Swapnil Meshram

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Education

Master of Science, Robotics and Autonomous Systems (Electrical Engineering) **December 2024**
Arizona State University, Tempe, Arizona GPA: 3.71/4.00

Bachelor of Engineering, Electronics Engineering **May 2020**
K. K. Wagh Institute of Engineering Education and Research, Nashik, India CGPA: 6.48/10

Skills

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

Experience

Arizona State University: Graduate Research Aide **February 2023 – September 2023**
Miniaturized and Advanced Power Electronics Laboratory *Tempe, Arizona*

- Designed high-frequency planar transformer PCBs, achieving 26 kV and material-enabled 35 kV medium-voltage isolation using 7 kV/mil polyimide for photovoltaic/small-scale solar thermal applications.
- Engineered multi-layer PCB stack-ups (2-14 layers) for planar transformers, optimizing layouts and dielectrics to improve interleaving for AC loss reduction and robust medium-voltage isolation.
- Collaborated with Ph.D. researchers on a Department of Energy (DOE) funded project (DE-EE0010239), refining planar transformer PCB designs for high-efficiency, low-cost renewable energy integration.
- Resolved complex PCB design challenges, including managing fringing electric fields, optimizing via spacing, and mitigating conduction losses to ensure successful fabrication of planar transformer modules.

Aerospace Engineers Private Limited: Electrical & Electronics Engineer **February 2021 – December 2022**
Autonomous & Undersea Systems Division *Tamil Nadu, India*

- Led research and development of unmanned marine vehicle electrical systems, achieving a 15% cost reduction on key projects including the 300-meter-depth-rated Neerakshi Autonomous Underwater Vehicle (AUV).
- Engineered full-cycle embedded-system design, including component selection, schematic design, PCB layout, and final integration of underwater sensors, payloads and wireless communication interfaces.
- Optimized the Neerakshi AUV's core power-distribution system, increasing vehicle endurance by 10% and reducing wiring complexity by 30% to enhance overall system efficiency.
- Developed a high-efficiency propulsion power drive that boosted vehicle endurance by 5% and eliminated the need for active cooling through strategic Electronic Speed Controller (ESC) optimization.

Projects

Comparative Analysis of SLAM Algorithms **January 2024 – April 2024**
Academic Project, Arizona State University *Tempe, Arizona*

- Evaluated Cartographer and GMapping SLAM algorithms on a ROS-enabled robot with an RPLIDAR sensor, measuring mapping accuracy using Mean Squared Error (MSE) and Mean Absolute Error (MAE).
- Identified GMapping's superiority in structured environments and Cartographer's strength in complex layouts through a comparative SLAM analysis, and recommended integrating depth sensors for improved obstacle avoidance.

EdgeVision: User-Defined Object Counting Using Raspberry Pi **August 2023 – December 2023**
Academic Project, 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 LineSegmentCounter and CentroidTracker modules for real-time object counting and tracking, supporting applications in traffic monitoring and retail analytics.

High-Efficiency DC-DC Buck Converter Design **January 2023 – April 2023**
Academic Project, Arizona State University *Tempe, Arizona*

- Designed a high-efficiency synchronous DC-DC Buck converter (24-36V to 18V), leveraging optimized component selection (MOSFETs, inductors, capacitors) to achieve a 99.21% peak efficiency.
- Developed a closed-loop control system with a tuned compensator to achieve minimal voltage ripple (49 mV p-p) and current ripple (0.70 mA p-p), demonstrating deep expertise in power stage calculations, loss reduction, and thermal management.