiple neural network architectures (CNNs, LSTMs, ResNet18, SVMs, Transformers) for classifying musical instruments, with CNNs achieving the highest accuracy of 63.75% on spectrogram data.
- Focused on preprocessing steps like generating spectrograms and extracting MFCC features to ensure the models effectively captured the spatial and temporal characteristics of audio signals.

Comparative Analysis of SLAM Algorithms **January 2024 - April 2024**
Arizona State University, Tempe, Arizona
- Compared Cartographer and GMapping SLAM algorithms using RPLIDAR, evaluating mapping accuracy with metrics like Mean Squared Error (MSE) and Mean Absolute Error (MAE).
- Validated the GMapping algorithm's superior performance in simpler environments, while the Cartographer algorithm excelled in more complex layouts with obstacles.

EdgeVision: User-Defined Object Counting Using Raspberry Pi **August 2023 - December 2023**
Arizona State University, Tempe, Arizona
- Developed and deployed a real-time object detection and tracking system using the Faster R-CNN ResNet-50 model on Raspberry Pi 4, achieving 95.6% accuracy in bright conditions and 82.5% in low-light conditions.
- Developed modules like the LineSegmentCounter for user-defined object counting and CentroidTracker for reliable tracking, ensuring the system was optimized for resource-constrained embedded platforms.