

ARGHYA CHATTERJEE

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A robotics and machine learning researcher experienced in applying Deep Learning, Edge & Cloud Computing in Computer Vision for Object Detection, Segmentation & Localization, Advanced Perception based SLAM for Localization, Mapping, Metric & Semantic understanding of the environment, Control theory & Deep Reinforcement Learning for risk aware autonomous robotic exploration in perceptually degraded environments and Swarm Intelligence for multi-robot collaboration & rapid exploration in outer space to help take better decision for humans.

EDUCATION

- Bangladesh University of Engineering and Technology, Dhaka, Bangladesh**
Degree: BSc. in Mechanical Engineering Feb 2015 - Sept 2019
CGPA: 3.14/4.00
- Khulna Public College, Khulna, Bangladesh**
Degree: HSC in Science Jul 2012 - Aug 2014
GPA: 5.00/5.00
Class Position: 1st/60
- Khulna Bidyut Kendra Secondary School, Khulna, Bangladesh**
Degree: SSC in Science Jan 2010 - May 2012
GPA: 5.00/5.00
Class Position: 1st/60

RESEARCH & PROJECT EXPERIENCE

- Advisor & Robotics Engineer, Lotus Robotics** Oct 2021 – Present
Research Engineer for ROS based Autonomous Robotics Projects
Project Coordinator: Mansurul Haque
Responsibilities:
 - Developing Autonomous UGVs for GPS guided delivery missions.
 - Developing Autonomous UGVs for Warehouse Security, Lawn Mowing & Floor Scrubbing.
 - Building Autonomous UAVs for agriculture & surveying.
- Team Member, Team CoSTAR of NASA JPL** Jul 2020 – Sep 2021
DARPA organized SubT Challenge
Perception Team Supervisors: Dr. B. Morrell (NASA JPL) & Prof. L. Carlone (MIT)
Responsibilities:
 - Built Advanced perceptive sensor based multi-robot SLAM algorithm (LOCUS & LAMP) and analyzed efficiency, accuracy & robustness with SOTA algorithms.
 - Developed Object detection & localization capability for robots like Spot, Husky, Rollercopter & UAV with advanced perceptive sensors as part of NeBula autonomy Solution.
- Team Supervisor & Educator, STEMX 365** Jan 2020 – Present
JAXA (& NASA) org. Kibo-Astrobee ISS Robot Programming Challenge
International Project Coordinator: Mizanul H. Chowdhury (MIT)
Responsibilities:
 - Helped in Developing Algorithms for Autonomously operate Astrobee (A free flying robot) inside ISS avoiding obstacles, following way points and detecting QR & AR Tag.
 - Educated students about ISS & How Astrobee is going to help astronauts automate tasks.
- Research Assistant at Mars Rover Lab (MRL), BUET** Oct 2019 – Sept 2020
Project Researcher, Advisor & Instructor for URC, ERC, IPASC & KRPC
Supervisor: Dr. Md. Ashiqur Rahman (BUET)
Responsibilities:
 - Carried out research on Autonomous Navigation Based on GPS, SLAM & Object Detection and Plan Path accordingly for Safe Exploration of Rovers on Rough Terrains, Caves and Mineral Ores of Earth and Mars.
- Software Team Leader & Member, Team Interplanetary** Jun 2017 – Sep 2019
ESA organized ERC & Mars Society organized URC
Supervisor: Dr. Md. Ashiqur Rahman (BUET)

Responsibilities:

- Lead Software Group & Built a GPS Guided Autonomous Mars Rover Mission & On-board Object Detection for University Rover Challenge (URC) and Way-point Based Autonomous Mars Rover Mission & On-board AR Tag Detection for European Rover Challenge (ERC).
- **Researcher & Collaborator at Department of ME, BUET** Mar 2018 – Apr 2019
Undergraduate Thesis Dhaka, Bangladesh
Supervisors: Dr. Maglub Al Nur (BUET) and Dr. Muhammad Abir (MIT)

Responsibilities:

- Investigated Pool Boiling IR Images of MIT's Nuclear Reactor Lab Computationally for Segmentation of Dry Spots Automatically and Evaluated Performance of Traditional Image Processing and Deep Neural Networks in Quantifying Dry Area Segments.
- **Team Leader, Team Octatron** Mar 2017 - Feb 2018
Undergraduate Project Dhaka, Bangladesh
Supervisors: Dr. M.A. Rashid Sarkar and Musanna Galib (BUET)

Responsibilities:

- Lead a Team & Built a Fire and Flood Fighter Octocopter (UAV) for Extinguishing Fire in Fire Affected Buildings and Distributing Flood Reliefs to people in Flood Affected Zones.
- **Researcher & Technical Leader, Team Out of the Box** Jan 2017 - May 2017
Microsoft BD Internship Project Dhaka, Bangladesh
Supervisors: Sonia B. Kabir and Ashikur Rahman (Microsoft)

Responsibilities:

- Lead a Team & Built a Mobile Application for Earlier Screening of Particular Disability in Children Using Microsoft Products like Azure Cloud Platform and Bing Maps Server.
- **Team Leader, Team Igniters** Jul 2016 - Feb 2017
Undergraduate Project Dhaka, Bangladesh
Supervisors: Dr. M.A. Rashid Sarkar and Dr. A. B. M. Alim Al Islam (BUET)

Responsibilities:

- Lead a Team and Built a Hand Wearable Solar Powered Obstacle Detection and Safe Navigation Device for Blind People in Low Cost.

TEACHING EXPERIENCE

- **BUET Mars Rover Robotics Team** Oct 2020 - Present
Teaching Assistant at Mars Rover Lab (MRL), BUET Dhaka, Bangladesh
- **JAXA org. Kibo Astrobee ISS Robot Prog. Challenge** Jan 2020 - Present
Educator & Instructor of Teams from Bangladesh, STEMX 365 Dhaka, Bangladesh
- **National Space Carnival & Camp** Sep 2019 - Jun 2020
Instructor & Academic Coordinator for Workshops & Camps Dhaka, Bangladesh
- **Bangladesh Astronomical Society** Mar 2017 – Apr 2019
Instructor for Workshops & Seminars Dhaka, Bangladesh

PROFESSIONAL EXPERIENCE

- **Lotus Robotics** Oct 2021 – Present
Advisor & Robotics Engineer Newyork, USA
Activities: Working on Autonomous UGVs for GPS guided delivery missions, Warehouse Security, Lawn Mowing & Floor Scrubbing and UAVs for agriculture & surveying.
- **Bangladesh Astronomy Research Collaboration (BARC)** Jan 2020 – Present
Advisor & Fellow Member Dhaka, Bangladesh
Activities: Give advice on research activities & how the organization should operate.
- **Youthpreneur Network (A Social Welfare Organization)** Jun 2019 – Jun 2020
Head of STEM Education & Development Dhaka, Bangladesh
Activities: Instructed, Organized and Lead Projects, Workshops, Olympiads and Camps in Educational Institutions to Promote STEM Education in Bangladesh.
- **American Astronomical Society** Apr 2018 - Mar 2020
Country Collaborator & Member Dhaka, Bangladesh
Activities: Celebrated International Astronomical Events in Bangladesh and Reported to Proper AAS Authority for Publishing on their Magazines.

PUBLICATIONS

- Matteo Palieri, Benjamin Morrell, Abhishek Thakur, Kamak Ebadi, Jeremy Nash, **Arghya Chatterjee**, Christoforos Kanellakis, Luca Carlone, Cataldo Guaragnella, Ali-akbar Aghamohammadi, "LOCUS: A Multi-Sensor Lidar-Centric Solution for High-Precision Odometry and 3D Mapping in Real-Time," IEEE Robotics & Automation Letters Journal, 2020, vol: 6/2, pp. 421-428.
- **Arghya Chatterjee**, M. Galib and M. A. R. Sarkar, "Application of Arduino in designing modern electromechanical laboratory," 2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI), Chennai, 2017, pp. 222-225.
- **Arghya Chatterjee**, S. Dutta, P. Sarkar and A. B. M. A. A. Islam, "Obstacle Detector for Blind People with Low Cost (Poster Presentation)," Proceedings of 2017 International Conference on Networking, Systems and Security (NSysS), Dhaka, 2017.

INTERNSHIPS & TRAININGS

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| • Microsoft Bangladesh Limited
<i>Internship Project: Disabling Disability through Microsoft Products</i> | Jan 2017 - May 2017
Dhaka, Bangladesh |
| • Khulna Power Company Limited
<i>Training: Power Plant Visit & Industrial Attachment (3 weeks)</i> | Oct 2018 – Oct 2018
Khulna, Bangladesh |

SKILL SETS

- **Prg. Language:** Python, C++, C#, Arduino, Java, Java S, HTML, PHP, CSS, & LATEX.
- **Framework & OS:** ROS, ROS2, OpenCV, PCL, Nvidia Isaac SDK, Keras, TensorFlow, PyTorch, Caffe, CUDA, OpenGL, Kubernetes, .NET, Django, Linux, Mac, Windows & Android.
- **Software & Tool:** Git, Github, Gitlab, Docker, MIPAR, Solidworks, Ansys, PLC, Blender, Unity & UE 4, Verge3D, Carla Simulator, Microsoft Airsim, Deeplab, OpenPose3D, Meshroom, Meshlab, CloudCompare, Open3D, OpenDroneMap, OpenSpace, Photoshop, Kdenlive & MS Office Family.
- **IDE, Compiler & Text Editor:** CodeBlocks, Microsoft Visual Studio, MATLAB, Atom, Jupiter Notebook, PyCharm, Android Studio, Nodejs, IntelliJ IDEA, VS Code & Notepad++.
- **Cloud Platform:** AWS Compute, AWS RoboMaker & Storage, GCP, Google Colab.
- **Hardware:** GPS (RTK), IMU, VLP-16 (3D) & RPLidar (2D) LIDAR, Intel Realsense D200 & 400 series RGBD & L515 Lidar Camera, ZED 3D Camera, Microsoft Kinect Camera, Nvidia Jetson & Intel NUC Boards, Arduino & Raspberry PI Boards, Pixhawk, Ardupilot, VESC, BLDC motor, Nvidia AMD GTX Boards & Oculus Rift S VR Headset.
- **Language Proficiency:** Bangla, English & Hindi.

AWARDS, HONORS & SCHOLARSHIPS

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| • 5th Worldwide in Final Round of DARPA SubT Challenge
<i>Awarded to Team CoSTAR of NASA JPL for competing in the final round</i> | Sep 2021
Kentucky, USA |
| • Special Grant from ICT Division (Ministry) of Bangladesh
<i>Awarded to BUET Mars Rover Lab (MRL) for outstanding performance in robotics</i> | Feb 2020
Dhaka, BD |
| • Gold Medalist from Duke of Edinburgh International Foundation
<i>Awarded for Outstanding Extra-curricular & Service to the Society</i> | Dec 2019
London, UK |
| • 2nd in Asia & 16th Internationally in European Mars Rover Challenge
<i>Organized by European Space Foundation (ESF) & European Space Agency (ESA)</i> | Sep 2019
Kielce, Poland |
| • Special Fund & Grant from BUET Alumni Association Trust
<i>Awarded to Team Interplanetary of BUET MRL for competition & robotics research</i> | Jul 2019
Dhaka, BD |
| • Finalist in IEEE SS12 International Project Competition & Maker Fair
<i>Organized at SS12: Age of Innovation and Maker Fair 2017</i> | Jul 2017
Hyderabad, India |
| • 1st in National Project Show Competition (Senior Category)
<i>Organized at EEE Day, BUET</i> | May 2017
Dhaka, BD |
| • 3rd in Inter University Project Show Competition
<i>Organized at Mechanical Festival, BUET</i> | Apr 2017
Dhaka, BD |
| • 1st in National Poster Presentation Competition
<i>Organized at Robolution, MIST</i> | Mar 2017
Dhaka, BD |

- **2nd in Inter University Project Show Competition** Nov 2016
Organized at CSE Day, BUET Dhaka, BD
- **1st in All Classes** (2002 - 2014)
 - Primary at Elizabeth M Primary School (2002-2006)
 - Secondary at Khulna BKS School (2009-2012)
 - Junior at Khulna BKS School (2006-2009)
 - H. S. at Khulna Public College (2013-2014)
- **Govt. Merit Scholarship from Education Board of Bangladesh** (2006 - 2019)
 - Primary Scholarship (2006-2009)
 - Secondary Scholarship (2013-2014)
 - Junior Scholarship (2010-2012)
 - H. Secondary Scholarship (2015-2019)
- **Olympiad Achievements**
 - 1 st in Reg. R. of Science Olympiad'14
 - 3 rd in Reg. & 10 th in Nat. R. of Astro-Olympiad'13
 - 1 st in Reg. R. of Zoology Olympiad'14
 - 3 rd in Reg. R. of Math Olympiad'14

CERTIFICATIONS (COURSERA)

- **Machine Learning** by Stanford University, Feb 2018.
- **Deep Learning Specialization** (5 course) by DeepLearning.AI, Sept 2018.
- **Robotics Specialization** (6 course) by University of Pennsylvania (UPenn), Sept 2021.
- **Modern Robotics: Mechanics, Planning & Control Specialization** by Northwestern Uni, May 2021.
- **Control of Mobile Robots** by Georgia Institute of Technology, May 2020.
- **Image & Video Processing** by Duke University, Nov 2018.
- **Intro to Satellite Communications** by Institut Mines – Télécom, May 2019.
- **Wireless Communications for Everybody** by Yonsei University, Dec 2018.

LEADERSHIPS

- **Head** of STEM Education & Development *Youthpreneur Network*
- Software **Team Lead** *Team Interplanetary, BUET*
- **Technical Lead** of Internship Project *Microsoft BD*
- **President** (Senior Rover Mate) *BUET Rover Scout Group*
- **President** *Satyen Bose Science Club, BUET*

VOLUNTEERING

- **Sceptre (Poverty Alleviation Organization)** Jan 2015 - Present
Activities: Org. free medical camps & distribute dress & sewing machines to poor people monthly.
- **BUET Rover Scout Group** Feb 2015 - Apr 2019
Activities: Volunteered on tree plantation camp & org. flood relief distribution camp monthly.

MEMBERSHIPS

- Institute of Electrical and Electronics Eng. (**IEEE**)
- American Institute of Aero and Astronautics (**AIAA**)
- Bangladesh Astronomy Research Collaboration
- American Astronomical Society (**AAS**)
- IEEE Robotics and Automation Society
- Bangladeshi Researchers Network

REFERENCES

- **Dr. Benjamin Morrell**
Perception Team Leader, Team CoSTAR
Robotics Technologist, NASA JPL .
Ex. Post Doc Researcher, JPL, Caltech .
Email: benjamin.morrell@jpl.nasa.gov
- **Dr. Muhammad Abir**
Thesis Co-Supervisor
Adjunct. Professor, Dept. of ME, UT El Paso.
Ex. Post Doc. Researcher, Dept. of NSE, MIT.
Email: miabir@utep.edu
- **Dr. Ali-Akbar Agha-Mohammadi**
Team Leader, Team CoSTAR
Robotics Technologist, NASA JPL.
Email: aliakbar.ghamohammadi@jpl.nasa.gov
- **Dr. Luca Carlone**
Perception Team Supervisor, Team CoSTAR
Professor, Dept. of Aero Astro., MIT.
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