

Md Babul Islam

PHD STUDENT (RESEARCHER) · APPLIED MACHINE LEARNING/APPLIED DEEP LEARNING

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“Success is not always convincing...”

Summary

Mr. Babul is a Ph.D. scholar specializing in Tiny Machine Learning (TinyML) and Applied Deep Learning for IoT environments, with a focus on Smart Buildings, Smart Cities, Smart Healthcare, IoT Edge Computing, and AI-driven Predictive Models. With extensive experience in developing AI-driven solutions for sensor-based systems, energy efficiency, and predictive analytics, he has contributed to advancing intelligent and sustainable IoT applications. His research outcomes include multiple publications in top-tier international journals and conferences, reflecting both academic rigor and practical impact. Currently, he is working as a PhD scholar at Unical and a research assistant at ICAR-CNR, Italy, where his work focuses on deploying tiny ML/DL models to optimize IoT-based smart environments.

Education

University College Dublin (UCD)

Dublin 4, Ireland

VISITING PH.D. STUDENT, SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

Jun. 2024 - Jan 2025

- Worked on Tiny Transformer and energy-efficient AI-driven model for sensor-based agriculture environment.
- Project Partially Funded by **Irish Government** and Met Éireann

University of Calabria (Unical)

Calabria, Italy

PH.D. IN INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

Nov. 2022 - 2025 (Appeared)

- Focused on TinyML models in IoT environments, including Smart Buildings, Offices, and Cities of AI-driven predictive models for Maintaining Energy Efficiency and Thermal Comfort.
- Awarded **PNRR** Full Scholarship

Huzhou University (HU)

Zhejiang, China

M.Sc. IN INFORMATION ENGINEERING

Sep. 2019 - Jul. 2022

- Applied ML/DL models in different fields such as fraud detection, COVID Twitter Sentiment Analysis.
- Full Funding University **Presidential** Scholarship

City University (CU)

Dhaka, Bangladesh

B.Sc IN COMPUTER SCIENCE AND ENGINEERING (CSE)

Nov. 2013 - Mar. 2017

- Worked on Web-Based E-Commerce Systems (B2B, B2C).
- Awarded Partial University Scholarship for Academic Excellence.

Attended Conference and Review

CONFERENCE

2025	Poster Presented , PhD Day at Unical, 2025	Italy
2025	Paper Presented , PiCom, 2025	Japan
2025	2nd International Workshop jointly held with 2nd PhD in ICT Day , IEEE@UNICAL, 2025	Italy
2024	Summer School , AI4SS, Artificial Intelligence for a Secure Society	Italy
2024	Summer School , EUMAS 2024, Multi-Agent Systems includes Reinforcement Learning	Ireland
2024	Keynote Speaker , ICETI Conference	Pakistan
2023	Paper Presented , EWSN Conference, University Calabria	Italy
2023	Poster Presentation , Ph.D Day, University Calabria	Italy
2022	Online Submitted Paper , DOSCI 2022, CCICT 2022, ICOECS 2022, CCET 2022, ICDCECE 2023	India
2021	Paper Presented , ISCEIC 2021, I3CME 2021	China

PAPER REVIEW

2025	Technical Program Committee , IEDGE 2025	Croatia
2025	Technical Program Committee , PICOM 2025	Japan
2025	Journal Paper Reviewer , (IEEE Transactions on Human-Machine Systems, The Journal of Supercomputing, SN Computer Science, IEEE Access, MDPI Computers, Scientific Reports)	–
2024	Technical Program Committee , 22 Edition, PICOM 2024	Philippines
2023	PC Member , Quatic 2023,	Portugal
2023	Reviewer and Scientific Member , EMCEI 2023	Italy
2022	Paper Review , ICMIAC IEEE Conference-2022, AICAT IEEE Conference 2022	China

Teaching Work History

Micro Institute of Technology (MIT)

Dhaka, Bangladesh

LECTURER

March 2018 – October 2019

- Taught undergraduate courses including C Programming, Python, Java, Web Design, Data Structures & Algorithms, Multimedia & Graphics, Embedded Systems & PLC, Computer Architecture, and Database Management Systems.
- Conducted laboratory sessions and delivered both theoretical and practical training to enhance students' technical skills.
- Supervised final-year projects for Diploma in Computer Technology students, providing guidance in project design, implementation, and reporting.

San Aibin Artificial Intelligent Education

China

PART TIME TEACHER

Feb 2021 – 2021 Dec

- Taught computer science curriculum in English to students aged 12–18, adapting lessons to diverse learning needs.
- Co-taught with Chinese teachers and contributed to the development and improvement of school-based curriculum.
- Assessed and monitored student progress, setting clear learning targets to support academic improvement.

Industrial Work History

Aeinnovation Energy

Italy

APPLIED ML ENGINEER

June 2023 – On Going

- **AI-Driven Predictive Model for Energy Efficiency and Thermal Comfort:** At AEI Srl, this work contributes by developing predictive data-driven models that integrate indoor and outdoor environmental features to forecast indoor temperature and occupancy, thereby enhancing energy efficiency and thermal comfort. The models are optimized through pruning and quantization to create lightweight architectures suitable for edge cloud deployment, enabling real-time predictions with low computational cost. In addition, a Digital Twin framework is introduced to provide a dynamic and adaptive approach to indoor temperature forecasting.

ICAR-CNR (Italian Govt. Research Institute)

Italy

RESEARCH ASSISTANT

Jan. 2022 – On Going

- At **ICAR-CNR**, a similar project to AEI Srl was carried out, focusing on indoor temperature and occupancy prediction. DL models were validated for accuracy and reliability, while the Digital Twin paradigm was explored to build a virtual representation of the environment, enhancing real-time monitoring, simulation, and predictive analysis.

Zhejiang Seating Technology Co., Ltd

China

DATA ANALYSIS

June 2022 – December 2022

- Proficiently supported data and analytics efforts in an innovative environment to align with business goals. Responsibilities included defining business problems, determining suitable analytical approaches, extracting relevant data, and applying appropriate statistical and data analysis techniques. Additionally, customer performance was analyzed using CSV files to derive actionable insights.

Zhejiang Linxin Smart Home Co., Ltd.

China

DATA ANALYST

Dec. 2021– June 2022

- Performed web scraping, managed international platforms (Alibaba, Amazon), and conducted SEO/digital marketing activities to support business growth and customer satisfaction.

Crown Hospital

Bangladesh

IT ASSISTANT

February 2016 – January 2018

- LAN, all attendance sheet checkup, report making, web Server maintenance, router setting, camera, etc.

Skills

Programming Languages	Python (Pandas, NumPy, Matplotlib, Scikit-Learn, Keras, Tensorflow, and PyTorch), C, C++, and Java (Basic),
Others	HTML/CSS, JavaScript, PHP, and SQL
ML	Supervised, Unsupervised, Self-supervised (RL, FL-Basic)
Developer Tools	Jupyter Notebook, Google Colab, PyCharm, Eclipse, Google Cloud Platform, Android Studio, etc
Languages	English, Bangla, Chinese (Basic)

Award & Extracurricular Activity

ACADEMIC AWARD

- Ph.D. Day [Pitch Competition Winner]**, Selected as the sole winner from DIMES to participate in the Ph.D. Day Pitch Competition at the University of Calabria, Italy, presenting research work alongside winners from other departments and showcasing innovative projects in a competitive and enriching environment.
- Ph.D. Student's Director**, Elected as the Ph.D. Students Director for the School of DIMES at the University of Calabria, Italy, for one year. The role involved representing the interests and needs of Ph.D. students, facilitating communication between students and faculty, and overseeing academic projects and administrative initiatives, thereby contributing to the enhancement of the overall educational experience within the school.
- Ph.D Scholarship**, Full funding PNRR Scholarship (Tuition, accommodation, and stipend) at Unica, Italy
- Office Director**, International Student Union(ISU), Huzhou University, China
- Master's Scholarship**, Master's Full Funding Scholarship (Tuition, Accommodation and Stipend) at Huzhou University (HU), Italy.
- Best Teacher**, at Micro Institute of Technology, Bangladesh.
- Bachelor Tuition Scholarship**, In my under-graduation time, I was awarded the last 5 semesters for the highest CGPA, Bangladesh..

NON-ACADEMIC AND ONLINE CERTIFICATE

- 2021 **English Language**, Foreign Language (TEFL) Certificate Course
- 2021 **Volunteers**, Excellent Volunteers Certificate at HU.
- 2020 **Online ML Course**, Online IBM Machine Learning Course (Certified)
- 2020 **Online DC Course**, Online IBM Data Science (Certified)
- 2020 **Cultural Award**, Room Beautification at Huzhou University
- 2016 **Programming Contest**, Programming Contest at the University of San Francisco.

Running Project

IoT Smart Home Management

PROGRAMMING LANGUAGE: PYTHON

Italy

Nov. 2023

- Developed Tiny ML/DL algorithms using data from smart environment sensors to predict indoor temperature and occupancy, enhancing energy efficiency while maintaining resident comfort. Explored strategies such as leveraging big data, integrating weather and HVAC factors, ensuring data accuracy, and collecting feedback from diverse age groups.
- Future directions include advancing activity recognition, improving privacy preservation, developing dialogue systems, and applying TinyLLM for human behavior understanding and HVAC control in smart environments.

Completed Projects

AI Healthcare with Deep Learning

VARIOUS PYTHON MODULES

China

Jan. 2023

- Developed and applied deep learning models for classification and prediction tasks in smart healthcare environments, focusing on applications relevant to smart hospitals.

Covid-19 with Machine Learning

VARIOUS PYTHON MODULES

China

Jan. 2021

- Machine learning algorithms were applied to analyze and compare performance across diverse datasets, including business impact analysis in the food sector and Twitter sentiment analysis related to vaccines and public reactions. This approach provided insights into the effectiveness of different algorithms in varying contexts, highlighting their suitability for specific applications.

Fraud Detection (ML, DC)

China

VARIOUS PYTHON MODULES

Jun. 2021

- The project aimed to apply multiple machine learning (ML) models to anonymized credit card fraud transaction data, with a focus on comparing their performance. Special attention was given to the effectiveness of synthetic data generation techniques such as SMOTE and ADASYN in conjunction with traditional ML algorithms, enabling an evaluation of how well each model detects fraudulent activities.

Web Based E-Commerce B2B and B2C

Bangladesh

HTML, CSS, PHP, BOOTSTRAP, AJAX

Dec. 2017

- The goal was to develop a web-based E-Commerce platform supporting both Business-to-Business (B2B) and Business-to-Consumer (B2C) models, enabling customers to buy and sell products, including both new and used items.

Other Projects

Bangladesh

HTML, CSS, PHP, BOOTSTRAP, AJAX

2014 -2018

- How to Caught a Thief in my House(Safety House or Room) and Seven Segment Lighting Systems | *Arduino, Arduino Library, ISIS Proteus Professional -7*
- Management System | C++, *Microsoft access*
- Smart Traffic Android App | (*Design part*), *Android Studio*
- BM newspaper-Where true always talk without fair | *HTML, CSS, PHP, Bootstrap*
- Traffic Alert | *Arduino, Arduino Library, ISIS Proteus Professional -7*

List of Research Papers

Submitted Paper

JOURNAL PAPER

Till Now

1. "Soil Former: A Customized Transformer for Soil Moisture Forecasting in Irish Scenarios" by **Md Babul Islam**, Antonio Guerrieri, Raffaele Gravina, John Byabazaire, Giancarlo Fortino, and Declan T. Delaney, (Under Review on the IEEE Sensor, Q1 Journal)
2. "iBTEC: A Tiny Deep Learning Approach for Temperature and Occupancy Prediction in Smart Buildings" by **Md Babul Islam**, Qimeng Li, Antonio Guerrieri, Raffaele Gravina, Luigi Rizzo, and Giancarlo Fortino, (Under Review on Future Generation Computer Systems, Elsevier, Q1 Journal)
3. "ATM-SB: An Indoor Temperature Prediction Approach for Smart Buildings Based on Deep Learning" by **Md Babul Islam**, Antonio Guerrieri, Raffaele Gravina, Luigi Rizzo, Giuseppe Scopelliti, Vincenzo D'Agostino, and Giancarlo Fortino (Under Review on Future Generation Computer Systems, Elsevier, Q1 Journal)
4. "From Traditional Machine Learning to Fine-Tuning Large Language Models: A Review for Sensors-Based Soil Moisture Forecasting" by **Md Babul Islam**, Antonio Guerrieri, Raffaele Gravina, Declan T. Delaney, and Giancarlo Fortino (Plan to Submit, Elsevier, Q1 Journal)
5. "Lightweight AI in IoT Applications: A Review of TinyML, TinyDL, and Emerging TinyLLMs" by **Md Babul Islam**, Antonio Guerrieri, and others, (Draft Done, Will submit to the ACM Computing Survey, Q1 Journal)

Published

JOURNAL PAPER

Till Now

1. "A meta-survey on intelligent energy-efficient buildings" by **Md Babul Islam**, Antonio Guerrieri, Raffaele Gravina, and Giancarlo Fortino, Big Data and Cognitive Computing, Q1 Journal, **Paper Link**.
2. "A novel mixed convolution transformer model for the fast and accurate diagnosis of glioma subtypes" by SM Nuruzzaman Nobel, SM Masfequie Rahman Swapno, **Md Babul Islam**, AKM Azad, Salem A Alyami, Md Alamin, Pietro Liò, Mohammad Ali Moni, Q1 Journal, **Paper Link**.
3. "Securing electric vehicle performance: Machine learning-driven fault detection and classification" by Mahbub Ul Islam Khan, Md Ilius Hasan Pathan, Mohammad Mominur Rahman, Md Maidul Islam, Mohammed Arfat Raihan Chowdhury, Md Shamim Anower, Md Masud Rana, Md Shafiul Alam, Mahmudul Hasan, Md Shohanur Islam Sobuj, **Md Babul Islam**, Veerpratap Meena, Francesco Benedetto, Q1 Journal, **Paper Link**.
4. "ViT-SENet-Tom: machine learning-based novel hybrid squeeze-excitation network and vision transformer framework for tomato fruits classification" by S M Masfequie Rahman Swapno, S M Nuruzzaman Nobel, **Md Babul Islam**, Pronaya Bhattacharya and Ebrahim A. Mattar, Q1 Journal, **Paper Link**.

1. **Md Babul Islam**, Student Member, IEEE, Antonio Guerrieri, Member, IEEE, Raffaele Gravina, Senior Member, IEEE, Luigi Pontieri, Luigi Rizzo, Francesco Scala, Andrea Vinci, and Giancarlo Fortino, Fellow, IEEE. "iTempDT: AI-Powered Digital Twin for Forecasting Indoor Temperature in Smart Buildings" 23rd IEEE International Conference on Pervasive Intelligence and Computing (PICom 2025), **Accepted, 2025**.
2. Luigi Rizzo, Paolo Zicari, Franco Cicirelli, Raffaele Gravina, Antonio Guerrieri, **Md Babul Islam**, Claudio Savaglio, and Andrea Vinci. "Modeling the Edge-Cloud Continuum: a Brain-Computer Interface Case Study." IEEE International Conference on Human-Machine Systems, **Accepted, 2025**.
3. **Islam, Md Babul**, Guerrieri Antonio, Gravina Raffaele, Rizzo Luigi, Scopelliti Giuseppe, D'Agostino, Vincenzo and Fortino, Giancarlo. "A Deep Learning Based Digital Twin for Indoor Temperature Prediction in Smart Buildings." 22nd International 2024 IEEE Conference on Pervasive and Intelligent Computing (PICom), *Paper Link*
4. **Islam, Md Babul**, Guerrieri Antonio, Gravina Raffaele, Rizzo Luigi, Scopelliti Giuseppe, D'Agostino, Vincenzo and Fortino, Giancarlo. "A Review on Machine Learning for Thermal Comfort and Energy Efficiency in Smart Buildings." EWSN 23, Proceedings of the 2023 INTERNATIONAL CONFERENCE ON EMBEDDED WIRELESS SYSTEMS AND NETWORKS Pages 243 - 248, *Paper Link*
5. Nag Anindya, Hassan Md Mehedi, Mandal Dishari Chand Nisarga, **Islam, Md Babul**, Meena VP, and Benedetto Francesco. "A Review of Machine Learning Methods for IoT Network-Centric Anomaly Detection." 47th International Conference on Telecommunications and Signal Processing (TSP), 2024, *Paper Link*
6. "Haque Rezaul, **Islam, Md Babul**, Chhabra Gunjan, Sharma Smita, Kaushik Keshav, Hosen Md Delwar and Dip, Riyadot Hossain". Alzheimer disease classification using deep neural network, 10th IEEE Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON), 2023, *Paper Link*
7. Bappi Basitir Rahman, Swapno SM Masfequie Rahman, Chhabra Gunjan, Kaushik Keshav, Nobel Sm Nuruzzaman, and **Islam, Md Babul**. "Deep learning based tuberculosis and pneumonia disease detection using CNN" Seventh International Conference on Image Information Processing (ICIIP), 2023, *Paper Link*
8. Imran, Md Asif and Swapno, SM Masfequie Rahman, Chhabra Gunjan, Kaushik Keshav and Mahi, Md Arif Anzum, **Islam, Md Babul** and Haque, Rezaul. "IoT-enabled smart manhole management system for real-time status, water level, and gas detection" 2024 International Conference on Intelligent Systems for Cybersecurity (ISCS), 2024, *Paper Link*
9. Islam, Md Babul, et al. "Detect deception on banking credit card payment system by machine learning classifiers." Second International Conference on Cloud Computing and Mechatronic Engineering (I3CME 2022). Vol. 12339. SPIE, 2022.
10. Islam, Md Babul, et al. "Cost Reduce: Credit Card Fraud Identification Using Machine Learning." 2022 7th International Conference on Communication and Electronics Systems (ICCES). IEEE, 2022
11. Islam, Md Babul, et al. "A fiber wireless improved 5G network-based virtual networking system focused on equal bandwidth." 2021 2nd international symposium on computer engineering and intelligent communications (ISCEIC). IEEE, 2021.
12. Islam, Md Babul, et al. "Twitter Opinion Mining on COVID-19 Vaccinations by Machine Learning Presence." Proceedings of Third Doctoral Symposium on Computational Intelligence: DoSCI 2022. Singapore: Springer Nature Singapore, 2022.
13. Islam, Md Babul, et al. "Pandemic Outbreak Time: Evaluation of Public Tweet Opinion by Machine Learning." 2022 IEEE International Conference on Current Development in Engineering and Technology (CCET). IEEE, 2022.
14. Islam, Khandaker Sajidul, et al. "Blockchain Based New E-voting Protocol System without Trusted Tallying Authorities." 2022 Fifth International Conference on Computational Intelligence and Communication Technologies (CCICT). IEEE, 2022.
15. Sayeed, Md Abu, et al. "Bangladeshi Traffic Sign Recognition and Classification using CNN with Different Kinds of Transfer Learning through a new (BTSRB) Dataset." 2023 International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE). IEEE, 2023.

Reference and Research Collaboration

BACHELOR AND MASTER'S SUPERVISORS

PhD Supervisor, Dr. Antonio Guerrieri, ICAR-CNR - Institute for high performance computing and networking - National Research Council of Italy, Rende (CS), Italy and Prof. Raffaele Gravina, Associate Professor, School of DIMES, University of Calabria, Italy.

Italy, Ireland

Master's Supervisor, Yanlei Kang (Ph.D.), Associate Professor, School of Information Engineering, Huzhou University, China. Mobile: +86- 13216172216, 02959@zjhu.edu.cn

China

RESEARCH COOPERATION

2023 **List of People**, Prof. Giancarlo Fortino, Dr. Antonio Guerrieri, Prof. Raffaele Gravina and many more.

Declaration:

I hereby declare that the above information is correct to the best of my knowledge.

Yours Sincerely

Islam Md Babul

Md Babul Islam