Raiful Hasan

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Summary

– Ph.D. candidate in Computer Science, NSF GRSP Fellow.
– Research interest: **Cyber-physical systems' security and privacy**, **mobile and wearable computing**, **human-computer interaction**, **Internet of Things**, and **machine learning**, 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), **Sparkman Fellowship** for global health (2022-23), and serving on the editorial board of **ACM XRDS**.
– Teaching experience in core computer science courses for undergraduate and graduate level, expertise in algorithms, data structures, programming, cloud computing, computer security, cloud security, etc.

Education

2019 – Present **Ph.D. in Computer Science, University of Alabama at Birmingham**
Advisor: *Dr. Ragib Hasan*
Dissertation Title: *Data-driven 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*
Expected graduation: **Spring 2023**

June 2012 **B.Sc. in Computer Science & Engineering, University of Dhaka**
Advisor: *Dr. Hafiz Md. Hasan Babu*
Thesis title: *Design a Reversible Fault Tolerant Programmable Array Logic*.

Professional Experience

Aug '21 - Present **NSF GRSP Fellow**
UAB SECRETLab, University of Alabama at Birmingham, Alabama, USA.
Responsibilities: *Research, Mentoring*
Advisor: *Dr. Ragib Hasan*

Jan '19 - July '21 **Graduate Teaching Assistant**
Department of Computer Science, University of Alabama at Birmingham.
Courses Taught: *Cloud Computing, Cloud Security, Computer Security, Algorithms and Data Structures, Discrete Structures.*
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).
- **Awarded Second Place**, IEEE International Conference on Digital Health (ICDH) 2022 student research competition.
- **Sparkman Fellows**, Sparkman Center for Global Health, UAB.
- **Selected as editorial board member** (Feature Editor) of **ACM XRDS**.
  XRDS is the flagship academic magazine for student members of the **Association for Computing Machinery (ACM)**. Issues focus on computer science topics and are published quarterly in both print and electronic forms (circulation ≈50,000).
- **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.
- **Professional Development Grant**, Graduate Student Government, 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 (a2i) and ICT Division of Bangladesh.

2011
- **Merit Scholarship**, Bangladesh Scholarship Council (BSC).

Research Grants

- **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 17]
  Alabama Established Program to Stimulate Competitive Research.
  Title: *Bluetooth Low Energy Assisted Secure Warning System for Emergency Management.*
  Amount: **18,750**. [2022 - 23]
- **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]

Research Publications

Peer-Reviewed Journals

1. **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)*. Vol. 9. 22. [**Impact Factor = 11.043**]. IEEE, 2022, pp. 23017–23030. DOI: 10.1109/JIOT.2022.3187965.
2. **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)*. Vol. 134. [**Impact Factor = 7.307**]. Elsevier, 2022, pp. 187–203. DOI: 10.1016/j.future.2022.03.036.

3. 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*. Vol. 159. [**Impact Factor = 6.376**]. Elsevier, 2021, p. 106253. DOI: 10.1016/j.aap.2021.106253.

4. **Raiful Hasan** and Ragib Hasan. "FinderX: A Bluetooth Beacon-Based System for Designing Sustainable Green Smart Cities". In: *IEEE Consumer Electronics Magazine (IEEE MCE)*. Vol. 11. 1. [**Impact Factor = 4.135**]. IEEE, 2021, pp. 65–72. DOI: 10.1109/MCE.2021.3076290.

Peer-Reviewed Conference Publications

1. **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.

2. **Raiful Hasan** and Ragib Hasan. "RoadNote: Automated Road Closure Detection using Urban Sensing". In: *Proceedings of 2022 IEEE 8th World Forum on Internet of Things (WF-IoT), Yokohama, Japan* (2022). Accepted.

3. **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, Flagship conference in the area of IEEE Future Networks Initiative), Montreal, QC, Canada* (2021), pp. 383–387. DOI: 10.1109/5GWF52925.2021.00074.

4. 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.

5. **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.

6. **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.

7. **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.

8. **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.

9. **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.

10. 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*. 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*. 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

Department of Computer Science, University of Alabama at Birmingham
Mentor: Dr. Ragib Hasan

- **RoadNote: Automated Road Closure Detection using Urban Sensing** [2021-2022]
  Funding Source: *National Science Foundation (NSF), NSF EPSCoR*
  - This research investigates instances where the maps application fails to give accurate data.
  - Evaluated 23 incidents and examined the effect in terms of duration and distances in a 15-day-long observational study.
  - I proposed ROADNote, an automated road closure detection system based on urban sensors. We implemented a proof of concept of ROADNote and assessed the feasibility.

- **StreetBit: Context-aware Intervention for Distracted Pedestrians.** [2019-2021]
  Funding Source: *National Institutes of Health (NIH)*
  - Performed research on 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.
  - Conducted a 10-week long crossover trial 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).

Selected Research Experience (continued)

- **eTrust: Vehicles Pedestrians Interaction, eHMI and Mixed Reality** [2022-Present]
  - Working to develop a platform for patterns of learning strategies of VRUs exposed to AVs in shared traffic space using mixed reality.
  - This study investigates the impact of eHMI design strategy on the long-term effects of VRUs on experience, trust, and acceptance.

- **InSight: Ad-hoc Emergency Warning System** [2020-2021]
  Funding Source: *National Science Foundation (NSF)*
  - Performed research on 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 on 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 (NIH), National Science Foundation (NSF)*
  - Conducted research for 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 (NSF)*
  - Identified and analyzed security and vulnerabilities of V2P communication and video conferencing.
  - 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.

Teaching Experience

Department of Computer Science, University of Alabama at Birmingham

- **Guest Lecturer, Cloud Security (CS 643) [Spring 2021, Fall 2022], Discrete Structures (CS 250)**

  - Topic 1: *Trustworthy Cloud Forensics: Securing E-Discovery, Event Timelines, and the Chain of Custody for Digital Evidence in Clouds.*

  - Topic 2: *Digital Forensics.*

  - Topic 3: *The Foundations: Logic and Proofs.*

  - Topic 4: *Tree Traversal and Applications of Trees.*

Teaching Experience (continued)

- **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.

- **Lab Instructor,** ***Cloud Computing (CS 403)*** [Online]
  - I worked on the lab materials and prepared lecture videos for the **Cloud Computing** lab section. This was an in-person course, and I had an opportunity to assist my supervisor to convert and redesigning it for online.

- **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: Teach lab section, 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 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.

Undergraduate Student

- **Boi Lee**, Department of Computer Science, UAB
  - Project: *Fingerprint information leakage in social media*
  - Undergraduate research experience in scientific data collection, and programming.

Selected Research 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 '22 - Present
- **Feature Editor**, XRDS (The ACM's flagship magazine for students)

May '22 - Present
- **Sparkman Fellow**, at the Sparkman Center for Global Health for the 2022-2023 academic year

2020 - 2022
- **Reviewer**
  - IEEE BigData, 2021, 2022.
  - IEEE Internet of Things Journal, 2021, 2022.
  - 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.