Azmyin Md. Kamal

Baton Rouge, Louisiana - Portfolio: https://mechazo11.github.io/

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Skills

Programming	C++, Python, MATLAB, LATEX
Software Development	Git, Docker, Ruff
Computer Vision	2D & 3D Object Detection
Robotics	Visual Collaborative SLAM, Model Predictive Control, ROS, Gazebo Harmon
Scientific Computing & Visualization Libraries	SciPy, Numpy, Numba, Eigen, Matplotlib

Education

Doctor of Philosophy (Ph.D.) in Mechanical Engineering — *Baton Rouge, Louisiana, U.S.A*
Louisiana State University (LSU) — *Fall 21 - Present*
- CGPA - 3.86 (as of Spring 2024)

Master of Science in Mechanical Engineering — *Lafayette, Louisiana, U.S.A*
The University of Louisiana at Lafayette (ULL) — *Fall 19 - Fall 21*
- CGPA - 4.0

Bachelor of Science in Mechanical Engineering — *Dhaka, Bangladesh*
Ahsanullah University of Science and Technology (AUST) — *Fall 11 - Spring 15*
- CGPA - 3.86

Work Experience

Graduate Research & Teaching Assistant — *Baton Rouge, Louisiana, U.S.A*
Louisiana State University — *Fall 21 - Present*
- Developing a novel fault-tolerant, collaborative metric-semantic CSLAM framework in ROS 2 utilizing 3D object semantics and camera pose.
- Developing a new implementation of *Deep3D* bounding box regressor using EfficientNetV2. This work will also introduce a new pipeline for generating training data for bounding box regressors.
- Developed a new Keyframe descriptor and a Place recognition algorithm to rapidly recover global pose during sudden tracking loss in Monocular VSLAM system using 2D object semantics and camera pose data.
- Developed a ROS 2 package to natively integrate ORB-SLAM3 into ROS 2 ecosystem.
- Responsible for the maintenance and upkeep of two RBKAIROS mobile manipulators, each valued at $90K.
- Conducted laboratory sessions for Machine Design II and Control Engineering courses.

Graduate Research Assistant — *Lafayette, Louisiana, U.S.A*
The University of Louisiana at Lafayette — *Fall 19 - Summer 2021*
- Developed a Python-based data analysis tool for COVID-19 infection phases, facilitating collaboration with computer scientists and contributing to publications in a Nature and a BMC journal papers.
- Developed a privacy-aware, multi-user indoor positioning system, deployed IoT occupancy monitoring systems and advised undergraduate RAs in IoT projects.

Projects (curated)

Solving Short-Term Relocalization Problems In MKVSLAM Using Spatial And Semantic Data | ROS 2, Python
- Developed a novel global pose recovery (relocalization) method for VSLAM frameworks using a new Keyframe descriptor and Keyframe place recognition method using object semantics and camera spatial data.
- About 2x speedup and 39% reduction in ATE in comparison to bag-of-words baseline method in ground and aerial vehicle datasets. Paper presented in IEEE/ASME AIM 2024. Code, Paper

ROS2 ORB-SLAM3 package | ROS 2, C++
- Developed a package that natively implements ORB-SLAM3 V1.0 in ROS 2 ecosystem. Code.

Clearpath Simulator comes to Gazebo Harmonic | ROS 2, C++, Python, Gazebo
- Modified Clearpath Simulator to make it compatible with ROS 2 Jazzy and Gazebo Harmonic. Also introduced a number of new features. Code

Python-MPPI | Python, Numpy, Numba
- Developed a Numba-accelerated Model Predictive Path Integral controller for a 2D Differential Drive Robot Code

Mobile Robot Path Planning Using Genetic Algorithm | MATLAB
- Wrote a Genetic Algorithm from scratch that can solve complex 2D path planning problem for robot navigation.Code

Anonymous Multi-User Tracking in Indoor Environment Using Computer Vision and Bluetooth | Python, PyTorch
- Developed a novel privacy-aware Multimodal Indoor Positioning System (MIPS) utilizing overhead RGB images and Bluetooth RSSI data. Thesis report.
- Project lead to a collaborative **patent**: US20240292188A1.

Deep Learning Projects | Python, PyTorch
- Developed a piano music generator using two Critic-Composer LSTMS. Code
- Implemented AlphaZero's Monte Carlo Tree Search algorithm in an 11x11 Gomoku game. Code

Honors & Awards

Jan 23	**Graduate Teaching Assistantship (LSU)**, Dept. of MIE	*Baton Rouge, U.S.A*
Aug 21	**Graduate Research Assistantship (LSU)**, NSF:NRI #2024795	*Baton Rouge, U.S.A*
Aug 21	**Graduate Research Assistantship (ULL)**, NSF:RAPIDS #2027688	*Lafayette, U.S.A*