

Mohammad Moniruzzaman Akash

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RESEARCH INTEREST

Field Mobile Robots, Human-Robot Interaction, Safety & Control, Robots in Healthcare
Methods Imitation Learning, ROS, Machine Learning, Robotic Manipulator, Perception, Sensor Fusion

ACADEMIC QUALIFICATIONS

- **University of New Hampshire** New Hampshire, USA
Master of Science in Computer Science 2024 - Present
- **University of Dhaka** Dhaka, Bangladesh
Bachelor of Science in Robotics and Mechatronics Engineering; CGPA: 3.59/4.00 2017 - 2021
Exam held in: November, 2021 Result Published: April, 2022

SKILLS SUMMARY

- **Languages:** Python, C/C++, MATLAB, L^AT_EX, Git
- **Frameworks:** ROS2, Nav2, Behavior Trees, SLAM, PyTorch, LangChain, PyQt5, OpenCV, Pandas
- **Robot Platforms:** Boston Dynamics Spot, Hello Robot Stretch, Unitree GO, Franka Emika Arm
- **Design:** CAD Design (SolidWorks), PCB Design (Eagle, Proteus, EasyEDA), GraphPad Prism
- **Systems & Platforms:** Docker, Linux, Arduino, Raspberry Pi, Jetson Nano, ESP, PlatformIO
- **Fabrication:** 3D Printing, Laser Cutting, Welding, Soldering, Rapid Prototyping
- **Soft Skills:** Problem Solving, Teamwork, Cross-Functional Collaboration, Practical Thinking

RESEARCH ACTIVITIES

Conference Proceedings:

- O. Ghattas, M. Hussein, M. Alam, **M. Akash**, S. Arthanat, D. LaRoche, and M. Begum. "CaRE-BT: An Embodied Planning Framework for In-Home Assistive Robots." In International Conference on Social Robotics + AI (ICSR+AI 2025), Naples, Italy, September 2025. [\[Paper\]](#)
- **M. M. Akash**, R. Abdullah, R. Ahmed, N. Irtisam, S. Sarker, L. Jamal. "Haate-khori: An AI-based Bengali Handwriting Teaching System for Children". Submitted to Machine Learning with Applications (MLWA), 2023. [\[Abstract\]](#) [\[Gallery\]](#)
- Irtisam N., Ahmed, R., **Akash M. M.**, Abdullah R., Sarker S., Rahman S., & Jamal L. "Pathfinder: A Fog Assisted Vision-Based System for Optimal Path Selection of Service Robots." In 2020 Joint 9th International Conference on Informatics, Electronics & Vision (ICIEV) and 2020 4th International Conference on Imaging, Vision & Pattern Recognition (icIVPR) (pp. 1-6). IEEE, Kitakyushu, Japan, August 2020. [\[Paper\]](#) [\[Code\]](#)

Conference and Journal Reviewing:

HRI 2024

RESEARCH EXPERIENCES

- **Assistive Robot for Dementia Care** Aug 2024 – Present
Graduate Research Assistant, University of New Hampshire - Supervisor: Dr. Momotaz Begum
Funding: National Institutes of Health (NIH)
 - Contributing to develop intelligent assistive robots to support older adults with Alzheimer's dementia.
 - Designed and developed a ROS2-based robotic framework enabling PDDL-based daily task planning, PyTree action execution, custom docking, BLE based person tracking, agentic dialogue management, and autonomous docking.
- **Translation of a Wearable Fetal Movement Monitor towards Stillbirth Prevention** Jun 2023- Jul 2024
Research Assistant - Supervisor: Dr. Niamh Nowlan, Dr. AK Ghosh
Funding: Wellcome Leap In Utero Lab: MAIMLab, University of Dhaka.
 - Translated wearable fetal movement sensing data into clinically meaningful motion indicators for stillbirth risk assessment, in collaboration with University College Dublin and University of Dhaka.
 - Analyzed fetal movement time-series data and characterized noise arising from real-world wearable deployment.
 - Evaluated signal-processing and noise-reduction techniques to improve robustness of movement detection.
- **IHABOT: Intelligent Hospital Assistance Robot to Fight Contagion by Reducing Doctor-Patient Interaction** [\[Report\]](#) [\[Demo\]](#) [\[Team\]](#) May-Sep 2022
Research Assistant - Supervisor: Dr. Sejuti Rahman
Funding: Centennial Research Grant, University of Dhaka

- Designed and deployed a ROS-based autonomous hospital assistance robot, implementing SLAM, navigation, and sensor fusion for real-world hospital environments, reducing direct doctor–patient interaction.
 - Integrated a diverse array of sensors to acquire and analyze patients’ physiological data, as well as evaluate their physical exercises
 - Led the Robot Design and Fabrication team and contributed to the navigation team.
- **Design and Development of Collaborative Mobile Robots to Implement Multi-agent Path Finding Algorithm to Automate Govt. Post Office Warehouses** [[Report](#)] [[Demo](#)] [[Gallery](#)]
Research Assistant - Supervisor: Dr. Md Mosaddek Khan *Sep 2021-Aug 2022*
 Funding: ICT Ministry, Bangladesh
 - Developed a prototype MAPF system for warehouse automation, employing advanced robotics and AI to enable efficient, collision-free navigation and task completion in a simulated environment.
 - Engineered autonomous robots with integrated controllers, utilizing mecanum wheels for agile maneuvering, and implemented QR code-based object detection for precise product handling and delivery within the warehouse setup.
 - **OxyPlus: A Patient Adaptive, automated, wireless Oxygen Supply System** [[Video Pitch](#)]
Research Assistant - Supervisor: Dr. Md Adnan Kiber *Aug 2020-Dec 2021*
 - Developed OxyPlus, an automated, wireless oxygen supply system tailored for patients with lung diseases, ensuring continuous, optimal oxygen delivery.
 - Innovated in healthcare research with Team Oxyplus, focusing on minimizing infection risks by integrating disinfection mechanisms in oxygen supply systems.

RESEARCH PROJECTS

- **Development of a Real Time Endoscopic Image Diagnostic System using Deep Neural Network(Undergrad Thesis)** [[Demo](#)] [[Thesis Report](#)]
Supervisor: Dr. Shamim Ahmed Deowan *2020-2022*
 - Developed a real-time computer-aided diagnostic system for endoscopic image analysis using deep neural networks.
 - Benchmarked SOTA object detection models and proposed architectural modifications to YOLOv5 to improve inference speed(50%) and mAP(4%).
 - Contributed to the creation of a colonoscopy image and video dataset collected from Dhaka Medical College and Hospital.
- **An Automatic System Design to Protect Intravenous Infusion Therapy Administration for Blood Flow in the Human Body** [[Report](#)][[Device](#)][[Patent](#)]
Supervisor: Dr. Lafifa Jamal *2019-2020*
 - Designed a non-invasive IoT-based system for real-time monitoring of intravenous saline levels in hospital settings.
 - Developed an automated flow-restriction mechanism to prevent blood backflow under low-fluid conditions, triggered by sensor thresholds.
 - Implemented a centralized Django server and web interface for real-time monitoring and control of infusion devices.

OTHER PROJECTS

- **Fiducial marker Based Welding Simulator for Bangladesh Army** [[Demo](#)] *2020*
 - Developed a welding simulation system with GUI and parameter selection panel for EME Centre and School, BD Army.
 - Customized Arc welding instruments with Fiducial markers to track jog path.
 - Implemented an automated PDF report generator producing final weld path visualizations and performance evaluations across five scoring criteria (out of 100).
- **Computer Vision Based Mobile Game Playing Robot** [[Demo](#)] *2022*
 - Designed and built a 3D printed autonomous robot capable of playing an iOS game *Bingo* faster than average human.
 - Implemented OCR using PaddlePaddle combined with computer vision techniques for real-time perception and decision.
- **Object Classification and Sorting using a 5-DOF Manipulator** [[Demo](#)] *2018*
 - Built a vision-guided 5-DOF robotic manipulator with conveyor belt for automated object classification and sorting.
 - Developed a Teach Pendant Android App to program pick-and-place trajectories using predefined landmarks.
- **Solving an 8-puzzle using A* algorithm** [[Demo](#)] *2019*
 - Implemented C++ based A* search algorithm from scratch to solve the 8-puzzle problem with optimal path planning.
 - Fabricated a physical 8-puzzle system using electromagnets to autonomously manipulate puzzle pieces.

OTHER WORK EXPERIENCE

- **Robotics Instructor** Dhaka, Bangladesh
Maple Leaf International School Jan 2023 - Jun 2024
 - : Maple Leaf is one of the most prestigious English medium International schools in Bangladesh. Responsibilities include:
 - * Designing and carrying out robotics lessons and labs
 - * Evaluating student progress through both formal and informal assessments
- **Freelance Robotics Engineer** Remote
Fiverr, Level-2 Mar 2021 - May 2023
 - : I am a Level-2 freelancer website Fiverr with more than 80 projects completed. Working in the domain of robot hardware and software development along with schematic design and consultancy service. Some of my works include:
 - * Autonomous snow cleaning robot of a Minnesota Based Robotics company of [Nivoso](#)
 - * Design and Development of Automated Bowling Machine
 - * Cricket Ball Thrower Projectile Simulation with Air Drag
 - * ROS-based indoor SLAM robot for warehouse management
 - * Line Following Robot

[Fiverr profile](#)
- **DataSoft Manufacturing & Assembly Inc. Ltd** Dhaka, Bangladesh
Engineer Level-I, Part-time Sep 2021 - Feb 2022
 - : Joined the RD team of intelligent embedded device after successful completion of 3-month engineering internship here. Some of my areas of responsibility include:
 - * Firmware development in C++ and python
 - * Field testing of embedded devices
 - * Product 3D design QA and 3D printing operation

VOLUNTARY EXPERIENCE

- **International Robot Olympiad (Bangladesh team)**
Mentor 2019-2022
 - Mentored Bangladeshi teams for the International Robot Olympiad (2018–2020), providing guidance in programming, electronics, mechanical design, and system debugging.
 - Supported teams achieving multiple gold, silver, bronze, and technical awards across three consecutive international competitions.
- **Bangladesh Robot Olympiad**
Academic Coordinator 2021-2022
 - Served as Academic Coordinator for the Bangladesh Robot Olympiad (2021–2022), the national program selecting under-18 robotics teams to represent Bangladesh at the International Robot Olympiad.
 - Led the Academic wing within a 70-member volunteer organization, overseeing activation programs, question design, and academic evaluation for national-level competitions supported by the ICT Ministry of Bangladesh.

HONORS AND AWARDS

- **1st Runners-Up**
Research and Publication Fair, University of Dhaka 2022
- **Semi-finalist**
Robotics reality show "Esho Robot Banai" on Channel-i 2019
- **Champion**
IntraDU project showcasing: University of Dhaka 2019
- **Champion**
IntraDU Robofest: University of Dhaka 2017
- **1st Runners-Up**
Line Following Robot competition, Mindsparks: AUST 2018
- **2nd Runners-Up**
Line Following Robot competition, Robofiesta: BUET 2018
- **2nd Runners-Up**
Line Following Robot competition, Techfest: DUET 2017