SUJAN SARKER

Ph.D. Student, Department of Computer Science
Graduate Research Assistant, Collaborative Robotics Lab
University of Virginia, Charlottesville, Virginia
Academic Links: *Google Scholar* (), *LinkedIn* ()
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Summary

- Ph.D. student in Computer Science at the University of Virginia
- Serving as General Chair at UVA CSGSG
- Assistant Professor (on study leave), Department of Robotics and Mechatronics Engineering, University of Dhaka, Bangladesh
- Former faculty at the Department of Computer Science and Engineering, Ahsanullah University of Science and Technology, Bangladesh
- Completed Master of Science (M.S.), and Bachelor of Science (B.Sc.) from the Department of Computer Science and Engineering, University of Dhaka, Bangladesh
- Research experience in Robotics, Internet of Things, Cyber Physical Systems, Wireless Sensor Networks, Mobile Crowdsensing, Edge Computing, and Machine Learning Applications.

Education

University of Virginia **Virginia, United States**
Ph.D. Student in Computer Science (ongoing) *Aug 2022-Present*
Advisor: **Professor Tariq Iqbal**

University of Dhaka **Dhaka, Bangladesh**
M.S. in Computer Science and Engineering (CSE) *Jul 2014 - Nov 2017*
ICT Fellow
GPA: 3.92 on a scale of 4.00
Thesis Title: Optimal Selection of Crowdsourcing Workers Balancing their Utilities and Platform Profit

University of Dhaka **Dhaka, Bangladesh**
B.Sc. in Computer Science and Engineering (CSE) *Feb 2010 - Feb 2014*
GPA: 3.82 on a scale of 4.00
Thesis Title: Multi-constraint QoS Aware MAC Protocol for Cluster Based Cognitive Radio Sensor Networks

Awards & Achievements

- **Selected for participation**, Graduate Instructor Seminar on the Teaching of Writing, PhD Plus, UVA, Aug 12 - Aug 15, 2024
- **Selected for participation**, AI-SCORE Summer School, University of Maryland, College Park, MD, USA, May 26 - June 1, 2024

- **Ph.D. fellowship** from the Department of Computer Science, University of Virginia
- **Dean's Award - 2019** from Faculty of Engineering and Technology, University of Dhaka for outstanding contribution to research
- **2nd best research project award**, Research and Publication Fair, University of Dhaka for the project, IHABOT: Intelligent Hospital Assistance Robot to Fight Contagion by Reducing Doctor-Patient Interaction.
- **Innovative Asia Short-term Scholarship** for *Short-term Program of Innovative Asia: Cutting-edge technologies on Robotics and AI* organized by Japan International Cooperation Agency (JICA) in collaboration with Shibaura Institute of Technology, February 24, 2020 to March 7, 2020.
- **ICT Fellowship** given by ICT Division, Government of the Peoples Republic of Bangladesh for M.S. Study in Computer Science and Engineering, January 2015 June 2016

Research Interests

Human-Robot Interaction - Applying Artificial Intelligence to enable fluent interaction in human-robot collaborative tasks.
Machine Learning Applications - Applying machine learning algorithms in healthcare and assistive robotics.
Cyber-Physical Systems - Designing real cyber-physical systems and optimizing their performances.

Research Experience

Graduate Research Assistant **Apr 2023 - Present**
Collaborative Robotics Lab
University of Virginia, USA

Research Supervisor **Nov 2018 - Aug 2022**
Green Networking Research Group, University of Dhaka
Role: Supervising Undergraduate Students

Co-Principle Investigator **Jan 2021 - Dec 2021**
Project: *IHABOT: Intelligent Hospital Assistance Robot to Fight Contagion by Reducing Doctor-Patient Interaction*
Funding Agency: Centennial Research Grant, University of Dhaka, Bangladesh
Funding Amount: 800,000 BDT ($\sim \$8,000$)

Publications

Google Scholar Citations: ***698*** *(𝔊)*

Manuscript in Preparation.....

- Ganesh Nanduru, **Sujan Sarker**, Sarah Naidu, A. Malori Oxford, Akiva Dienstfrey, and Tariq Iqbal, "Knowledgeable Embodied LLMs are Expert Negotiators," ***IROS, 2026 [In-preparation].***
- **S. Sarker**, M. S. Yasar, T. Iqbal, "A Vision-Language Architecture for Hierarchical Multi-Agent Coordination," ***IEEE Robotics and Automation Letters (RA-L) [In-preparation].***
- **Sujan Sarker**, Shaid Hasan, JinHong Zhao, Tariq Iqbal, "Leveraging Preferences for Adaptive Decision-Making in Human-Agent Interaction," ***IROS, 2026 [In-preparation].***

Under Review[*: Equal Contribution]

- Shaid Hasan*, **Sujan Sarker***, T. Iqbal, "Impact of Large Language Model Powered Adaptive Robot Feedback on Human Task Performance," ***ICRA, 2026 [Unver Review].***
- **S. Sarker**, H. Green, T. Iqbal, "Effects of Robots Policies on Perception of Fairness in Human-Robot Collaborative Tasks," ***ACM Transactions on Human-Robot Interaction (THRI) [Under-Review].***

Journals

- **Sujan Sarker**, Md. Tanvir Arafat, Aiman Lameesa, Mahbuba Afrin, Redowan Mahmud, Md. Abdur Razzaque, Tariq Iqbal, "FOLD: Fog-dew infrastructure-aided optimal workload distribution for cloud robotic operations", ***Internet of Things, vol. 26, 2024***. (**IF: 5.9**)
- Nawmi Nujhat, Fahmida Haque Shanta, **Sujan Sarker**, Palash Roy1, Md. Abdur Razzaque, Md. MamunOrRashid, Mohammad Mehedi Hassan, Giancarlo Fortino, "Task offloading exploiting grey wolf optimization in collaborative edge computing", ***Journal of Cloud Computing, vol. 13, no. 23, 2024***. (**IF: 4.4**)
- Pranjal Kumar Nandi, Md. Rejaul Islam Reaj, **Sujan Sarker**, Md. Abdur Razzaque, Md. Mamun-or-Rashid, Palash Roy, "Task offloading to edge cloud balancing utility and cost for energy harvesting Internet of Things", ***Journal of Network and Computer Applications, vol. 221, 2024***. (**IF: 8.7**)
- S. Rahman, **S. Sarker**, A. K. M. N. Haque, M. M. Uttsha, M. F. Islam and S. Deb, "AI-driven Stroke Rehabilitation Systems and Assessments: A Systematic Review", ***IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 31, pp. 192-207, 2023***. (**IF: 4.528**)
- F. Huq, N. Sultana, **S. Sarker**, M. A. Razzaque and M. M. Hassan, "Profit and Satisfaction Aware Order Assignment for Online Food Delivery Systems Exploiting Water Wave Optimization", ***IEEE Access, vol. 10, pp. 71194-71208, 2022***. ***(IF: 3.476)***
- **Sujan Sarker**, Lafifa Jamal, Syeda Faiza Ahmed, Niloy Irtisam, "Robotics and artificial intelligence in healthcare during COVID-19 pandemic: A systematic review", ***Robotics and Autonomous Systems, Volume 146, 2021.*** **(IF: 3.120)**
- Sifat Ahmed, Tonmoy Hossain, Oishee Bintey Hoque, Sujan Sarker, Sejuti Rahman, Faisal Muhammad Shah, "Automated COVID-19 Detection from Chest X-Ray Images : A High Resolution Network (HRNet) Approach", ***SN Computer Science 2, no. 4 (2021): 1-17***.
- Sejuti Rahman, **Sujan Sarker**, Md Abdullah Al Miraj, Ragib Amin Nihal, A. K. M. Nadimul Haque, Abdullah Al Noman, "Deep LearningDriven Automated Detection of COVID-19 from Radiography Images: a Comparative Analysis", ***Cognitive Computation (2021)*** **(IF: 4.307)**.
- Md. Shahin Alom Shuvo, Md. Azad Rahaman Munna, **Sujan Sarker**, Tamal Adhikary, Md. Abdur Razzaque, Mohammad Mehedi Hassan, Gianluca Aloi, Giancarlo Fortino, "Energy-efficient scheduling of small cells in 5G: A meta-heuristic approach", ***Journal of Network and Computer Applications, Volume 178, 2021*** **(IF: 5.570)**
- Palash Roy, **Sujan Sarker**, Md. Abdur Razzaque, Md. Mamun-or-Rashid, Mohmmad Mehedi Hassan, Giancarlo Fortino, "Distributed task allocation in Mobile Device Cloud exploiting federated learning and subjective logic", ***Journal of Systems Architecture, Volume 113, 2021*** **(IF: 2.552)**
- Palash Roy, **Sujan Sarker**, Md. Abdur Razzaque, Mohammad Mehedi Hassan, Salman A. AlQahtani, Gianluca Aloi, Giancarlo Fortino, "AI-enabled mobile multimedia service instance placement scheme in mobile edge computing",***Computer Networks, Volume 182, 2020*** **(IF: 3.111)**.
- Palash Roy, Anika Tahsin, **Sujan Sarker**, Tamal Adhikary, Md. Abdur Razzaque, Mohammad Mehedi Hassan **"User mobility and Quality-of-Experience aware placement of Virtual Network**

Functions in 5G", ***Computer Communications, Volume 150, 2020*** **(IF: 2.816)**.

- **Sujan Sarker**, MA Razzaque, MM Hassan, A Almogren, G Fortino, M Zhou, **"Optimal Selection of Crowdsourcing Workers Balancing Their Utilities and Platform Profit"**, ***IEEE Internet of Things Journal, vol. 6, no. 5, 2019*** **(IF: 9.936)**.
- MMA Pritom, **Sujan Sarker**, MA Razzaque, MM Hassan, MA Hossain, **"A Multi-constrained QoS Aware MAC Protocol for Cluster-based Cognitive Radio Sensor Networks"**, ***International Journal of Distributed Sensor Networks, vol. 11, no. 5, 2015*** **(IF: 1.151).**

Book Chapters

- Tonmoy Hossain, **Sujan Sarker**, Sejuti Rahman and Md Atiqur Rahman Ahad, "Skeleton-Based Human Action Recognition on Large-Scale Datasets.", **Vision, Sensing and Analytics: Integrative Approaches. Springer, Cham, 2021.**
- **Sujan Sarker**, Sejuti Rahman, Tonmoy Hossain, Syeda Faiza Ahmed, Lafifa Jamal, and Md. Atiqur Rahman Ahad, "Skeleton-Based Activity Recognition: Preprocessing and Approaches", **Contactless Human Activity Analysis, Springer Nature Switzerland AG (2021).**
- Sejuti Rahman, **Sujan Sarker**, A. K. M. Nadimul Haque and Monisha Mushtary Uttsha, "Deep Reinforcement Learning: A New Frontier in Computer Vision Research.", **Vision, Sensing and Analytics: Integrative Approaches. Springer, Cham, 2021.**

Conferences

- M. M. Islam, A. Gladstone, **S. Sarker**, G. Nanduru, M. Fahim, A. Chadha, T. Iqbal, "Embodied Referring Expression Comprehension in Human-Robot Interaction," ***HRI 2026 [Accepted].***
- Sarah Naidu, Evan Smith, Camp Hagood, Aramis Rolly, **Sujan Sarker**, Cory Hayes, and Tariq Iqbal, "A Data Capture and Gesture Recognition System to Enable Human-Robot Collaboration", **The Systems and Information Engineering Design Symposium (SIEDS) 2025, Charlottesville, VA., May 2025.**
- **Sujan Sarker**, T. Iqbal, "Examining Fairness, Workload, and Competency: Human Perceptions in Robot Collaboration Strategies", **Poster session presented at the University of Virginia Engineering Research Symposium (UVERS) 2024, Charlottesville, VA., March 2024.**
- Md. Tanvir Arafat, Mehedi Hasan Emon, **Sujan Sarker**, Md. Abdur Razzaque, Md. Mustafizur Rahman, "Balancing Worker Utility and Recruitment Cost in Spatial Crowdsensing: A Nash Game Approach", **In Proceedings of the 8th International Conference on Networking, Systems and Security (NSysS '21), Dhaka, Bangladesh, December 2021.**
- Zahan Zib Sarowar Dhrubo, Md. Ashiful Islam Hridoy, Lafifa Jamal, **Sujan Sarker**, Mohammad Shidujaman, "Development of a Sign Language for Total Paralysis and Interpretation using Deep Learning", **IEEE International Conference on Image Processing and Robotics (ICIPRoB), Negombo, Srilanka, March 2020.**
- N Irtisam, R Ahmed, MM Akash, R Abdullah, **S Sarker**, S Rahman, L Jamal, "Pathfinder: A Fog Assisted Vision-Based System for Optimal Path Selection of Service Robots", **2020 9th International Conference on Informatics, Electronics & Vision (ICIEV), Kitakyushu, Japan. Aug 2020.**
- M. T. Abdullah, M. J. A. Sourov, S. Rahman and **S. Sarker**, "Simulation of Pattern Formation of Swarm withMinimum Shape Parameters", **2020 Joint 9th International Conference on Informatics, Electronics & Vision (ICIEV) and 2020 4th International Conference on Imaging, Vision & Pattern Recognition (icIVPR), Kitakyushu, Japan, Aug 2020.**

- S. Saha, M. A. Habib, **S. Sarkar**, M. A. Razzaque and M. M. Rahman, "Minimizing Execution Cost of User Application Codes in Mobile Device Cloud", **2019 International Conference on Sustainable Technologies for Industry 4.0 (STI), Dhaka, Bangladesh, 2019.**
- F. Huq, N. Sultana, **S. Sarkar**, M. A. Razzaque and M. H. Kamal Tushar, "Optimal Worker Selection for Maximizing Quality-of-Service of Online Food Delivery System", **2019 International Conference on Sustainable Technologies for Industry 4.0 (STI), Dhaka, Bangladesh, 2019.**
- B Sultana, JF Katha, **S Sarker**, MA Razzaque, "Multi-Mode Project Scheduling with Limited Resource and Budget Constraints", **2018 International Conference on Innovation in Engineering and Technology (ICIET), Bangladesh. Dec 2018.**
- MS Hossain, SMH Reza, **S Sarker**, MA Razzaque, "Optimizing Deployment Period of Service Replication in 5G Edge Network", **2018 International Conference on Innovation in Engineering and Technology (ICIET), Bangladesh. Dec 2018.**
- **S Sarker**, AK Nath, A Razzaque, "Tradeoffs between sensing quality and energy efficiency for context monitoring applications", **International Conference on Networking Systems and Security (NSysS), Bangladesh, Jan 2016.**

Workshop Publication (Peer Reviewed)

- **Sujan Sarker**, Haley H. Green, Mohammad Samin Yasar, T. Iqbal, "CoHRT: A Collaboration System for Human-Robot Teamwork", **Robotics: Science and Systems (RSS), Safety and Normative Behaviors in Human-Robot Interaction Workshop, 2024.**

Teaching Experience

University of Virginia

Teaching Assistant **Spring 2024**
Department of Computer Science

- CS 4501/6465: Human-Robot Interaction (Spring 2024, Teaching Assistant w/ Dr. Tariq Iqbal)

Teaching Assistant **Spring 2025**
Department of Systems Engineering

- SYS 4582/SYS6465: Human-Robot Interaction (Spring 2024, Teaching Assistant w/ Dr. Tariq Iqbal)

University of Dhaka

Assistant Professor (on study leave) **Oct 2021 - Aug 2022**
Department of Robotics and Mechatronics Engineering

Lecturer **Nov 2018 - Sep 2021**
Department of Robotics and Mechatronics Engineering

Courses Taught

- **Robotics:** Nanorobotics, Multi-agent Systems, Human-Robot Interaction
- **Electrical and Electronics Engineering:** Fundamental of Electrical and Electronics Engineering, Digital Systems and Microprocessor
- **Artificial Intelligent and Computer Vision:** Digital Image Processing
- **Software Development and Programming:** Object Oriented Programming
- **Mechanical Engineering:** Engineering Mechanics, Machine Shop and Workshop Practices, Engineering Drawing

Ahsanullah University of Science and Technology

Assistant Professor **Apr 2018 - Oct 2018**
Department of Computer Science and Engineering

Lecturer **Oct 2014 - Mar 2018**
Department of Computer Science and Engineering

Courses Taught

- **Electrical and Electronics Engineering:** Microprocessor, Digital Logic Design, Micro controller-Based System Design
- **Computer Networking:** Computer Networks, Network Programming
- **Artificial Intelligent and Computer Vision:** Artificial Interlligent, Digital Image Processing
- **Software Development and Programming:** Object Oriented Programming, Software Development (C, Java, and Android)

Mentoring Experience

- Sarah Naidu, Evan Smith, Camp Hagood, Aramis Rolly , University of Virginia (Spring 2025)
- Andrea Celeste Sanchez, UVA Advance lab student (Summer 2024)
- Coby Chiu, University of Virginia (Spring 2023)
- Aiman Lameesa, University of Dhaka (2020 - 2021)

Academic Projects

Graduate-Level

- ***Data-Driven Cyber Attack Detection for In-Vehicle CAN Bus Communication Leveraging Cloud Service***
  The lack of security features in the Controller Area Network (CAN) bus system used in modern automobiles makes it vulnerable to attacks, allowing attackers to take control of the car system and cause damage. To address these security concerns, we have developed a data-driven end-to-end Intrusion Detection System (IDS) that offers secure cloud-based intrusion detection services to ensure the reliability of CAN attack detection in a large-scale cyber-physical system. The outcomes obtained from our work demonstrate that such a web-based system possesses the potential to provide secure intrusion detection in CAN bus communication. Additionally, we have analyzed the performance of five machine learning models on a large CAN bus attack dataset, revealing the potential for secure intrusion detection in CAN bus communication.

- ***"Can You Train Me NAO?" Examining a Humanoid Robot as a Feedback-Based Trainer***
  This project investigates the effectiveness of using a humanoid robot, NAO as an instructor for the Tower of Hanoi task, a problem-solving puzzle. The study finds that the humanoid robot is more effective than human instructors in assisting participants with the task, and participants reported feeling more comfortable interacting with the robot. These findings suggest that robots can provide a comfortable and engaging learning experience, especially for tasks requiring practice and feedback. The project suggests that future research should explore the limitations and challenges of using robots in education, such as the impact of robot design, nonverbal cues, personalized feedback, long-term learning outcomes, the balance between human and robot control, and cultural and ethical considerations.

- ***Training an Embodied Agent to Navigate in Unknown Environments using Policy Gradient***
  This project uses reinforcement learning to train an embodied agent to navigate an unknown environment. The agent is trained using the Habitat 2.0 platform and proximal policy optimization

(PPO) on the Matterport3D dataset. The agent's performance is evaluated on the point navigation task using metrics like task success and Success weighted by Path Length (SPL). The results demonstrate the potential of transferring the learned policy to a real-world embodied agent. While the project focuses on point navigation tasks, future work will explore other tasks like object navigation and embodied question answering. Additionally, the project highlights open issues in embodied AI research, such as incorporating multiple agents to learn an optimal global policy and developing offline RL algorithms for more efficient task performance.

Research Projects

- ***Learning Fair Collaboration Policies in Human-Robot Team [Jan 2023 - Present]***
  Publications: THRI 2025 [Under Review]
  We developed an integrated artificial intelligence and operations research framework for learning and optimizing fair collaboration policies in human-robot teams. Our approach leverages machine learning techniques to model human factors impacting team dynamics and formulates the collaboration problem as a constrained multi-agent resource allocation task incorporating fairness criteria. Novel methods combining reinforcement learning, constrained optimization, and inverse optimization are proposed to derive policies that jointly optimize team performance and fairness objectives. The framework enables deploying collaborative robots across domains in a socially responsible manner by ensuring equitable treatment of human teammates while maintaining high team efficiency.

- ***Embodied Referring Expressions Comprehension [Dec 2022 - Present]***
  Publication: HRI 2026 [Accepted]
  We developed machine learning models to address challenges in multimodal representation learning, such as extracting complementary representations from heterogeneous modalities, prioritizing noisy and non-noisy data modalities, and cooperative multitask learning. These models aimed to enhance the perception of human actions and intentions in real-world settings. Our work included introducing a novel dataset capturing embodied interactions from multiple viewpoints across diverse environments and proposing a guided residual module to reinforce salient modality-specific representations. Extensive experiments demonstrated the effectiveness of our approaches in comprehending complex human-centric interactions.

- ***Hierarchical robot learning framework based on reinforcement learning for decision making and control [Aug 2022 - Aug 2023]***
  The work was done in collaboration with General Motors, GE Research, and Siemens and was supported by the ARM-TEC-22-01 grant.
  This project aims to advance hardware and software tools for automated robotic assembly and troubleshooting in manufacturing, reducing manual programming time and reconfiguration efforts. It focuses on developing robotic learning strategies that leverage historical data from virtual or real environments to enable robots to plan and perform complete manufacturing tasks autonomously. The ability to develop and transfer learnings across multiple robotic operations has the potential to transform manufacturing automation, enabling low-volume/high-mix production through reduced explicit programming needs and quicker reconfiguration. This increases scalability, flexibility and agility for robotic manufacturing systems.

Professional Development

AI-SCORE: Artificial Intelligence School for Computer Science and Operations Research Education, University of Maryland, College Park, MD, USA **May 26 - June 1, 2024**

- Attended a 6-day intensive summer school program on Artificial Intelligence, Fairness, and Reinforcement Learning
- Participated in thematic tutorials, hands-on exercises, and cross-disciplinary team projects
- Modules led by renowned professors from Cornell University, University of Pennsylvania, MIT, and University of Toronto.

Technical Skills

Languages: Python, C, C++, C#, JAVA, HTML5, PHP, XML, JavaScript, .net, 80x86 Assembly
Database: MySQL, SQLite, Oracle
Design Tools: NetBeans, Microsoft Visual Studio, PyCharm
Operating System: Windows, LINUX, Android
Hardware: ATMEL (AVR Programming)
Deep Learning Tools: Keras, PyTorch, TensorFlow
Others: PL/SQL, LaTeX

Professional Membership

IEEE Membership **Jan 2014 - Present**

Professional Services

Program Committee/Reviewer.....

ICRA (2025), **HRI (2025)**, **STI (2021)**, **NSysS (2021)**, **STI (2020)**, **ICIET (2019)**

Journal Reviewer.....

- IEEE Internet of Things Journal
- IEEE Access
- IEEE Transactions on Neural Systems and Rehabilitation Engineering
- ACM Transactions on Human-Robot Interaction

Other Services

General Chair
Computer Science and Engineering Graduate Student Group (CSGSG) ***2025***

President
Association of Bangladeshi Students (ABS) at UVA ***Aug 2024 - Present***

Branch Counselor
IEEE Student Branch ***2021-2022***
University of Dhaka

(IEEE Regional Exemplary Student Branch Award 2022)

Student Advisor
Department of Robotics and Mechatronics Engineering ***Sep 2019 - Aug 2022***
University of Dhaka

Adjudicator

Bangabandhu Innovation Grant (BIG) ***2021***
ICT Division, Government of the People's Republic of Bangladesh

Publicity Coordinator
IEEE Computer Society Bangladesh Chapter ***2019***
University of Dhaka

Student Activity Coordinator
IEEE Robotics and Automation Society Bangladesh Chapter ***2019***

Trainer
Information Technology Engineers Examination (ITEE) ***2019***
Funded by: The Japan International Cooperation Agency (JICA)

Mentor
IEEE Student Branch ***2019***
University of Dhaka

Talk, Seminar & Workshop

- Invited Talk on IEEE highlighting the motto and benefits of IEEE membership *Host: IEEE Student Branch, University of Dhaka, October 19, 2019*
- Invited Talk on Membership Benefits and Formation Requirements of IEEE CS SBC *Host: IEEE Student Branch, University of Asia Pacific, October 26, 2019*
- Seminar on Research Methodology *Host: IEEE Computer Society SBC, RUET, August 02, 2019*
- Seminar on Introduction to Optimization *Host: Department of Computer Science and Engineering, Green University of Bangladesh, June 19, 2019*
- Workshop on Python Programming *Host: Department of Computer Science and Engineering, Green University of Bangladesh, March 20, 2019*
- Talk on "Perception of Fairness in Human-Robot Collaborative Task." Project Bridge & PhD Plus Gong Show, Kardinal Hall, Charlottesville, VA, USA, May 15, 2024.