

Raiful Hasan

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Summary

- NSF GRSP Fellow, Ph.D. candidate in Computer Science.
- Research interest: **Mobile and wearable computing**, **human-computer interaction**, the **Internet of Things**, **machine learning**, and **smart city**, with a focus on pedestrian safety in urban environments, bystanders' privacy, and emergency management.
- Awarded by **NSF GRSP** (2021-22 and 2022-23), **Sigma Xi** (Fall 2021), and **Sparkman Fellowship** (2022-23)
- Expertise in algorithms, data structures, and programming. Five years of industry experience in software design and development; and debugging.

Education

- 2019 – Present 📖 **Ph.D. in Computer Science, University of Alabama at Birmingham**
GPA: 4.00/4.00
Advisor: *Dr. Ragib Hasan*
Dissertation Title: *Multimodal Automated Personal Safety for Pedestrians in Smart City Environments*
Dissertation Committee: *Dr. Ragib Hasan, Dr. David C. Schwebel, Dr. Tanveer Islam, Dr. Da Yan, and Dr. Sidharth Kumar*
- June 2012 📖 **B.Sc. in Computer Science & Engineering, University of Dhaka**
GPA: 3.24/4.00
Advisor: *Dr. Hafiz Md. Hasan Babu*
Thesis title: *Design a Reversible Fault Tolerant Programmable Array Logic.*

Professional Experience







- Jan '19 - Present 📖 **Graduate Research Assistant**
UAB SECRETLab, University of Alabama at Birmingham, Alabama, USA.
Responsibilities: *Research, Mentoring*
Advisor: *Dr. Ragib Hasan*
- Aug '19 - July '21 📖 **Graduate Teaching Assistant**
Department of Computer Science, University of Alabama at Birmingham.
Responsibilities: *Teaching, Grading, Lab Instructor*
- Sept '12 - Dec '18 📖 **Software Engineer**
Divine IT Limited, Dhaka, Bangladesh.
Responsibilities: *Research, Development, and Team Management*
- June '12 - Aug '18 📖 **Software Engineer**
JICA Bangladesh, Dhaka, Bangladesh.
Responsibilities: *Software Development*

Awards and Achievements

- 2022  **NSF-EPSCoR GRSP Fellowship** for the 2022-23 academic year (until graduation).
-  **Sparkman Fellows**, Sparkman Center for Global Health, UAB.
-  **Sigma Xi Grant**, The Scientific Research Honor Society Grants In Aid of Research (GIAR).
-  **Professional Development Grant**, Graduate Student Government, UAB.
- 2021  **NSF-EPSCoR GRSP fellowship** for the 2021-22 academic year.
-  **Travel Grant** for participating in IEEE CCNC '21 by Graduate School, UAB.
- 2019  **Full Tuition** scholarship at UAB.
-  **Travel Grant** for participating in IEEE SoutheastCon '19 by Graduate School, UAB.
- 2014  **Innovation Fund**, Access to Information (azi) and ICT Division of Bangladesh.
- 2011  **Merit Scholarship**, Bangladesh Scholarship Council (BSC).

Research Publications

Peer-Reviewed Journals and Conference Publications

- 1 **Raiful Hasan** and Ragib Hasan. "Pedestrian Safety Using the Internet of Things and Sensors: Issues, Challenges, and Open Problems". In: *Future Generation Computer Systems (FGCS)* (2022).  DOI: 10.1016/j.future.2022.03.036.
- 2 **Raiful Hasan**, Aminul Hoque, Yasser Karim, Russell Griffin, David C Schwebel, and Ragib Hasan. "Someone to Watch Over You: Using Bluetooth Beacons for Alerting Distracted Pedestrians". In: *IEEE Internet of Things Journal (IoTJ)* (2022).
- 3 **Raiful Hasan**, and Ragib Hasan. "X-Fidence: Post-Pandemic Wellness By Density Monitoring with Privacy Preservation". In: *Proceedings of the 2022 IEEE 19th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA* (2022), pp. 578–583.  DOI: 10.1109/CCNC49033.2022.9700586.
- 4 **Raiful Hasan** and Ragib Hasan. "Towards a Threat Model and Privacy Analysis for V2P in 5G Networks". In: *Proceedings of the 2021 IEEE 4th 5G World Forum (5GWF), Montreal, QC, Canada* (2021), pp. 383–387.  DOI: 10.1109/5GWF52925.2021.00074.
- 5 David C Schwebel, Ragib Hasan, Russell Griffin, **Raiful Hasan**, Mohammad Aminul Hoque, Md Yasser Karim, Kevin Luo, and Anna Johnston. "Reducing Distracted Pedestrian Behavior using Bluetooth Beacon Technology: A Crossover Trial". In: *Accident Analysis and Prevention* 159 (2021), p. 106253.  DOI: 10.1016/j.aap.2021.106253.
- 6 Mohammad Aminul Hoque, **Raiful Hasan**, and Ragib Hasan. "R-CAV: On-Demand Edge Computing Platform for Connected Autonomous Vehicles". In: *Proceedings of the 2021 IEEE 7th World Forum on Internet of Things (WF-IoT), New Orleans, LA, USA* (2021), pp. 65–70.  DOI: 10.1109/WF-IoT51360.2021.9595160.
- 7 **Raiful Hasan** and Ragib Hasan. "FinderX: A Bluetooth Beacon-Based System for Designing Sustainable Green Smart Cities". In: *IEEE Consumer Electronics Magazine (IEEE MCE)* 11.1 (2021), pp. 65–72.  DOI: 10.1109/MCE.2021.3076290.
- 8 **Raiful Hasan**, Ragib Hasan and Tanveer Islam. "InSight: A Bluetooth Beacon-based Ad-hoc Emergency Alert System for Smart Cities". In: *Proceedings of 2021 IEEE 18th Annual Consumer*

Communications and Networking Conference (CCNC), Las Vegas, NV, USA (2021), pp. 1–6. [DOI: 10.1109/CCNC49032.2021.9369621](#).

- 9 **Raiful Hasan**, and Ragib Hasan. “Towards a Threat Model and Security Analysis of Video Conferencing Systems”. In: *Proceedings of 2021 IEEE 18th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA (2021)*, pp. 1–4. [DOI: 10.1109/CCNC49032.2021.9369505](#).
- 10 **Raiful Hasan** and Ragib Hasan. “BeaCloud: A Generic Architecture for Sustainable Smart City using Bluetooth Beacons”. In: *Proceedings of 2020 IEEE 22nd International Conference on High Performance Computing and Communications; IEEE 18th International Conference on Smart City; IEEE 6th International Conference on Data Science and Systems (HPCC/SmartCity/DSS), Cuvu, Fiji (2020)*, pp. 1150–1157. [DOI: 10.1109/HPCC-SmartCity-DSS50907.2020.00149](#).
- 11 **Raiful Hasan**, and Ragib Hasan. “Towards Designing a Sustainable Green Smart City using Bluetooth Beacons”. In: *2020 IEEE 6th World Forum on Internet of Things (WF-IoT), New Orleans, LA, USA (2020)*, pp. 1–6. [DOI: 10.1109/WF-IoT48130.2020.9221118](#).
- 12 **Raiful Hasan**, Mohammad Aminul Hoque, Yasser Karim, Russell Griffin, David C Schwebel, and Ragib Hasan. “Smartphone-based Distracted Pedestrian Localization using Bluetooth Low Energy Beacons”. In: *2020 IEEE SoutheastCon, Raleigh, NC, USA (2020)*, pp. 1–2. [DOI: 10.1109/SoutheastCon44009.2020.9249649](#).
- 13 Khandakar M Rashid, Songjukta Datta, Amir H Behzadan, and **Raiful Hasan**. “Risk-incorporated Trajectory Prediction to Prevent Contact Collisions on Construction Sites”. In: *Journal of Construction Engineering and Project Management* 8.1 (2018), pp. 10–21. [DOI: 10.6106/JCEPM.2018.8.1.010](#).

Publications Under Review or Preparation

- 1 **Raiful Hasan**, and Ragib Hasan. *Can I Post That?: An Empirical Study of Fingerprint Information Leakage in Social Media*. In preparation.

Peer-Reviewed Poster and Demos

- 1 **Raiful Hasan**, Ragib Hasan and Tanveer Islam. “Smart City Technology for Disaster Management: Demonstrating the Use of Bluetooth Low Energy (BLE) Beacons for Emergency Alert Dissemination”. In: *2022 IEEE 19th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA. IEEE. 2022*, pp. 931–932. [DOI: 10.1109/CCNC49033.2022.9700562](#).
- 2 **Raiful Hasan**, Mohammad Aminul Hoque, Yasser Karim, Russell Griffin, David C Schwebel, and Ragib Hasan. “Streetbit: A Bluetooth Beacon-based Personal Safety Application for Distracted Pedestrians”. In: *Proceedings of 2021 IEEE 18th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA. IEEE. 2022*, pp. 1–2. [DOI: 10.1109/CCNC49032.2021.9369650](#).

Books and Chapters

- 1 **Raiful Hasan**, and Ragib Hasan. “Threat Model and Security Analysis of Video Conferencing Systems as a Communication Paradigm During the COVID-19 Pandemic”. In: *Novel AI and Data Science Advancements for Sustainability in the Era of COVID-19*. Elsevier, 2022, pp. 181–199. [DOI: 10.1016/B978-0-323-90054-6.00009-X](#).
- 2 **Raiful Hasan** and Ragib Hasan. “Bluetooth Low Energy (BLE) Beacon-Based Micro-Positioning for Pedestrians Using Smartphones in Urban Environments”. In: *Precision Positioning with Commercial Smartphones in Urban Environments*. Springer, 2021, pp. 135–149. [DOI: 10.1007/978-3-030-71288-4_6](#).

Selected Research Experience

Dept. of Computer Science, UAB

Mentor: Dr. Ragib Hasan

■ **StreetBit: Context-aware Intervention for Distracted Pedestrians.** [2019-2022]

Funding Source: *National Institutes of Health*

- Developed a Bluetooth beacon-based intervention system for pedestrians that can identify *Smartphone Zombies* at the intersection. A rule-based auto-identification system utilizes BLE, activity recognition, and user status.
- Developed StreetBit mobile application and installed a Testbed at a busy traffic intersection.
- Worked on conducting 10-weeks long study with 437 participants to identify behavioral changes and usability of StreetBit.
- *Faculty Collaborators:* David C. Schwebel (Department of Psychology, UAB), Russell Griffin (Department of Epidemiology, UAB).

■ **InSight: Ad-hoc Emergency Warning System** [2020-2021]

Funding Source: *National Institutes of Health, National Science Foundation*

- Developed BLE beacons and smartphones-based systems to locate and circulate any warning marked by emergency responders without an internet or cellular network.
- Proposed RSSI signal over time-based user direction recognition technique.
- Worked in deployment model, InSight reduces installation time by 20% than the traditional system.
- *Faculty Collaborators:* Tanveer Islam (Dept. of Emergency Management, JSU).

■ **X-Fidence: Density Monitoring with Privacy Preservation** [2021]

Funding Source: *National Institutes of Health, National Science Foundation*

- Developed an automated occupancy monitoring system where ensuring user privacy was the primary focus by anonymizing the data.
- Developed the X-Fidence prototype and demonstrated that the system provides a scalable architecture that has the option to add new places within a city.

■ **Fingerprint Information Leakage in Social Media** [2019-2021]

- Proposed a semi-automated method to extract available finger photos to fingerprint.
- Extracted fingerprint from unconstrained finger photos taken as long as 12 feet distance.
- Identified that it is possible to reveal fingerprint information from certain photos shared on popular social media platforms.

■ **Security Analysis and Threat Modeling** [2020, 2021]

Funding Source: *National Science Foundation*

- Identified and analyzed security and vulnerabilities of V2P and video conferencing system.
- Adopted STRIDE threat modeling to identify threat components and potential attacks.
- Proposed a set of mitigation techniques against vulnerabilities of V2P technology in the 5G era and video conferencing system.

■ **Preemptive Construction Site Safety (PCS2)** [2018]

- Proposed PCS2, an automated system for real-time location tracking, trajectory prediction, and prevention of potential collisions between workers and site hazards.
- PCS2 uses ubiquitous mobile technology for positional data collection and a robust trajectory prediction technique that couples the hidden Markov model (HMM) with risk-taking behavior modeling.

Research Grants

- **NSF-EPSCoR GRSP (AL EPSCoR)** [Round 17]
Alabama Established Program to Stimulate Competitive Research.
Title: *Bluetooth Low Energy Assisted Secure Warning System for Emergency Management*.
Amount: **\$18,750**. [2022 - 23]
- **Sole PI: Sigma Xi, The Scientific Research Honor Society Grants In Aid of Research (GIAR)**
Title: *Drone Assisted Ad-Hoc Public Alert System in Emergency Management*.
Amount: **\$1,000**. [Jan '22 - July '22]
- **NSF-EPSCoR GRSP (AL EPSCoR)** [Round 16]
Alabama Established Program to Stimulate Competitive Research.
Title: *Bluetooth Low Energy Assisted Secure Warning System for Emergency Management*.
Amount: **\$25,000**. [2021 - 22]

Teaching Experience

Department of Computer Science, University of Alabama at Birmingham

- **Guest Lecturer**, Discrete Structures (CS 250) [Spring 2020, Fall 2020]
 - Topic 1: *The Foundations: Logic and Proofs*.
 - Topic 2: *Tree Traversal and Applications of Trees*.
- **Lab Instructor, Cloud Computing Lab (CS 733L)** [Summer 2021]
 - Course Description: A graduate lab teaches basic and advanced features of cloud computing, including Elastic Beanstalk, AWS Lambda, AWS RDS, managing security groups, AWS Cognito, and MapReduce.
 - Number of Students: 77
 - Responsibilities: Conducted lab lectures, held office hours; graded lab and regular assignments.
- **Teaching Assistant, Algorithms and Data Structures (CS 303)** [Fall 2020]
 - Course Description: An undergraduate-level course that teaches techniques for the design and analysis of algorithms and various data structures.
 - Number of Students: 43
 - Responsibilities: Assisted in lab sessions by providing hands-on coding experience using Java and Python.
- **Teaching Assistant, Cloud Computing (CS 733)** [Summer 2020]
 - Course Description: A graduate course that teaches cloud computing architectures and programming paradigms, theoretical and practical aspects of cloud programming.
 - Number of Students: 82
 - Responsibilities: Held regular office hours; graded homework, project, and exams.
- **Teaching Assistant**, Discrete Structures (CS 250) [Fall 2019, Spring 2020, and Spring 2021]
 - Course Description: An undergraduate-level course covers propositional and predicates logic, sets, relations, functions, counting, elementary graph theory, and proof techniques.
 - Number of Students: 78 - 90 (different semester).
 - Responsibilities: Held weekly office hours and assisted students with assignments. Graded assignments and classwork.

Mentorship

Undergraduate Student

- **Boi Lee**, Department of Computer Science, UAB
 - Introduce to the research in computer science, scientific data collection, and programming experience.

High School Student

- **Maisha Iqbal**, Alabama School of Fine Arts Math/Science
 - Project: *Patient monitoring application for telemedicine using Arduino and Android.*
 - Current: Undergraduate Student, Dept. of Software Engineering, Rochester Institute of Technology.







Skills

Languages	■ Java, C, Python, Swift, Kotlin, Shell Programming.
Databases	■ MySQL, SQLite, PostgreSQL, Oracle.
OS	■ Mac OS X, Windows, Linux, Android, iOS.
Protocols	■ SIP, VoIP, Room, OKHTTP, Retrofit, Geofence, NLTK, JSON, XML, REST.
Tools	■ SVN, Git, JIRA.
Framework	■ Tensorflow, Keras, Pytorch, CUDA, OpenMP.

Selected Talks

- Jan '22 ■ *Smart City Technology for Disaster Management: Demonstrating the Use of Bluetooth Low Energy (BLE) Beacons for Emergency Alert Dissemination*, 2022 IEEE 19th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA.
- *X-Fidence: Post-Pandemic Wellness By Density Monitoring with Privacy Preservation*, 2022 IEEE 19th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA.
- Jan '21 ■ *InSight: A Bluetooth Beacon-based Ad-hoc Emergency Alert System for Smart Cities*, 2021 IEEE 18th Annual Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA.
- Dec '20 ■ *BeaCloud: A Generic Architecture for Sustainable Smart City using Bluetooth Beacons*, 2020 IEEE 18th International Conference on Smart City (virtual).
- May '20 ■ *Towards Designing a Sustainable Green Smart City using Bluetooth Beacons*, 2020 IEEE 6th World Forum on Internet of Things (WF-IoT), New Orleans, LA, USA.
- Mar '20 ■ *Smartphone-based Distracted Pedestrian Localization using Bluetooth Low Energy Beacons*, 2020 IEEE SoutheastCon, Raleigh, NC, USA.
- Oct '19 ■ *StreetBit: A Bluetooth Beacon-based Intervention System for Distracted Pedestrians*, 2019 Behavioral Health Research Symposium, UAB.

Leadership Experience and Professional Services

- Feb '2022  **Feature Editor**, XRDS (The ACM's magazine for students)
- 2020 - 2022  **Reviewer**
- IEEE BigData, 2021.
- IEEE Internet of Things Journal, 2021.
- WFIoT, 2021.
- IEEE CCNC, 2021.
- 2018 - Present  **Student Member**
- IEEE Student Member
- ACM Student Member
- 2021 - Present  Associate Member of **Sigma Xi**.
- 2019 - Present  **Senator** of Graduate Student Government at UAB (GSG).
- 2020 - 2022  **Budget Committee Voting Member**, Graduate Student Government at UAB.

References

Available on Request