em

Roumen Guha

+1 (469) 328 3442
roumen.guha@gmail.com
roumenguha.github.io

Experience

Dec 2016 - May 2018 **Controls & Electrical Team Lead**, *Wisconsin Hybrid SAE Vehicle Team*, Madison, WI.
Managed team to completion of converting a stock SUV into an **electric vehicle** with 35-mile range, in **under 4 months**.
- Developed motor control code for **driving and regenerative braking**, improving range on a single charge.
- Managed student team to **integrate a small ethanol engine** into our electric vehicle to achieve a range-extended hybrid.
- Planned, designed, built, wired and wrote code for a dynamometer over summer. Used by several vehicle teams for testing.
- Performed high-voltage wiring, built and debugged vehicle wiring-harness, and integrated power electronics.
- Worked with **Simulink**, **MotoHawk**, **MotoTune**, **CANoe**, **CANdb++** and other Woodward and Vector development tools and software.

Sept 2014 - May 2018 **Team Member**, *Wisconsin Hybrid SAE Vehicle Team*, UW-Madison.
- Assisted in the implementation of a load dump and high-voltage battery, allowing dynamometer to continue for longer periods without stopping.
- Integrated temperature control sensors onto the vehicle network, allowing easy driver-monitoring of battery state.
- Successfully debugged and resolved issue with battery voltage sags shutting down the electric motor.

Sept 2017 - Dec 2017 **Undergraduate Teaching Assistant**, *Department of Electrical & Computer Engineering*, UW-Madison.
- Assisted **Professor Barry Van Veen** in teaching an introductory undergraduate signal processing course.
- Supervised lab assignments. Validated assignment questions.

Education

2019–2021 **M.S., Electrical Engineering**, *University of California San Diego*, Focus: Robotics, *Advanced courses: Sensing & Estimation, Planning/Learning, FPGA High-Level Synthesis, Image Understanding, Autonomous Driving*.

2014–2018 **B.S., Electrical Engineering & Mathematics**, *University of Wisconsin-Madison*, Dean's Honors, AMCHAM Scholarship, *Advanced courses: Robotics, Machine Learning, Image Processing, Optimization, Artificial Intelligence*.
GPA: 3.4

Favorite Projects

Most of these (and more) can be found on my GitHub page.

Sept 2019 - Present **High-Speed Camera Array PCB**.
- Designing a **high-speed PCB** to offload images from up to 6 Sony IMX 334 **image sensors** for fast inference capability in **open-source hardware**.
- Work done for the **UCSD DroneLab**; currently in progress.

Nov 2017 - Dec 2017 **Dancing Robot**.
- Built a dancing robot arm with a robotic arm, utilizing **inverse kinematics** and a **DSP-based beat-tracker**.
- Programmed using **ROS** in **Python** on a **Raspberry Pi**. Video demo available on GitHub.

March 2020 **Visual-Inertial SLAM via the Extended Kalman Filter**.
- Wrote an EKF routine to filter noisy **IMU** data using **visual-keypoint** data extracted via **Harris Corners**.
- Achieved beautiful results. Animations compared to map available on GitHub.

February 2020 **Particle Filter SLAM**.
- Wrote a particle filter routine to filter noisy **IMU** data and build an occupancy grid of the environment.
- Achieved passable results. Animations available on GitHub.

January 2020 **Stop Sign Detection Redux**.
- Made a red color classifier using **logistic regression** color classifier, and added various **shape heuristics** to make a stop-sign detector in **Python** and **OpenCV**.

Sept 2017 - Oct 2017 **Stop Sign Detection**.
- Coded a **Mathematica** image processing routine that **detected stop signs** in a class-provided dataset with 98% accuracy.
- Utilized classical techniques such as **segmentation, filtering, dilation and erosion, opening and closing**.
- **Won Silver in class competition.**

Skills

Advanced: MATLAB, OpenCV, Vivado HLS

Intermediate: Python, ROS, C++, Altium, Simulink, C, Java, Mathematica, Julia, Git, ARM Assembly, Cortex-M4, Quartus, SPICE