

# Azmyin Md. Kamal

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

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## Skills

**Programming** C++, Python, PyTorch, MATLAB, L<sup>A</sup>T<sub>E</sub>X  
**Software Development** Git, Docker, Ruff  
**Frameworks & Platforms** ROS 1 & 2, Gazebo Harmonic, ros2\_control

## Education

**Ph.D. in Mechanical Engineering (Ongoing)** *Baton Rouge, Louisiana, U.S.A*  
LOUISIANA STATE UNIVERSITY (LSU) *Fall 21 - Present*  
**Master of Science in Mechanical Engineering** *Lafayette, Louisiana, U.S.A*  
THE UNIVERSITY OF LOUISIANA AT LAFAYETTE (UL LAFAYETTE) *Fall 19 - Fall 21*  
**Bachelor of Science (B.Sc) in Mechanical Engineering** *Dhaka, Bangladesh*  
AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (AUST) *Fall 11 - Spring 15*

## 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 training bounding box regressor.
- 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**

- Heavily modified fork of Clearpath Simulator that makes the simulator compatible with ROS 2 Jazzy and Gazebo Harmonic. Also introduces 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 N-dimensional 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**

- Master's thesis project where I developed a novel privacy-aware Multimodal Indoor Positioning System (MIPS) utilizing overhead RGB images and Bluetooth RSSI data. Manuscript available [here](#).
- 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

Jul 24	<b>Attendance &amp; Travel Grant</b> , IEEE/ASME AIM 2024	<i>Boston, U.S.A</i>
Oct 23	<b>Attendance Grant</b> , ROSCon 2023	<i>New Orleans, U.S.A</i>
Jan 23	<b>Graduate Teaching Assistantship (LSU)</b> , Dept. of MIE	<i>Baton Rouge, U.S.A</i>
Aug 21	<b>Graduate Research Assistantship (LSU)</b> , NSF:NRI #2024795	<i>Baton Rouge, U.S.A</i>
Aug 21	<b>Graduate Research Assistantship (ULL)</b> , NSF:RAPIDS #2027688	<i>Lafayette, U.S.A</i>
Nov 16	<b>Dean's List of Honor</b> , AUST	<i>Dhaka, Bangladesh</i>