


# Md Jahidul Islam


## Research Scientist II

Robert Bosch LLC, Sunnyvale, CA

## Ph. D. in Computer Science

University of Minnesota (UMN), Twin Cities

 jahidul.org

 islam034@umn.edu

 linkedin.com/in/mdjahidulislam

 scholar.google.com/citations?user=XuEzu5cAAAAJ

## Research Interest

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I am an avid robotics researcher with a passion for robot perception and machine vision. My work broadly focuses on the design and development of robust perception modules for visually-guided underwater robots. I am particularly interested in the following research domains

- 🔗 Robot perception: attention modeling; object detection and tracking; visual servoing
- 🔗 Machine vision : image enhancement/restoration; image super-resolution
- 🔗 Underwater robotics: human-robot cooperative task execution

## Education

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### Ph.D. in Computer Science

Fall 2015 - May 2021

University of Minnesota (UMN), Twin Cities

Dissertation: "Machine Vision for Improved Human-Robot Cooperation in Adverse Underwater Conditions"

Advisor: Prof. Junaed Sattar

### M.Sc. in Computer Science & Engineering

Spring 2012-15

Bangladesh University of Engineering and Technology (BUET)

Thesis: "Intelligent DSA by Exploiting a Synergy between Genetic Algorithm and Local Search"

Advisor: Prof. Md. Monirul Islam and Prof. A. B. M. Alim Al Islam

### B.Sc. in Computer Science & Engineering

Fall 2007-12

Bangladesh University of Engineering and Technology (BUET)

Thesis: "Self-adaptive and Genetically Programmed Differential Evolution"

Advisor: Prof. Md. Monirul Islam

## Academic Enrollments

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### Graduate Research Assistant

Summer 2017, Fall 2018-20, Summer 2020 - Spring 2021

Interactive Robotics and Vision Lab (IRVLab)

📁 Primary role involves working on sponsored research projects and assisting in the robotic field trials.

### Graduate Teaching Assistant

Fall 2016, Fall 2017, Spring 2018

Dept. of CSE, University of Minnesota (UMN), Twin Cities

📁 Was involved in preparing/grading tests; also held office-hours and conducted occasional lectures.

Courses: Introduction to Intelligent Robotic Systems; Introduction to C/C++ Programming.

### Assistant Professor / Lecturer

Spring 2015 / Fall 2012-15

Dept. of CSE, United International University (UIU), Dhaka

Major courses instructed: Artificial Intelligence; Structured Programming Languages; Algorithms; Numerical Methods; Microprocessors and Microcontrollers; Data Communications; Electronic Devices and Circuits.

### Part-time Lecturer

November 2013 - April 2014

Dept. of CSE, Bangladesh University of Engineering and Technology (BUET), Dhaka

Courses instructed: Machine Learning; Artificial Intelligence; Digital System Design; Software Engineering.

## Industry Enrollments

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### Research Scientist II

June 2021 - Present

Robert Bosch LLC, Sunnyvale, CA, USA

📁 Working in the CR/RHI3-NA department on perception in mixed reality and robotics.

### Research & Development (R&D) Intern

Summer 2019

Qualcomm Technologies, Inc. Santa Clara, CA, USA

📁 Worked with the Glance team on design/customization of vision-based models for ultra-low powered systems.

### Research & Development (R&D) Intern

Summer 2018

3M Corporate Research Systems Lab. Maplewood, MN, USA

📁 Worked with the AI group on visual and corpus data analysis, and on building features of a virtual assistant app.

## Honors and Awards

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- 2019-20** Doctoral Dissertation Fellowship (DDF), Dept. of CSE, University of Minnesota, USA.
- 2019** RAS travel grant for ICRA 2019 in Montreal, Canada.
- 2017** IEEE/RSJ travel grant for IROS 2017 in Vancouver, Canada.
- 2015-16** ADC graduate fellowship, Digital Technology Center (DTC), University of Minnesota, USA.
- 2012-13** Runner-up. International Robotics Challenge (IRC) grand finale, Techfest, IIT-Bombay, India.
- 2012** Champion. Bangladesh regional of IRC, IEEE student branch, BUET, Bangladesh.
- 2006** Odyssey honorary award. English club, Notre Dame College (NDC), Dhaka, Bangladesh.
- 2004** 1st Gold medalist. Sher-e-Bangla government boys' high school, Dhaka, Bangladesh.

## Selected Publications

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### Journal Articles

- [1] **M. J. Islam**, Y. Xia, and J. Sattar. *Fast Underwater Image Enhancement for Improved Visual Perception*. IEEE Robotics and Automation Letters (RA-L), 5 (2), pp. 3227-3234, 2020. [Impact Factor: 3.61]  
📄 <https://ieeexplore.ieee.org/document/9001231>  
📁 <https://github.com/xahidbuffon/FUnIE-GAN>
- [2] **M. J. Islam**, J. Hong, and J. Sattar. *Person Following by Autonomous Robots: A Categorical Overview*. The International Journal of Robotics Research (IJRR\*), 38 (14), 2019. [Impact Factor: 6.134]  
📄 <https://journals.sagepub.com/doi/10.1177/0278364919881683>
- [3] **M. J. Islam**, M. Fulton, and J. Sattar. *Towards a Generic Diver Following Algorithm: Balancing Robustness and Efficiency in Deep Visual Detection*. IEEE RA-L, 4 (1), pp. 113-120, 2018. [Also presented at the ICRA 2019]  
📄 <https://ieeexplore.ieee.org/document/8543168>
- [4] **M. J. Islam**, M. Ho, and J. Sattar. *Understanding Human Motion and Gestures for Underwater Human-Robot Collaboration*. Journal of Field Robotics (JFR\*), 2018, DOI: 10.1002/ROB.21837. [Impact Factor: 4.345]  
📄 <https://onlinelibrary.wiley.com/doi/full/10.1002/rob.21837>
- [5] **M. J. Islam**, J. Mo, and J. Sattar. *Robot-to-Robot Relative Pose Estimation using Humans as Markers*. Autonomous Robots, 45(4), December 2019, DOI: 10.1007/s10514-021-09985-6. [Impact Factor: 3.602]  
📄 <https://link.springer.com/article/10.1007/s10514-021-09985-6>
- [6] **M. J. Islam**, R. Wang, K. Langis, and J. Sattar. *SVAM: Saliency-guided Visual Attention Modeling by Autonomous Underwater Robots*. **Under review** at the IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI), November 2020. [Impact Factor: 22.973]  
📄 <https://arxiv.org/pdf/2011.06252.pdf>  
📁 <https://github.com/xahidbuffon/SVAM-Net>

## Conference Papers

[C1] **M. J. Islam**, P. Luo, and J. Sattar. *Simultaneous Enhancement and Super-Resolution of Underwater Imagery for Improved Visual Perception*. Robotics: Science and Systems (RSS), July 2020, Virtual.

📄 <http://www.roboticsproceedings.org/rss16/p018.pdf>

📄 [https://github.com/xahidbuffon/Deep\\_SESR](https://github.com/xahidbuffon/Deep_SESR)

[C2] **M. J. Islam**, C. Edge, Y. Xiao, P. Luo, M. Mehtaz, C. Morse, S. S. Enan, and J. Sattar. *Semantic Segmentation of Underwater Imagery: Dataset and Benchmark*. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), October 2020, Virtual.

📄 <https://arxiv.org/pdf/2004.01241.pdf>

📄 <https://github.com/xahidbuffon/SUIM>

[C3] **M. J. Islam**, S. S. Enan, P. Luo, and J. Sattar. *Underwater Image Super-Resolution using Deep Residual Multipliers*. IEEE International Conference on Robotics and Automation (ICRA), May 2020, Virtual.

📄 <https://ieeexplore.ieee.org/document/9197213>

📄 <https://github.com/xahidbuffon/SRDRM>

[C4] **M. J. Islam**, M. Ho, and J. Sattar. *Dynamic Reconfiguration of Mission Parameters in Underwater Human-Robot Collaboration*. IEEE International Conference on Robotics and Automation (ICRA), pp. 1-8, May 2018, Brisbane, Australia.

📄 <https://ieeexplore.ieee.org/document/8461197>

[C5] C. Fabbri, **M. J. Islam**, and J. Sattar. *Enhancing Underwater Imagery Using Generative Adversarial Networks*. IEEE International Conference on Robotics and Automation (ICRA), pp. 7159-7165, 2018, Brisbane, Australia.

📄 <https://ieeexplore.ieee.org/document/8460552>

[C6] **M. J. Islam** and J. Sattar. *Mixed-domain Biological Motion Tracking for Underwater Human-Robot Interaction*. IEEE International Conference on Robotics and Automation (ICRA), pp. 4457-4464, May 2017, Singapore.

📄 <https://ieeexplore.ieee.org/document/7989516>

[C7] F. Shkurti, W. Chang, P. Henderson, **M. J. Islam**, J. C. G. Higuera, J. Li, T. Manderson, A. Xu, G. Dudek, and J. Sattar. *Underwater Multi-Robot Convoying using Visual Tracking by Detection*. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 4189-4196, September 2017, Vancouver, Canada.

📄 <https://ieeexplore.ieee.org/document/8206280>

[C8] J. Mo, **M. J. Islam** and J. Sattar. *Learning Rolling Shutter Correction from Real Data without Camera Motion Assumption*. **Under review** at the Conference on Robot Learning (CoRL), 2021.

📄 <https://arxiv.org/pdf/2011.03106.pdf>

## Selected Talks and Presentations

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**08/20**: Conference presentation of paper [C2] at the IEEE/RSJ IROS 2020 (virtual).

**07/20**: Conference presentation of paper [C1] at the RSS 2020 (virtual).

**06/20**: Presentation on "Challenges of Salient Object Detection" at IRVLab, UMN (interactive).

**05/20**: Conference presentation of paper [C3] at the IEEE ICRA 2020 (virtual).

**12/19**: Presentation on "Learning Generative Model from Single Image" at IRVLab, UMN (interactive).

**11/19**: Presentation on "Simultaneous Enhancement and Super-Resolution" at VCAI, UMN (seminar).

**05/19**: Conference presentation of paper [J3] at the IEEE ICRA 2019, Montreal, Canada (interactive).

**02/19**: Presentation on "Challenges of Underwater Visual Perception" at UIU, Dhaka (invited talk).

**06/18**: Conference presentation of paper [C4] at the IEEE ICRA 2018, Brisbane, Australia (interactive).

**03/18**: Poster presentation on "Robo-Chat-Gest Language", MnDrive Symposium, UMN (interactive).

**02/18**: Presentation on "One-Shot Person Re-Identification" at IRVLab, UMN (interactive).

**10/17**: Presentation on "Gradient-based Optimization Functions" at SDCC, UMN (interactive).

**06/17**: Conference presentation of paper [C6] at the IEEE ICRA 2017, Singapore (talk).

**03/17**: Poster presentation on "The MDPM Tracker", MnDrive Symposium, UMN (interactive).

## Participation in Marine Robotics Field Trials

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**2018 and 2019:** Bellairs Research Institute in Barbados (see <https://www.mcgill.ca/bellairs/>)

## Collaboration and Mentoring Experiences

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### ★ Peer Collaboration

- The Multi-robot convoying project (2017): lead by Dr. Florian Shkurti at the Mobile Robotics Lab of McGill University; Florian Shkurti is now an Assistant Professor at UToronto.  
➡ [http://www.cim.mcgill.ca/~mrl/robot\\_tracking/](http://www.cim.mcgill.ca/~mrl/robot_tracking/)
- The UGAN project (2018): lead by Cameron Fabbri at the IRVLab; he is now working at 3M.  
➡ <https://github.com/cameronfabbri/Underwater-Color-Correction>
- The UnRolling project (2020): lead by Jiawei Mo at the IRVLab.  
➡ <https://github.com/IRVLab/unrolling>

### 👤 Mentoring Experience

- Peigen Luo: UG student, UMN (2019-20); he is now a graduate student at UIUC.
- Youya Xia: UG student, UMN (2018-19); she is now a PhD student at Cornell.
- Yuyang Xiao: UG student, UMN (2019-20); he is now a graduate student at UIUC.
- Marc Ho: Masters student, UMN (2017-18); he is now working at Optum.
- Muntaqim Mehtaz, Christopher Morse, and Ruobing Wang: current UG students at the UMN.

## Community Services

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### 📄 Conference and Journal Reviewer

- IEEE ICRA 2016-21, IEEE/RSJ IROS 2016-20
- IEEE ICME 2021, ICCV 2019, CRV 2018-20
- IEEE Signal Processing Letters (SP-L)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Industrial Electronics (T-IE)
- Elsevier Signal Processing: Image Communication (SPIC)
- IEEE Journal of Oceanic Engineering (JOE)

### 👤 Member / Student Member

- IEEE and IEEE RAS
- TinyML summit 2019-20
- Graduate student panel, UMN
- Self-Driving Car Club (SDCC), UMN
- Robot vision reading group, IRVLab
- Field robotics reading group, IRVLab
- Vision reading group, Dr. Park's Lab

## Software and Hardware Skills

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### 🔧 Programming Languages

- Python, C++/C
- Java, MATLAB
- Unix Shell

### 📊 Deep NN Libraries

- TensorFlow 1.14+
- Keras 2.2.0+
- PyTorch 1.5.1+

### 🔗 Embedded AI devices

- Nvidia Jetson Xavier, TX2
- Nvidia Jetson Nano
- Google Coral Edge TPU

### ⚙️ Operating Systems

- Linux (Ubuntu)
- Windows

### 🔧 Vision Tool-kits

- OpenCV 3.0
- ROS Kinetic/Melodic

### 🐾 Robotic platforms

- AQUA 8, OpenROV
- TurtleBot 2

## Volunteering and Extracurricular Activities

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### 👤 Volunteer / Activist

- Clean Energy and Climate (CEC)
- One-Taka-Meal Project
- Oceanic Preservation Society (OPS)

### 👤 Practitioner / Enthusiast

- Keen explorer: century-old math problems and puzzles
- Semi-professional cricketer: major leagues in MN/CA/TX
- Self-taught photographer: like to travel & capture memories