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 layouts and stack-ups based on project specifications.
- Collaborated with Ph.D. students to evaluate and refine designs, ensuring alignment with project goals.
- Diagnosed and resolved PCB design challenges, contributing to successful fabrication and system integration.

Aerospace Engineers Private Limited: Electrical & Electronics Engineer **February 2021 - December 2022**
Autonomous & Undersea Systems Division, Tamil Nadu, India
- Led R&D for electrical and embedded systems in unmanned marine vehicles, including the Neerakshi AUV rated for 300-meter depth, achieving 15% cost reduction through optimized hardware designs and efficient project management practices.
- Designed embedded electronic systems from concept to prototype, covering component selection, schematic design, multi-layer PCB layout, and end-to-end system integration.
- Developed and optimized the Power Distribution and Sensor Suite, increasing vehicle endurance by 10%, reducing wiring complexity by 30%, and enhancing overall system efficiency.
- Engineered a Propulsion Power Drive by optimizing electronic speed controller (ESC) efficiency and reducing thermal losses, increasing endurance by 5%, and eliminating the need for active cooling.

Academic Projects

Comparative Analysis of SLAM Algorithms **January 2024 - April 2024**
Arizona State University, Tempe, Arizona
- Evaluated Cartographer and GMapping SLAM algorithms on the Yahboom ROS Master X3 robot with an RPLIDAR sensor, measuring mapping accuracy using Mean Squared Error (MSE) and Mean Absolute Error (MAE).
- Demonstrated GMapping's superior performance in structured environments and Cartographer's effectiveness in complex layouts, recommending the integration of depth sensors to overcome evaluation challenges and improve obstacle detection.

EdgeVision: User-Defined Object Counting Using Raspberry Pi **August 2023 - December 2023**
Arizona State University, Tempe, Arizona
- Developed EdgeVision, 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 and 82.5% in low-light environments.
- Implemented interactive modules, including LineSegmentCounter for dynamic user-defined counting and CentroidTracker for consistent object tracking, enabling real-time applications such as traffic monitoring and retail analytics.

DC-DC Buck Converter Design **January 2023 - April 2023**
Arizona State University, Tempe, Arizona
- Designed a high-efficiency synchronous DC-DC Buck converter stepping down 24-36V input to a stable 18V output, achieving a 99.21% peak efficiency through optimized component selection (MOSFETs, inductors, capacitors).
- Developed a closed-loop control system with a tuned compensator, ensuring minimal voltage ripple (49 mV peak-to-peak) and current ripple (0.70 mA peak-to-peak), demonstrating expertise in power stage calculations, loss reductions, and thermal management for reliable power delivery.