

AHMED IMTEAJ

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EDUCATION

Ph.D. in Computer Science

Aug. 2018 - July 2022

Knight Foundation School of Computing and Information Science

Sustainability, Optimization, and Learning for InterDependent networks laboratory (**solid lab**)

College of Engineering and Computing, Florida International University

Ph.D. Advisor: **Dr. M. Hadi Amini**

Ph.D. Dissertation Topic: Distributed Machine Learning Algorithms for Resource-Constrained Heterogeneous Internet-of-Things Environments

Recipient of:

- **2021 Best Graduate Student Research Award**
- **2022 Outstanding Student Life Award** (the Graduate Scholar of the Year Award)
- **CSCI 2019's Best Paper Award**

M.Sc. in Computer Science

August 2018 - 2021

Knight Foundation School of Computing and Information Sciences, College of Engineering and Computing, Florida International University

Recipient of **Outstanding Master's Degree Graduate Award**

Chittagong University of Engineering and Technology

2011 - 2015

B.Sc. in Computer Science and Engineering

Recipient of **Merit Scholarship** in all semesters

HONORS AND RECOGNITION

1. **Best Graduate Student Research Award** among around 100 Ph.D. students at the Knight Foundation School of Computing and Information Sciences, Florida International University.
2. **2022 Graduate Scholar of the Year Award** at the Outstanding Students Life Awards Ceremony, Division of Academic and Student Affairs, Florida International University.
3. **The Outstanding Master's Degree Graduate** award among all the engineering and science department at Florida International University.
4. **Best Paper Award** at 2019 Annual Conference on Computational Science and Computational Intelligence (CSCI'19).
5. **One of the Two Winners** at **FIU Graduate Student Appreciation Week Scholarly Forum 2021**.
6. Published a book on Blockchain in Springer as the Lead author and we were recognized at **2021 FIU Book Authors Recognition Ceremony**.
7. Recipient of the **Student Travel Scholarship Award** at the 13th International Conference on Intelligent Human Computer Interaction (IHCI-2021), Kent, Ohio, USA.
8. Awarded **Travel grant** twice from FIU Graduate and Professional Student Committee (GPSC).
9. Awarded Graduate Teaching Assistantship and Graduate Research Assistantship from Knight Foundation School of Computing and Information Science at Florida International University.
10. Recipient of Academic Merit Scholarship in every semester from undergraduate school, Chittagong University of Engineering and Technology.

HIGHLIGHTS

- Profound knowledge on the state-of-the-art **Computer Science, Artificial Intelligence, Machine Learning, Cybersecurity** and **Data Science** concepts.
- More than **six** years of teaching experience as a faculty member in CSE at IIUC, Secondary Instructor at FIU and Primary Instructor at NSF REU and RET program.
- Actively contributed and assisted my supervisor in drafting a proposal that recently awarded \$300,000 funding from **DHS, Criminal Investigations and Network Analysis, Center of Excellence**, which is based on my PhD research on Federated Learning: “Agent-based Learning to Utilize Local Data for Activity Recognition”.
- My Ph.D. research is the fundamental basis of two research grants from DHS and DoH!
- Our journal titled, “A Survey on Federated Learning for Resource-constrained IoT Devices” is ranked 4th among all publications in the IEEE Internet of Things journal! (January 2022)
- Outstanding experience in leading and mentoring research teams (**directly mentored more than 15 undergraduate and graduate students**) to conduct research on ML, AI, data analytics, smart systems, and IoT, and published a couple of peer-reviewed journal and conference papers.
- Achieved “**Best Graduate Student Research Award**” at the Knight Foundation School of Computing and Information Sciences. [\[Link\]](#)[\[Link\]](#)
- Awarded “**The Outstanding Master’s Degree Graduate**” in recognition of the academic achievement and exemplary service to the department, FIU, and the community. This award is given to only one Masters graduate among all the engineering and science department. [\[Link\]](#) [\[Link\]](#)
- Received **Best Paper Award** at **2019 Annual Conference on Computational Science and Computational Intelligence (CSCI’19)**. [\[SCIS News\]](#) [\[UGS News\]](#) [\[FIU News\]](#)
- Won the **Second Place** at **Graduate Student Appreciation Week Scholarly Forum 2021** for my PhD research work, “Lightweight Federated Learning Framework for Resource-constrained IoT Environment”. [\[Link\]](#)
- Received the **Graduate & Professional Student Committee (GPSC) Travel Award** twice in a semester to present our research paper in CSCI’21 and IHCI’21.
- Achieved excellent **Teaching Efficiency Rating (TER)** in several courses.
- Selected **Top eight team** accepted proposal for International Auto-checkout Competition, (Supported by **AiFi Carnegie Mellon University**)
- Received an award from International Transactions on Electrical Energy Systems (ITEES) for reviewing **14** manuscripts in the year of 2020.
- Recipient of **Academic Merit Scholarship** in every semester from undergraduate school.
- Scored GPA 5.00/5.00 in Bangladesh Government secondary and higher secondary public exams (2008 & 2010) **Placed top 1% among 2.5 million students**.
- Placed amongst the nation’s **top 100 mobile application** of the year 2013 in Bangladesh.

RESEARCH INTERESTS

- **Distributed Machine Learning** (Federated Learning, Transfer Learning, Zero-shot learning).
- **Internet of Things** (Internet of Mobile Robots, Internet of Vehicles, Wireless Sensor Network).
- **Cybersecurity** (Prevention of data and model information leakage, Detect False model injection).
- **Blockchain** (Distributed Machine Learning with Blockchain, Blockchain for Internet of Things, Coupling blockchain with Interdependent Networks).
- **Machine Learning and Data Mining** (Supervised and Unsupervised regression, classification, deep learning, data analytics).

SELECTED PROJECTS (DURING PHD)

Lightweight Federated Learning Framework for Resource-constrained Heterogeneous IoT Devices (July 2020 - March 2021): We developed a privacy-preserving lightweight federated learning model that leverages model training on-device, shrinks model size with negligible deterioration of model quality, chooses clients for training based on their contributions towards model convergence, and enables partial works from the weak clients through a generalization of the state-of-the-art FedAvg algorithm.

Distributed Sensing Using Smart End-user Devices (August 2019 - September 2019): We propose a distributed sensing approach that is capable to identify a device using token, can activate distributed end-user devices to send data to the cloud whenever it requires and store data in the cloud server maintaining proper format. This approach enables remote data collection leveraging available end-user devices and reduces the cost of installing new sensors for autonomous IoT applications.

Data Analytics for COVID-19 Prediction (Feb 2020 - June 2020): We developed models using Holt-Winters and exponential smoothing to forecast the total cases of COVID-19 and deaths related to the disease with an accuracy over 90%. [\[Link\]](#)

Attention level measurement of a driver: (August 2021 - June 2022): The goal of this project is to detect pre-accident situation by monitoring driver's leap movement, jaws, eyes and face angle and triggers a buzzer to alert the driver. We measured the attention level by developing a novel algorithm that is effective for resource-constrained IoT devices.

TECHNICAL STRENGTHS

Programming language	C, python, ...
Data Mining Software	Weka, ...
Database Management Systems	Oracle, DB2, Microsoft SQL Server, MySQL, ...
Hardware tool	Raspberry Pi, Arduino, WemosD1, sensors, ...
Development tool	Android Developer tool, ...
Other App	MATLAB, LATEX, NetBeans, Jupyter NoteBook, Spyder, ...

WORK EXPERIENCE

Florida International University January 2022 - April 2022
Graduate Research Assistant

Responsibilities:

- Conducted cutting-edge research on the area of Federated Learning, IoT and Blockchain.
- Submit research works in peer-reviewed journals and top conferences venues.
- Present our research works in different conference and seminars.
- Contribute in drafting proposals to submit in various funding organizations, e.g., NSF, DHS, DoH.

Florida International University August 2018 - December 2021
Graduate Teaching Assistant

Conducted Java Programming (Fall'18, Spring'19, Fall'19, Spring'20), Software Engineering (Spring'21), Computer Programming 2 (Summer'21), Discrete Structure (Fall'20, Fall'21) at undergraduate level.

Responsibilities:

- Evaluated assignments and projects, and held office hours to answer student's questions.
- Designed weekly quizzes, graded quizzes and lab reports, tracked the student progress.
- Held office hours to ensure students understood the class topics.
- Prepared PowerPoint presentations, lesson plans, and programming projects for classes on average thirty students each.

Florida International University Summer 2019, Summer 2020, Summer 2021
Summer NSF-DoD RET Site Instructor

- ◊ Graduate Mentor and Instructor in **National Science Foundation (NSF)** supported Research Experience for Teachers (RET) and Research Experience for Undergraduates (REU) programs.

- Mentored three undergraduate students and two k-12 high-school teachers in research formulation, data collection and analysis to help them complete their summer REU and RET research project.
- Guided the students in preparation and presentation of their research findings.
- Prepared PowerPoint presentations, lesson plans, and assignments for twenty K-12 STEM teachers each year on summer from 2019-2021.
- Taught the fundamental concepts of Java programming (2019), Python (2020), and web programming (2020).
- Applied various teaching methods to make learning fun and keep teachers of all ages engaged in the learning process.

International Islamic University Chittagong (IIUC)

September 2015 - July 2018

Lecturer in Department of Computer Science and Engineering

• **Responsibilities:**

- Conducted 15-18 credit hour of courses per semester.
- Computer Science course development.
- Advise 30 Computer Science Undergraduate students in each semester.
- Examine student's research works and arrange oral defense for the final year thesis/project as a part of IIUC Thesis Committee.

PUBLISHED BOOK (DURING PHD AT FIU:)

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- [B1] **Ahmed Imteaj**, M. Hadi Amini, and Panos M. Pardalos, "Foundations of Blockchain: Theory and Applications", Springer, 2021. [Link][Link]

SELECTED PUBLICATIONS (DURING PHD AT FIU:)

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- [J6] **Ahmed Imteaj**, U. Thakker, S. Wang, J. Li and M. H. Amini, "A Survey on Federated Learning for Resource-Constrained IoT Devices," in IEEE Internet of Things Journal, vol. 9, no. 1, pp. 1-24, 1 Jan.1, 2022, doi: 10.1109/JIOT.2021.3095077. [Listed as 4th most popular journal articles in IEEE Internet of Things Journal in January, 2022] (Impact Factor: 9.936)
- [J5] **Ahmed Imteaj** and M. Hadi Amini. "Leveraging Asynchronous Federated Learning to Predict Customers Financial Distress." Intelligent Systems with Applications (2022): 200064.
- [J4] **Ahmed Imteaj**, Irfan Khan, Javad Khazaei, M. Hadi Amini, "FedResilience: A Federated Learning Application to Improve Resilience of Resource-Constrained Critical Infrastructures," Electronics 2021, 10(16):1917. <https://doi.org/10.3390/electronics10161917> (Impact Factor: 2.397)
- [J3] **Ahmed Imteaj** and M. Hadi Amini. "FedPARL: Client Activity and Resource-Oriented Lightweight Federated Learning Model for Resource-Constrained Heterogeneous IoT Environment." Frontiers in Communications and Networks 2 (2021): 10. [One of the Two Winners of FIU GSAW Scholarly Forum 2021]
- [J2] *M. Hyman, *Calvin Mark, ***Ahmed Imteaj**, Hamed Ghiaie, Shabnam Rezapour, Arif M. Sadri, M. Hadi Amini, "Data Analytics to Evaluate the Impact of Infectious Disease on Economy: Case Study of COVID-19 Pandemic," Patterns Journal (2021). [Link] [*Authors contributed equally]
- [J1] M. Hadi Amini, **Ahmed Imteaj**, and Panos Pardalos, "Interdependent Networks: A Data Science Perspective", Patterns Journal (2020). [Link]
- [C12] **Ahmed Imteaj**, Raghad Alabagi and M. Hadi Amini, "Exploiting Federated Learning Technique to Recognize Human Activities in Resource-Constrained Environment", in Proceedings of the 13th International Conference on Intelligent Human Computer Interaction (IHCI-2021), 2021, Ohio, USA. [Received IHCI'21 Student Travel Scholarship Award and FIU GPSC Travel Grant]

- [C11] M. Hadi Amini, Laurent L. Njilla, **Ahmed Imteaj**, and Calvin Mark, “Distributed Network Optimization for Secure Operation of Interdependent Complex Networks”, Accepted in 8th Annual Conf. on Computational Science & Computational Intelligence (CSCI’21), 2021, Las Vegas, USA. **[Received FIU GPSC Travel Grant, and supported by US Air Force Research Lab]**
- [C10] Khandaker Mamun Ahmed, **Ahmed Imteaj**, and M. Hadi Amini, “Federated Deep Learning for Heterogeneous Edge Computing”, in Proceedings of 20th IEEE International Conference Machine Learning And Applications (ICMLA), 2021, San Diego, USA.
- [C9] **Ahmed Imteaj**, and M. Hadi Amini, “FedAR: Activity and Resource-Aware Federated Learning Model for Distributed Mobile Robots”, in Proceedings of the 19th IEEE International Conference Machine Learning And Applications, 2020, Miami, USA.
- [C8] **Ahmed Imteaj**, M.Hadi Amini, *Distributed Sensing Using Smart End-user Devices: Pathway to Federated Learning for Autonomous IoT*, 2019 IEEE Conference on Computational Science & Computational Intelligence, 2019. **(Best Paper Award)**
- [C7] **Ahmed Imteaj**, M. Hadi Amini, and Javad Mohammadi. “Leveraging decentralized artificial intelligence to enhance resilience of energy networks.” In 2020 IEEE Power & Energy Society General Meeting (PESGM), pp. 1-5. IEEE, 2020.
- [C6] **Ahmed Imteaj**, *Distributed machine learning for collaborative mobile robots: PhD forum abstract*, in Proceedings of the 18th Conference on Embedded Networked Sensor Systems (SenSys’20), Association for Computing Machinery, New York, NY, USA, 798–799, 2020.
- [C5] Mohammadi, Farid Ghareh, **Ahmed Imteaj**, M. Hadi Amini, and Hamid R. Arabnia. “Human Motion Recognition Using Zero-Shot Learning.” In Advances in Artificial Intelligence and Applied Cognitive Computing, pp. 171-181. Springer, Cham, 2021.
- [C4] **Ahmed Imteaj**, Urmish Thakker, Shiqiang Wang, Jian Li, and M. Hadi Amini. “Federated Learning for Resource-Constrained IoT Devices: Panoramas and State-of-the-art.” Accepted in Federated and Transfer Learning (2022).
- [C3] M. Hadi Amini, **Ahmed Imteaj**, and Javad Mohammadi, “Distributed Machine Learning for Resilient Operation of Electric Systems”, in Proceedings of International Conference on Smart Energy Systems and Technologies (SEST)(2020).
- [C2] Syed Rahman, **Ahmed Imteaj**, Irfan Khan, M. Hadi Amini, “Cascaded Solid State Transformer Structure to Power Fast EV Charging Stations from Medium Voltage Transmission Lines”, in Proceedings of the 54th Annual Asilomar Conference on Signals, Systems, and Computers (Asilomar 2020), USA.
- [C1] Abdur Rahman Bin Shahid, Niki Pissinou, Laurent Njilla, Sheila Alemany, **Ahmed Imteaj**, Kia Makki, “*Quantifying Location Privacy in Permissioned Blockchain-Based Internet of Things (IoT)*,” in Proceedings of 16th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services (MobiQuitous 2019).

PROFESSIONAL ACTIVITIES (DURING PHD AT FIU)

Machine Learning Researcher: Working as lead machine learning researcher for FIU’s Thrive project which will make use of various machine learning systems to drive a precision health-care mobile application.

MENTORSHIP:

NSF—DoD REU Site Mentor NSF Funded Research Experience for Undergraduate Students
Knight Foundation School of Computing and Information Sciences, Florida International University

- Mentored two undergraduate students in research formulation, data collection and analysis to help them complete their summer REU program.
- Guided the students in preparation and presentation of their research findings.

NSF—DoD RET Site Mentor Research Experience for Teachers, Supported by NSF
Knight Foundation School of Computing and Information Sciences, Florida International University

- Mentored three K-12 STEM teachers to participate in authentic summer research experiences.
- Acted as a bridge to establish a long-term collaborations between Kindergarten-through-12th grade (K-12) STEM teachers and the research community.
- Introduced K-12 teachers' knowledge of cutting-edge research topics.
- Build K-12 teachers' technology competency through research and professional development programs.
- Guided the teachers to translate their research experiences and new scientific knowledge into their classroom activities and curricula.

Undergraduate Senior Project Design/Final Year Project Mentor

Spring 2020

Knight Foundation School of Computing and Information Sciences, FIU

◊ Project Title: "Distributed Machine Learning for Mobile Programmable Robots: From Programming to Distributed Intelligence"

- Helps the students to find out research findings and assist them by giving suggestions, directions, and technical supports for developing their project.
- News Coverage: "Students rise against the odds to complete their senior design project on machine learning for robotics" by FIU College of Engineering and Computing News [[Link](#)] and KFSCIS News [[Link](#)].

Mentor of FIU Thrive ML Team

Fall 2022

A Collaborative Team Science Project of the Green Family Foundation Neighborhood Health Education Learning Program (NeighborhoodHELP) funded by the Florida Department of Health in Miami-Dade

- FIU Thrive will advance health equity, systems transformation, public health response readiness, and the management of health for patients and populations by aligning systems and data from patient-consumers, community organizations, healthcare, social services, public health, and public policy into a coordinated health information technology ecosystem that centers on patients and their households as its point of integration.

PROFESSIONAL EXPERIENCE IN GRANT WRITING

- Actively contributed in writing a proposal draft based on my PhD works on Federated Learning: "Agent-based Learning to Utilize Local Data for Activity Recognition" that recently awarded \$300,000 funding from **DHS, Criminal Investigations and Network Analysis, Center of Excellence**.
- Participated in Fall 2021 **National Science Foundation's (NSF) Virtual Grants Conference, 2021!**

ORGANIZER (Editorial Board Member and Program Committee Member)

- Review Editor, *Frontiers in Communications and Networks* (June 2020- present).
- Publicity Chair, *Combining Physical and Data-Driven Knowledge in Ubiquitous Computing (Ubi-comp CPD 2020)* [[Link](#)]
- Technical Program Committee Member, *Advanced Machine Learning and Applications: Federated Learning and Meta-Learning (AML-IoT FLAME 2021)* [[Link](#)]
- Technical Program Committee Member, *International Workshop on Security, Privacy, and Trust for Emergency Events (EmergencyComm 2020)* [[Link](#)]
- Publicity Chair, *Advanced Machine Learning and Applications: Federated Learning and Meta-Learning (AML-IoT FLAME 2020)* [[Link](#)]
- Technical Program Committee Member in *International Conference on Big Data, IoT and Machine Learning (BIM 2021)* [[Link](#)]

SERVICE (DURING PHD AT FIU)

Conference/Special Session Reviewer

- 20TH IEEE International Conference on Machine Learning and Applications, Pasadena, California,

USA.

- ACM international joint conference on pervasive and ubiquitous computing (UbiComp)-CPD 2020
- International Workshop on Federated Learning for User Privacy and Data Confidentiality in Conjunction with ICML 2020 (FL-ICML'20) (June 2020)
- 19TH IEEE International Conference on Machine Learning and Applications (December 2020)
- International Workshop on Security, Privacy, and Trust for Emergency Events (EmergencyComm 2020)
- 21st IEEE International Workshop on Signal Processing Advances in Wireless Communications.