
RESEARCH INTERESTS

Keywords: Robotics, Computer Vision. Specifically: Simultaneous Localization and Mapping (SLAM); Sensor Fusion; Stereo camera; IMU; Sonar Sensor; Image processing.

A slightly longer story: My research activity covers State Estimation fusing multiple sensors for robotic systems. My current work includes developing a Simultaneous Localization and Mapping (SLAM) algorithm integrating visual, inertial, depth, and sonar range measurements for marine environments where vision-only methods fail due to challenges inherent to that domain, such as low visibility and haze. The long-term goal is to deploy such an algorithm in autonomous robots for robust localization and persistent mapping.

EDUCATION

2014 – present Ph.D. in Computer Science and Engineering, University of South Carolina (Columbia SC, USA).

2009 – 2012 B.Sc. in Computer Science and Engineering, Military Institute of Science and Technology (Dhaka, Bangladesh).

PROFESSIONAL EXPERIENCE

June 2019 – present Software Engineer Intern, Oculus, Facebook.

2016 – May 2019 Research Assistant at Autonomous Field Robotics Laboratory, Computer Science & Engineering Department, University of South Carolina (Columbia SC, USA).
Supervisor: Prof. Ioannis Rekleitis

- Augmented a Visual-Inertial Odometry system that integrates Sonar and depth measurements, showing qualitative improvements in underwater environments.
- Analyzed state-of-the-art Visual-Inertial odometry packages (including ORB-SLAM and OKVIS) to get insights on strengths and weaknesses.
- Deployed underwater robot (Aqua) and custom sensor-suite (stereo camera, IMU, Sonar, and depth) in Barbados, developing necessary drivers to collect vision, inertial, sonar data.

2014 – 2016 Teaching Assistant in the Computer Science & Engineering Department, University of South Carolina (Columbia SC, USA).

- Taught HTML, CSS, and JavaScript as Instructor in CSCE102 “General Applications Programming” (Summer 2015, Fall 2016, Spring 2016, Summer 2016; ~ 100 students).
- Assisted students on their Java lab assignments and graded them as Teaching Assistant in CSCE146 “Introduction to Algorithmic Design II” (Spring 2015; ~ 50 students).
- Graded students’ C++ assignments as Teaching Assistant in CSCE240 “Introduction to Software Engineering” (Fall 2014; ~ 70 students).

February 2014 – August 2014 Adjunct Lecturer at Military Institute of Science and Technology (Dhaka, Bangladesh).

- Taught data structures in C++ and pattern recognition in MATLAB during the lab of the classes “Data Structures” and “Pattern Recognition”, respectively (~ 70 students).

July 2013 – January 2014 Software Engineer at BRAC IT Services Limited, (Dhaka, Bangladesh).

- Developed an Android mobile app to enable online banking.

SCHOLARSHIPS, HONORS, AND AWARDS

- Finalist for IEEE/RSJ International Conference on Intelligent Robots and Systems (2019) Best Application Paper Award, awardees to be announced.
- IEEE International Conference on Robotics and Automation (2018) travel grant from IEEE RAS.

PROGRAMMING LANGUAGES AND SOFTWARE

- (Proficient) C/C++, Python, MATLAB; (Familiar) Java, JavaScript, SQL.
- ROS, OpenCV, boost, Eigen, Qt, OpenGL, L^AT_EX, Git, Mercurial.
- GNU/Linux, Mac OSX, Windows.

PUBLICATIONS

FULLY-REFEREED CONFERENCE AND WORKSHOP PAPERS

- [C7] S. Rahman, A. Quattrini Li, and I. Rekleitis, “SVIn2: an underwater SLAM system using sonar, visual, inertial, and depth sensor,” in *Intelligent Robots and Systems (IROS)*, (accepted), 2019.
- [C6] —, “Contour based reconstruction of underwater structures using sonar, visual, inertial, and depth sensor,” in *Intelligent Robots and Systems (IROS)*, (accepted), 2019.
- [C5] B. Joshi, S. Rahman, M. Kalaitzakis, B. Cain, J. Johnson, M. Xanthidis, N. Karapetyan, A. Hernandez, A. Quattrini Li, N. Vitzilaios, and I. Rekleitis, “Experimental comparison of open source visual-inertial-based state estimation algorithms in the underwater domain,” in *Intelligent Robots and Systems (IROS)*, (accepted), 2019.
- [C4] S. Rahman, A. Quattrini Li, and I. Rekleitis, “Sonar visual inertial SLAM of underwater structures,” in *International Conference on Robotics and Automation (ICRA)*, 2018.
- [C3] M. Modasshir, S. Rahman, O. Youngquist, and I. Rekleitis, “Coral identification and counting with an autonomous underwater vehicle,” in *IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2018.
- [C2] N. Weidner, S. Rahman, A. Quattrini Li, and I. Rekleitis, “Underwater cave mapping using stereo vision,” in *International Conference on Robotics and Automation (ICRA)*, Singapore, 2017.
- [C1] A. Quattrini Li, A. Coskun, S. M. Doherty, S. Ghasemlou, A. S. Jagtap, M. Modasshir, S. Rahman, A. Singh, M. Xanthidis, J. M. O’Kane, and I. Rekleitis, “Experimental comparison of open source vision based state estimation algorithms,” in *International Symposium on Experimental Robotics (ISER)*, 2016.

LIGHTLY-REFEREED CONFERENCE AND WORKSHOP PAPERS

- [O6] S. Rahman, A. Quattrini Li, and I. Rekleitis, “Visual-acoustic SLAM for underwater caves,” in *ICRA2019 Workshop on Underwater Robotics Perception*, 2018.
- [O5] —, “A modular sensor suite for underwater reconstruction,” in *Proceedings of the MTS/IEEE OCEANS – Charleston*, 2018.
- [O4] S. Rahman, “Underwater cave mapping,” in *ICRA2018 PhD Forum*, 2018.
- [O3] S. Rahman, A. Quattrini Li, and I. Rekleitis, “Underwater cave mapping: stereo visual SLAM with IMU and Sonar,” in *IROS2017 Abstract*, 2017.

- [O2] A. Quattrini Li, A. Coskun, S. M. Doherty, S. Ghasemlou, A. S. Jagtap, M. Modasshir, S. Rahman, A. Singh, M. Xanthidis, J. M. O’Kane, and I. Rekleitis, “Vision-based shipwreck mapping: On evaluating features quality and open source state estimation packages,” in *Proceedings of the MTS/IEEE OCEANS – Monterey*, 2016.
- [O1] —, “On understanding the challenges in vision-based shipwreck mapping,” in *ICRA2016 (International Conference on Robotics and Automation) Workshop on “Marine Robot Localization and Navigation”*, 2016.

SERVICES

Reviewer for

Journals:

- International Journal of Robotics Research, 2019
- IEEE Robotics and Automation Letters, 2018 – 2019

Conferences:

- IEEE International Conference on Robotics and Automation, 2018 – 2019
- IEEE/RSJ International Conference on Intelligent Robots and Systems, 2018 – 2019

ASSOCIATIONS MEMBERSHIP

- IEEE, the Institute of Electrical and Electronics Engineers, student member.
- IEEE Robotics and Automation Society (RAS).