Tarikul Islam Papon **PhD Researcher@Boston University**

CONTACT INFORMATION

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RESEARCH INTERESTS

Databases, Data Management, Data Systems, Storage Systems, Flash Memory, Near-Data Processing, Disaggregated Memory and Storage.

PROFESSIONAL EXPERIENCE

- PhD Researcher at **Boston University**, MA, USA — Sept 2019 - Present
- Research Intern at **Microsoft Research**, WA, USA — May 2021 - Aug 2021
  I worked with MSR's Data Systems Group on column-store reclustering.
- Lecturer at **CSE, BUET**, Dhaka, Bangladesh — Oct 2015 - Aug 2019

EDUCATION

Ph.D. in Computer Science, 2019 - Present
Boston University, Massachusetts, USA.
Expected Graduation: April, 2024

M.Sc. in Computer Science and Engineering, 2016 - 2019
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh.
Thesis: "Design and Development of A Deep Learning Based Application for Detecting Diabetic Retinopathy"

B.Sc. in Computer Science and Engineering, 2010 - 2015
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh.
Thesis: "Photoplethysmographic Analysis of Optical Signals : A Single Device to Measure All the Vital Signs"

SCHOLARSHIPS AND AWARDS (SELECTED)

- **Honorable Mention** for **Best Gong Show Talk** at CIDR, 2021 — 2021
- **Dean's Fellowship** at Boston University — Fall 2019
- **Dean's Honor List** in all 4 levels of Undergraduate Studies — 2010-2015
- **University Merit Scholarship** in all 8 terms of U.G. Studies — 2010-2015
- **Champion** of the Intra University Database Project Show — 2013
- **Champion** of the Intra University Robotics Contest — 2012
- **Champion** of the Intra University Logic Olympiad — 2012

PUBLICATIONS

1. **Tarikul Islam Papon**, Manos Athanassoulis. *A Parametric I/O Model for Modern Storage Devices*, In Proceedings of the International Workshop on Data Management on New Hardware (**DaMoN**), 2021.
2. **Tarikul Islam Papon**, Manos Athanassoulis. *The Need for a New I/O Model*, Conference on Innovative Data Systems Research **(CIDR)**, 2021. (Abstract)
3. Subhadeep Sarkar, **Tarikul Islam Papon**, Dimitris Staratzis, Manos Athanassoulis. *Lethe: A Tunable Delete-Aware LSM Engine*, In Proceedings of the ACM **SIGMOD** International Conference on Management of Data, 2020.
4. Sadia Tamanna Khan, Ashef Ainan Baksh, **Tarikul Islam Papon**, Muhammad Ashraf Ali. *Rainwater Harvesting System: An Approach for Optimum Tank Size Design and Assessment of Efficiency*, International Journal of Environmental Science and Development, 8(1), 37-43, 2017.

5. **Tarikul Islam Papon**, Ishtiyaque Ahmad, Nazmus Saquib and Ashikur Rahman. *Non-invasive Heart Rate Measuring Smartphone Applications using On-board Cameras: A Short Survey.* The 1st International Conference on Networking Systems and Security 2015 (NSysS 2015), January 5-7, 2015, Dhaka, Bangladesh.

6. Nazmus Saquib, **Tarikul Islam Papon**, Ishtiyaque Ahmad and Ashikur Rahman. *Measurement of Heart Rate Using Photoplethysmography.* The 1st International Conference on Networking Systems and Security 2015 (NSysS 2015), January 5-7, 2015, Dhaka, Bangladesh.

Posters and Presentations

1. Subhadeep Sarkar, Dimitris Staratzis, **Tarikul Islam Papon**, Manos Athanassoulis. *Lethe: A Delete-Aware LSM-Based Storage Engine*, Poster at North East Database Day 2020.

Research Talks

1. "A Parametric I/O Model for Modern Storage Devices", June 2021, *DaMoN Workshop*, China (Virtual).
2. "The Need for A New I/O Model", Jan 2021, *CIDR*, Virtual.
3. "The Case for a Parametric I/O Model", May 2020, *MiDAS Seminar*, Boston University, MA, USA.

Teaching Experience (Selected)

Boston University (Teaching Fellow) 2020 - Present

- CS 460 (Introduction to Database Systems) Fall 2021
- CS 561 (Data Systems Architectures) Spring 2021
- CS 460 (Introduction to Database Systems) Fall 2020

Bangladesh University of Engg. and Tech. (Lecturer) 2015 - 2019

- CSE 453 (High Performance Database Systems) Jan 2019
- CSE 218 (Numerical Methods Lab) Jan 2019
- CSE 410 (Computer Graphics Lab) Jan 2019
- CSE 322 (Computer Networks Lab) Jul 2018, Jan 2016
- CSE 208 (Data Structures & Algorithms II Lab) Jul 2018
- CSE 108 (Object Oriented Programming Lab) Jul 2018, Jul 2017
- CSE 433 (Digital Image Processing) Jan 2018, Jul 2016
- CSE 308 (Software Engineering Lab) Jan 2018, Jan 2017
- CSE 206 (Digital Logic Design Lab) Jan 2018, Jan 2016
- CSE 102 (Structured Programming Language Lab) Jan 2018
- CSE 317 (Numerical Methods) Jul 2017
- CSE 216 (Database Lab) Jul 2017, Jul 2016
- CSE 307 (Software Engineering & Information System Design) Jan 2017
- CSE 402 (Artificial Intelligence Lab) Jul 2016
- CSE 404 (Digital Sytem Design Lab) Jul 2016, Jan 2016
- CSE 214 (Assembly Language Lab) Jul 2016

Supervision & Mentorship

- Subin (Rachael) Kim, *High-school Research Intern.* Fall 2020 - Spring 2021
  Topic: Visualizing the impact of PIO on new bufferpool algorithms.
- Zheng Hui, *Undergraduate Research Intern* Fall 2020
  Topic: Designing a concurrency-aware graph traversal algorithm.

Professional Services

- **Reviewer** - Journal of Systems Architecture (JSA), IEEE BigData
- **Member**, Sponsorship and Finance Committee, International Conference on Networking, Systems and Security (NSysS 2016 – 2018)

M.Sc. Thesis

Tarikul Islam Papon. *Design and Development of A Deep Learning Based Application for Detecting Diabetic Retinopathy*, M.Sc. Engineering Thesis, 2019, Department of CSE, BUET, Bangladesh. (under the supervision of Dr. A.K.M. Ashikur Rahman)

I worked on detecting diabetic retinopathy from the images of interior surface of eye (known as fundus image) under the supervision of Dr. A.K.M. Ashikur Rahman, Professor, Department of CSE, BUET. This is a collaborative project with Ubicomp Lab at Marquette University. I trained a deep convolutional neural network with our data set of fundus images. *TensorFlow* was used to create the deep learning model. Moreover, various image processing and machine learning techniques have been used to perform a comparative study.

B.Sc. Thesis

Tarikul Islam Papon, Nazmus Saquib, Ishtiyaque Ahmad. *Photoplethysmographic Analysis of Optical Signals : A Single Device to Measure All the Vital Signs*, B.Sc. Engineering Thesis, 2015, Department of CSE, BUET, Bangladesh. (under the supervision of Dr. A.K.M. Ashikur Rahman)

I worked to build a cost-effective noninvasive device to calculate heart rate using Photoplethysmographic (PPG) signal under the supervision of Dr. A.K.M. Ashikur Rahman. Infrared sensors were used to capture the volumetric change of blood from the fingertip of a person. From different parameters of the PPG signal, patients heart rate was calculated and blood pressure was approximated.

Technical Skills

- **Programming Languages:** C, C++, C#, Java, Python, Assembly, PHP
- **Markup Languages:** HTML, XML, LaTeX
- **Database Management Systems:** RocksDB, MonetDB, PostgreSQL, MySQL, Oracle, SQL Server, MongoDB, Neo4j
- **Distributed Computing Frameworks:** Apache Hadoop, Apache Spark
- **Machine Learning:** TensorFlow, PyTorch, Keras
- **Hardware:** Arduino, AVR, Rasberry Pi, Xilinx

Selected Projects

- **Relational Memory:** We are working on introducing a new type of near-memory computation to transform between row-oriented data to column-oriented data on the fly. This system uses an FPGA-based module that augments the memory controller with a column extracting module. The transformation is transparent to the processor, and it can happen at a high bandwidth since it is closer to memory. I am working on the hardware synthesis and software abstraction. We have implemented projection and are now working on pushing other relational operators: selection, aggregation, join.

- **Parametric I/O Model:** I am currently developing a new design paradigm for interacting with durable storage that takes into account performance asymmetry between read and write operations, as well as the variable access concurrency that different devices may support. Essentially, I am working on proposing a new I/O model that captures these properties by parameterizing them. With this model as a framework, I envision to propose new *asymmetry/concurrency-aware* algorithms and data structures tailored for modern storage devices.

- **Enabling Efficient Deletes in LSMs:** In this project, we highlight that all out-of-place data stores treat deletes as second class citizens, and are not designed to efficiently realize deletes without hurting performance. We introduce Lethe, a new delete-aware out-of-place key-value store that introduces two new key design

components for LSM-based engines: a family of new compaction strategies named FADE and a new storage layout, Key Weaving Storage Layout (KiWi). I worked extensively on the implementation and experimentation of KiWi.

- **A New Distributed Approach for Determining the Most Influential Spreader in a Social Network:** I implemented a modification of the popular *k-core decomposition* algorithm that can be run in a distributed manner. MongoDB was used to store and process 5 million twitter data and Neo4j was used to visualize the highly intricate graph. For distributed computation, Apache Giraph was run over HDFS on an amazon AWS cluster. I am still working on this project to include Natural Language Processing (NLP) for better performance.
- **PinBox:** An android application which I developed where a user can Pin his favorite places in Google Map based on category. User could maintain his profile as well as view other users profile to explore different pins (favorite places) based on category and location. Polygonal data structure in spatial database was used to automatically identify the zone/area of a pin, which was the prime feature of the app. This project was declared as the *Champion* of the "Database Project Show" in BUET.

Consultancy Projects (Selected)

- Testing and Certification of the Flora Bank Core Banking System (2018-2019)
- Development of Android Based I-Books & Associated Services for Bangladesh Technical Education Board and Madrasah Education Board (2016-2019)
- Development, Supply & Installation of Multi-Language Training Software titled "*Vashaguru*" for Sheikh Russell Digital Labs in Bangladesh (2017-2018)
- XI Class Admission in Bangladesh (Session: 2016-2017, 2017-2018)
- Processing of Results of IEB Election (2017)

Extra-Curricular Activities (Selected)

- **Student Volunteer** in VLDB 2020 conference
- **Seminar Coordinator** of MiDAS Group, Spring 2020
- **Convener** of BUET CSE Festival 2019
- **Runner Up** of Intra University Faculty Bridge Competition, BUET, 2017
- **Trainer** at Bangladesh Bank IT Training on Java Spring, 2016
- **Lead Organizer & Treasurer** of BUET CSE Festival 2015
- **Member** of BUET System Analysis, Design and Development community
- **Champion** of the Intra BUET Poker Tournament, BUET CSE Festival 2015
- **Branch Coordinator & Lecturer** at Sunrise Coaching Center, 2010 – 2014

Last Update: October 2021