

Sayed Erfan Arefin

🏠 sayederfanarefin.github.io

"Seek knowledge from the cradle to the grave."

Education

Texas Tech University

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

Lubbock, Texas

2020 Spring - 2024 Summer

- Research focus on Cyber Security
- Dissertation Title: Covert Observation of Deep Neural Network Operations for Architectural Inference Attacks
- CGPA: 3.85 out of 4

BRAC University

MASTER OF SCIENCE IN COMPUTER SCIENCE AND ENGINEERING

Dhaka, Bangladesh

2018 Spring - 2019 Fall

- CGPA: 3.32 out of 4
- Thesis Title: IoT in Smart-homes and Smart-cities using FOG, NDN and Trust Management System

BRAC University

BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND ENGINEERING

Dhaka, Bangladesh

2013 Spring - 2017 Summer

- Thesis Title: Fog based service oriented IoT infrastructure

Work Experience

University of Dayton

ASSISTANT PROFESSOR

Dayton, Ohio

August 2024 - Present

- Developing and delivering undergraduate and graduate courses in computer science, focusing on topics such as Software Engineering and Deep Learning.
- Conducting research in artificial intelligence and security.
- Participating in departmental committees.

Texas Tech University

TEACHING ASSISTANT

Lubbock, Texas

Aug. 2020 - Exp. Jul. 2024

- Instructor or, Teaching Assistant

Dashroad

BACKEND MACHINE LEARNING ENGINEER

Part-time Remote job - Dubai, UAE

Feb. 2019 - Exp. May. 2019

- Developed on PostgreSQL database and Express.js-based backend.
- Designed and implemented machine learning models to predict the value of older Tesla cars.
- Conducted data collection through web scraping and performed extensive data cleaning.
- Conducted and deployed ML experiments and model in Azure Machine Learning Studio.

Sweet iTech

SOFTWARE ENGINEER

Full-time job - Dhaka, Bangladesh

Feb. 2018 - Aug. 2018

- Spring Boot and MySQL for RESTful backend and database development in three projects.
- Integrated 3rd-part Auth0 for authentication.
- Focused on HR information systems, integrated with physical devices.
- Built two Android apps from scratch using the MVVM boilerplate, including a cricket fantasy app and an e-commerce app.
- Collaborated in a 3-person team, following Scrum methodology.

Anontech

APP DEVELOPER

Part time job - Dhaka, Bangladesh

Jul. 2016 - Aug. 2016

- Worked on existing Android & Windows apps.

Publication

Music to My Ears: Turning GPU Sounds into Intellectual Property Gold

S. E. Arefin and A. Serwadda, "Music to My Ears: Turning GPU Sounds into Intellectual Property Gold", *Proceedings of the 2024 Workshop on Artificial Intelligence and Security*, Salt Lake City, UT, USA, **2024**, 10.1145/3689932.3694771.

Dissecting the Origins of the Power Side-Channel in Deep Neural Networks

S. E. Arefin and A. Serwadda, "Dissecting the Origins of the Power Side-Channel in Deep Neural Networks," *2024 IEEE World AI IoT Congress (AlloT)*, Seattle, WA, USA, **2024**, pp. 414-420, doi: 10.1109/AlloT61789.2024.10579025.

The Road to Web 3.0: Empirical Insights into Full Node Workload in the Bitcoin Blockchain

S. E. Arefin and A. Serwadda, "The Road to Web 3.0: Empirical Insights into Full Node Workload in the Bitcoin Blockchain," *2024 International Conference on Smart Applications, Communications and Networking (SmartNets)*, Harrisonburg, VA, USA, **2024**, pp. 1-6, doi: 10.1109/SmartNets61466.2024.10577750.

Stable or Shaky? The Semantics of ChatGPT's Behavior Under Repeated Queries

T. A. Heya, Y. Ineza, S. E. Arefin, G. Uzor and A. Serwadda, "Stable or Shaky? The Semantics of ChatGPT's Behavior Under Repeated Queries," *2024 IEEE 18th International Conference on Semantic Computing (ICSC)*, Laguna Hills, CA, USA, **2024**, pp. 110-116, **2024**, doi: 10.1109/ICSC59802.2024.00023.

Unmasking the giant: A comprehensive evaluation of ChatGPT's proficiency in coding algorithms and data structures

S. E. Arefin, T. H. Ashrafi, H. Al-Qudah, Y. Ineza and A. Serwadda, "Unmasking the giant: A comprehensive evaluation of ChatGPT's proficiency in coding algorithms and data structures", *16th International Conference on Agents and Artificial Intelligence*, **2024**, doi: 10.5220/0012467100003636.

Weaponizing IoT Sensors: When Table Choice Poses a Security Vulnerability

G. Casaquero, S. E. Arefin, T. H. Ashrafi, H. Wassawa and A. Serwadda, "Weaponizing IoT Sensors: When Table Choice Poses a Security Vulnerability", *IEEE TPS: The Fourth IEEE International Conference on Trust, Privacy, and Security*, **2022**, doi: 10.1109/TPS-ISA56441.2022.00029.

Deep Neural Exposure: You Can Run, But Not Hide Your Neural Network Architecture!

S. E. Arefin and A. Serwadda, "Deep Neural Exposure: You Can Run, But Not Hide Your Neural Network Architecture!", *IH&MMSec 21: Proceedings of the 2021 ACM Workshop on Information Hiding and Multimedia Security*, **2021**, doi: 10.1145/3437880.3460415.

Agent Based Fog Architecture using NDN and Trust Management for IoT

S. E. Arefin, T. Ashrafi Heya and A. Chakrabarty, "Agent Based Fog Architecture using NDN and Trust Management for IoT", *IEEE TENCON*, **2019**, doi: 10.1109/TENCON.2019.8929709.

Real-life Implementation of Internet of Robotic Things Using 5 DoF Heterogeneous Robotic Arm

S. E. Arefin, T. Ashrafi Heya and J. Uddin, "Real-life Implementation of Internet of Robotic Things Using 5 DoF Heterogeneous Robotic Arm", *2018 Joint 7th International Conference on Informatics, Electronics & Vision (ICIEV) and 2018 2nd International Conference on Imaging, Vision & Pattern Recognition (icIVPR)*, **2018**, doi: 10.1109/ICIEV.2018.8641019.

A Novel Extended Cloud Based Approach for Internet of Things

T. H. Ashrafi, M. A. Hossain, S. E. Arefin, K. D. J. Das and A. Chakrabarty, "A Novel Extended Cloud Based Approach for Internet of Things", Mishra B., Das H., Dehuri S., Jagadev A. (eds) *Cloud Computing for Optimization: Foundations, Applications, and Challenges. Studies in Big Data*, vol 39, *Studies in Big Data book series (SBD, volume 39)*, Springer, **2018**, doi: 10.1007/978-3-319-73676-1_12.

IoT Infrastructure: Fog Computing Surpasses Cloud Computing

T. A. Heya, S. E. Arefin, M. A. Hossain, K. D. J. Das, and A. Chakrabarty, "IoT Infrastructure: Fog Computing Surpasses Cloud Computing", In: Hu, YC., Tiwari, S., Mishra, K., Trivedi, M. (eds) *Intelligent Communication and Computational Technologies. Lecture Notes in Networks and Systems*, vol 19. Springer, Singapore, **2018**, https://doi.org/10.1007/978-981-10-5523-2_5

Image Processing Based Indoor Localization System for Assisting Visually Impaired People

T. A. Heya, S. E. Arefin, A. Chakrabarty and M. Alam, "Image Processing Based Indoor Localization System for Assisting Visually Impaired People", *2018 Ubiquitous Positioning, Indoor Navigation and Location-Based Services (UPINLBS)*, Wuhan, China, **2018**, pp. 1-7, doi: 10.1109/UPINLBS.2018.8559936.

Service Based FOG Computing Model for IoT

T. H. Ashrafi, M. A. Hossain, S. E. Arefin, K. D. J. Das and A. Chakrabarty, "Service Based FOG Computing Model for IoT", *IEEE 3rd International Conference on Collaboration and Internet Computing (CIC)*, pp. 163-172, **2017**, doi: 10.1109/CIC.2017.00031.

Indoor localization system for assisting visually impaired people

M. M. Alam, **S. E. Arefin**, M. A. Alim, S. I. Adib and M. A. Rahman, "Indoor localization system for assisting visually impaired people", *International Conference on Electrical, Computer and Communication Engineering (ECCE)*, Cox's Bazar, Bangladesh, **2017**, doi: 10.1109/ECACE.2017.7912927.

Comparative analysis of computation models for IoT: Distributed fog vs. conventional cloud

T. A. Heya, **S. E. Arefin**, M. A. Hossain and A. Chakrabarty, "Comparative analysis of computation models for IoT: Distributed fog vs. conventional cloud", *4th International Conference on Advances in Electrical Engineering (ICAEE)*, Dhaka, Bangladesh, **2017**, pp. 760-765. doi: 10.1109/ICAEE.2017.8255456.

Fog Based Distributed IoT Infrastructure

T. A. Heya, **S. E. Arefin**, K. D. J. Das, M. A. Hossain and A. Chakrabarty, "Fog Based Distributed IoT Infrastructure", *Second International Conference on Internet of things and Cloud Computing (ICC)*, Cambridge, UK, **2016**, doi: 10.1145/3018896.3036365.

Teaching Experience

Software Engineering

Fall 2024 and Spring 2025

INSTRUCTOR

University of Dayton

- Crafted lectures, and prepared quiz, exam, and homework questions.

Data Structures

Fall 2023 and Fall 2021

INSTRUCTOR AND LAB INSTRUCTOR

Texas Tech University

- Conducted live coding sessions and engaged in problem-solving activities related to data structures.
- Designed **animations** to enhance the comprehension of data structures.
- Crafted lectures, and prepared quiz, exam, and homework questions.
- Implemented a **grading rubric** to standardize the evaluation across TA, Grader, and Students.

Computer Organization and Assembly Language Programming

Summer 2021 and Summer 2022

INSTRUCTOR

Texas Tech University

- Generated course lectures, questions for quizzes, exams, and homework assignments.
- Led live coding sessions and played an active role in problem-solving exercises.
- Grading homework, exams, and quizzes.

Object-Oriented Programming

Summer 2023

INSTRUCTOR

Texas Tech University

- Produced lectures, quiz, exam, and homework questions.
- Created both precise and erroneous code examples to endorse critical thinking.
- Facilitated in-class practice exercises accompanied by clear explanations.

Discrete Computational Structure

Spring 2023

INSTRUCTOR

Texas Tech University

- Crafted lectures, and prepared quiz, exam, and homework questions.
- Completed **ABET** evaluation for the course.
- Facilitated in-class practice exercises accompanied by clear explanations.

Computer Architecture

Fall 2020

TEACHING ASSISTANT

Texas Tech University

- Assessing homework, exams, and quizzes.

Research Interests

- Cyber-security
- Deep Learning
- Side Channel Attacks
- Large Language Models
- Internet of Things (IoT) Network Architectures
- Robotics Security

Peer Reviewing Experience

- Reviewed **8** research papers on IEEE Access, Web of Science ResearcherID: AAH-1401-2019.

- Reviewed 6 research papers on IEEE Internet of Things Journal.

Projects

Hackathon Platform

SpringBoot based WebApp

LEARNING TOOL, DATABASE COURSE, TEXAS TECH UNIVERSITY

- Developed an online Hackathon tool for teaching Database Queries, by collaborating with the advisor for a Database course.
- Designed an intuitive user interface with Bootstrap, Thymeleaf, and Spring Boot featuring a Leaderboard and an online SQL query IDE.
- Implemented a points breakdown system to evaluate student performance.

Jetson Nano based Land Drone

Hardware & Neural Networks

SELF PACED PROJECT

- Developed a 5-DOF robotic arm with tracked chassis using Jetson Nano platform.
- Real-time object identification with ResNet50, and use arm to move color-coded objects precisely.

Network Simulations and Integration

MOBILE DATA MANAGEMENT AND PRIVACY, COURSE PROJECT, TEXAS TECH UNIVERSITY

CSIM simulation

- Server-client and peer-to-peer network simulations with real-world conditions.
- Conducted Hot-Cold Item, data validity, and Pull-Based Caching simulations.

Matlab-based drone simulation

AERIAL COMPUTING, COURSE PROJECT, TEXAS TECH UNIVERSITY

Matlab simulation

- Conducted comprehensive drone flight simulations using MATLAB.
- Developed MATLAB scripts and evaluated algorithm performance in terms of distance, time efficiency, and predictability: Random Waypoint, Clustering & Nearest Neighbor Algorithm

Lustre Auditing Project

ADVANCED OS, COURSE PROJECT, TEXAS TECH UNIVERSITY

Luster, CentOS

- Explored Lustre auditing within a CentOS-based Lustre architecture.
- Analyzing auditing logs and tracked access patterns.

Voice-Driven SPARC App

INTELLIGENT SYSTEMS, COURSE PROJECT, TEXAS TECH UNIVERSITY

Answer Set Programming

- Collaborated on a voice-driven SPARC query app with clever suggestions, voice output.
- Answer Set Programming: SPARC implementation, for knowledge base.
- Deployed CORS bridge on Azure Web Services and hosted the main project on Azure Web App.

Extracurricular Activity

MENTORSHIP

- Mentored 2 undergraduate students in research.
- National Women's Hackathon, Women in Digital, ICT Ministry, Dhaka, Bangladesh.
- Space Apps Challenge Dhaka, Dhaka, Bangladesh.
- Delivered presentations on Microsoft Azure at East West University and Daffodil International University, Dhaka

ENTREPRENEURSHIP

- Founded "Ten Posters & Merchandise" (2013-2015), a Band Merchandising Startup.
- Founded "Bulb Inc" (2017), Microsoft Bizspark funded Startup.

STUDENT CLUB ACTIVITIES & COMMUNITY SERVICE

- Conducted training sessions on "Hands-on Microsoft Azure" at BRAC University Computer Club.
- Served as the Microsoft Student Partner Campus Lead at BRAC University Computer Club (2017).
- Actively participated in the Fast Response team from BRAC University Computer Club, providing aid to the wounded during **National Crisis: Rana Plaza Building Collapse** tragedy (2013).

Skills

ACADEMIC AND RESEARCH SKILLS

- Data Analysis & Data Visualization: Matplotlib, Seaborn, Plotly, Folium
- High Performance Computing (HPC) for Deep Learning Experiments on SLURM environment
- Machine Learning Tools: Anaconda, Jupyter Notebook.
- Python Packages: TensorFlow, PyTorch, PyTorch Lightning, Pandas, Dask, Matplotlib, Sklearn, etc.
- Deep Learning Techniques:
 - Convolutional Neural Networks (CNN): ResNet variations, MobileNet
 - Long Short-Term Memory (LSTM)
- Single-Board Computers:
 - Raspberry Pi/Orange Pi
 - Nvidia Jetson Nano
 - Arduino/Redboard
- LaTeX tools: Latex Workshop, MikTeX, Texmaker, Overleaf

SOFTWARE DEVELOPMENT SKILLS

- Android Development (MVVM architecture)
- Frontend Web Development: Vue.js
- Backend Development: Spring Boot
- Continuous Integration/Continuous Deployment (CI/CD) and VCS Tools:
 - Docker: Docker compose, Container Registry, etc.
 - Gitlab CI: Build, Test, and deploy web apps (Zero downtime deployment) and Android App
 - Github CI: Build, Test, and deploy web apps
 - Version Control: Github & Gitlab.
- Cloud Environments:
 - Microsoft Azure: VMs, Storage, Database, Load Balancer, DNS zone, VPN
 - Digital Ocean: VM, Storage, Database
- Databases: MySQL, PostgreSQL, MongoDB, Neo4j
- 3rd Party Services:
 - Firebase: Authentication, Realtime Database, Storage, Cloud Messaging
 - Google APIs: Road API, Maps API
 - Azure Vision API
 - Amazon Rekognition
 - Auth0 for authentication

Professional Certificates & Awards

2023	HPC Monthly Workshop: Machine Learning and BIG DATA , Pittsburgh Supercomputing Center, Co-hosted with Texas Tech University	Lubbock, Texas
2021	International Teaching Assistant (ITA) Approved , Texas Tech University	Lubbock, Texas
2018	Scholarship , Linux Foundation conference KubeCon + CloudNativeCon	CPH, Denmark
2015	Runners Up , Software Development category at AUST Engenius	Dhaka, BD
2014	Microsoft Technology Associate (MTA) , Software Development Fundamentals, Microsoft Certification number: F144-9204	Dhaka, BD
2014	Winner , National Hackathon, “Non Communicable Diseases” Category. Organized by, ICT Ministry of Bangladesh	Dhaka, BD