Ahmed Tanvir Mahdad

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Google Scholar | ResearchGate
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Education

- **Texas A&M University** — College Station, Texas, US
  Doctor of Philosophy in Computer Science — *Aug 2021 - Aug 2025 (anticipated)*
  Advisor: Dr. Nitesh Saxena
  Committee Members: Dr. Nitesh Saxena, Dr. Guofei Gu, Dr. Jeyvijayan Rajendran, Dr. Juan Garay

- ***University of Alabama at Birmingham*** — *Birmingham, Alabama, US*
  Doctor of Philosophy in Computer Science — *Aug 2019 - July 2021 (transferred)*
  Advisor: Dr. Nitesh Saxena

- ***Bangladesh University of Engineering and Technology (BUET)*** — *Dhaka, Bangladesh*
  B.S. in Computer Science & Engineering — *Jan 2006 - Feb 2011*

Research Interest

Security of authentication systems, side channel attacks, mobile malwares.

Publications

- **Peer-reviewed Journal**:
  - [**ACM TOPS**] Prakash Shrestha, **Ahmed Tanvir Mahdad**, Nitesh Saxena. *Sound-based Two-factor Authentication: Vulnerabilities and Redesign*, ACM Transactions on Privacy and Security, 27(1), 1-27

- **Peer-reviewed Conference**:
  - [**IEEE S&P 2025**] [Accepted with Shepherding], 2025 IEEE Symposium on Security and Privacy (SP).
  - [**CCS 2024**] **Ahmed Tanvir Mahdad** , Mohammed Jubur, Nitesh Saxena, *"Breaching Security Keys without Root: FIDO2 Deception Attacks via Overlays Exploiting Limited Display Authenticators"*, In proceedings of 2024 ACM SIGSAC Conference on Computer and Communications Security.
  - [**PST 2024**] **Ahmed Tanvir Mahdad** and Nitesh Saxena, *"Mobile Login Bridge: Subverting 2FA and Passwordless Authentication via Android Debug Bridge""*, In the proceedings of 21st Annual International Conference on Privacy, Security, and Trust.
  - [**CCS 2024**] Tianfang Zhang, Qiufan Ji, Zhengkun Ye, Md Mojibur Rahman Redoy Akanda, **Ahmed Tanvir Mahdad** Cong Shi, Yan Wang, Nitesh Saxena, and Yingying Chen. *"SAFARI: Speech-Associated Facial Authentication for AR/VR Settings via Robust VIbration Signatures"*, In proceedings of 2024 ACM SIGSAC Conference on Computer and Communications Security.
  - [**CCS 2023**] Tianfang Zhang, Zhengkun Ye, **Ahmed Tanvir Mahdad**, Md Mojibur Rahman Redoy Akanda, Cong Shi, Yan Wang, Nitesh Saxena, and Yingying Chen, *"FaceReader: Unobtrusively Mining Vital Signs and Vital Sign Embedded Sensitive Info via AR/VR Motion Sensors"*, In 2023 ACM SIGSAC Conference on Computer and Communications Security (pp. 446-459).
  - [**Mobicom 2023**] **Ahmed Tanvir Mahdad** , Mohammed Jubur, Nitesh Saxena, *"Breaking Mobile Notification-based Authentication with Concurrent Attacks Outside of Mobile Device"*, 29th Annual International Conference on Mobile Computing and Networking. pp. 1-15. 2023
  - [**ICDCS 2023**] **Ahmed Tanvir Mahdad**, Cong Shi, Zhengkun Ye, Tianming Zhao, Yan Wang, Yingying Chen and Nitesh Saxena, *"EmoLeak: Smartphone Motions Reveals Emotions"*, In the proceedings of 43rd IEEE International Conference on Distributed Computing Systems (pp. 316-326). IEEE.
  - [**Wisec 2023**] **Ahmed Tanvir Mahdad** and Nitesh Saxena, *"SoK: A Comprehensive Evaluation of 2FA-based Schemes in the Face of Active Concurrent Attacks from User Terminals"*, In the proceedings of 16th ACM Conference on Security and Privacy in Wireless and Mobile Networks, pp. 175-186. 2023

- [**ICDCS 2022**] Cong Shi, Tianming Zhao, Wenjin Zhang, **Ahmed Tanvir Mahdad** , Zhengkun Ye, Yan Wang, Nitesh Saxena and Yingying Chen, *"Defending against Thru-barrier Stealthy Voice Attacks via Cross-domain Sensing on Phoneme Sounds"*, In the proceedings of 42nd IEEE International Conference on Distributed Computing System. pp. 680-690. IEEE, 2022.
- [**ICICS 2021**] **Ahmed Tanvir Mahdad** , Mohammed Jubur, Nitesh Saxena, *"Analyzing the Security of OTP 2FA in the Face of Malicious Terminals"*, 23rd International Conference on Information and Communication Security. Proceedings, Part I 23, pp. 97-115. Springer International Publishing, 2021.

- **Other Peer-reviewed publications**:

1. [**MobiHoc 2023**] Tianfang Zhang, Zhengkun Ye, **Ahmed Tanvir Mahdad**, Md Mojibur Rahman Redoy Akanda, Cong Shi, Yan Wang, Nitesh Saxena, and Yingying Chen, *"Poster: Unobtrusively Mining Vital Sign and Embedded Sensitive Info via AR/VR Motion Sensors"*, In proceedings of the 24th International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing. pp. 308-309. 2023.
2. [**MobiSys 2022**] Tianming Zhao, Zhengkun Ye, Tianfang Zhang, Cong Shi, **Ahmed Tanvir Mahdad**, Yan Wang, Yingying Chen, Nitesh Saxena, *"Poster: Continuous Blood Pressure Monitoring Using Low-cost Motion Sensors on AR/VR Headsets"*, In proceedings of the 20th ACM International Conference on Mobile Systems, Applications, and Services. pp. 589-590. 2022

- **Pre-prints**:

1. [**ArXiv**] **Ahmed Tanvir Mahdad**, Cong Shi, Zhengkun Ye, Tianming Zhao, Yan Wang, Yingying Chen and Nitesh Saxena, *"Earspy: Spying caller speech and identity through tiny vibrations of smartphone ear speakers"*, arXiv preprint arXiv:2212.12151 (2022)

Research Experience

- **Texas A&M University** — College Station, Tx
  Graduate Assistant- Research — *Sep 2021 - Current*
  - **Robocall Detection from Smartphone Induced Vibration**: In this study, our primary focus was on developing an effective robocall detection system using smartphone speaker-induced vibrations. We utilized this vibration data to construct an adaptive longitudinal model, enhancing the system's ability to effectively deter robocalls.
  - **Emotion Detection From Motion Sensor of Smart Devices**: Our study examined the use of smart devices' built-in speaker-induced vibrations to detect the emotions of the speaker. We implemented this technique as a side-channel attack, which allows an adversary to eavesdrop on the speaker's emotions, potentially enabling them to access the user's private information, including healthcare data.
  - **Investigation into ear speaker-induced vibration on smartphone motion sensors and eavesdropping possibility**: This study investigates the impact of the powerful ear speaker vibrations found in recent smartphones on the device's built-in security measures. Specifically, we explore the potential for eavesdropping through the extraction of speech and speaker-related information.
  - **Assessing the Security of Push Notification Authentication Systems**: This work aims to assess the security of push notification authentication systems against malicious entities originating from the user terminal. To evaluate the system, we designed various attacks and conducted a user study to test our hypothesis.
  - **Assessing the Security of FIDO2 key-based authentication system in the presence of malware in terminal:**: We analyzed the workflow of FIDO2 components, including WebAuthn and CTAP2, and developed a new attack framework to compromise FIDO2 key-based authentication systems. Additionally, we developed a proof-of-concept system and conducted a user study to evaluate its practicality and stealthiness.
  - **Systematization of Academic Authentication Systems from Last 15 years:**: We systematically analyzed Academic Authentication Systems proposed in the last 15 years and assessed their potential vulnerabilities in the presence of malicious entities on the user terminal.
- **The University of Alabama at Birmingham** — Birmingham, AL
  Graduate Research Assistant — *August 2019 - August 2020*
  - **Analysis of security of OTP-2FA in the face of malicious terminals:**: We conducted a security analysis of One-Time PIN (OTP) systems, which are designed to prove possession of other entities, such as a smartphone or phone number, in the presence of malicious entities on the user terminal. We analyzed OTP-2FA systems deployed by major service providers and demonstrated how adversaries can take control of user accounts without compromising the 2FA devices, such as smartphones.

- **Evaluating the Security of Smartphone-Based 2FA Systems in the Presence of Android Debug Bridge (ADB) Vulnerabilities**: We developed an attack framework that leverages well-known Android Debug Bridge (ADB) vulnerabilities to evaluate the security of recently deployed state-of-the-art 2FA systems that use smartphones as a 2FA device.

Teaching Experience

- **Texas A&M University** College Station, TX
  Voluntary Teaching Assistant *January 2022 - December 2022*
  - **CSCE 689 - Secure Authentication System**: As a voluntary teaching assistant, I was responsible for grading assignments and evaluating reports..
  - **CSCE 689 - Network Security**: As a voluntary teaching assistant, I was responsible for grading the assignments, mid-term and final examinations.
- **The University of Alabama at Birmingham** Birmingham, AL
  Graduate Teaching Assistant *August 2020 - August 2021*
  - **CS 743 - Cloud Security**: As a teaching assistant, my responsibilities included assisting students with lab assignments, grading assignments, and providing weekly lectures. I demonstrated sample projects that utilized AWS implementations and provided guidance to students during the development of their final projects.
  - **CS 689 - Cyber Risk Management:**: As part of my responsibilities for this course, I graded assignments and projects and provided assistance to students in preparing their reports.

Services

- **Reviewer**:
  1. ACM Transactions on Privacy and Security (2022, 2024)
  2. IEEE Transactions on Mobile Computing (2022, 2023)
  3. IEEE Transactions on Dependable and Secure Computing (2022)
  4. Springer Mobile Networks and Applications (2021, 2023)
- **Sub-reviewer**:
  1. International Conference on Information and Communications Security (ICICS) (2020, 2021)
  2. 7th IEEE European Symposium on Security and Privacy (Euro S&P) (2022)
  3. 20th International Conference on Applied Cryptography and Network Security (ACNS) (2022)
  4. IEEE Conference on Communications and Network Security (CNS) (2021)
  5. ACM The Web Conference (WebConf) (2020, 2021)
  6. Annual Computer Security Applications Conference (ACSAC) (2023)
  7. 30th ACM Conference on Computer and Communications Security (CCS) (2023)

Student Mentoring

- Krishna Kushal [Master's Student, Texas A&M University] (Spring 2023)
- Sidharth Anil [Master's Student, Texas A&M University] (Spring 2023)
- Samuel Shteyman [Undergraduate Student, Texas A&M University] (Spring 2022)
- Rituparna Mandal [Master's Student, Texas A&M University] (Fall 2023)
- Brandon Shim [Undergraduate Student, Texas A&M University] (Summer 2024)

Selected Media Coverages

- [Texas A&M Today]Researchers Hack Android Smartphones, Find A Security Risk
- [Texas A&M Engineering]Research hack reveals call security risk in smartphones
- [Android Headlines]EarSpy can spy on your phone calls by using motion sensors
- [Android Police]EarSpy can eavesdrop on your phone conversations using motion sensors
- [SecurityWeek]EarSpy: Spying on Phone Calls via Ear Speaker Vibrations Captured by Accelerometer
- [BleepingComputer]EarSpy attack eavesdrops on Android phones via motion sensors

Industry Experience

- **TigerIT Bangladesh Limited** Dhaka, BD
  Principal Software Engineer *February 2014 - July 2019*
  - **Design**: Design and Manage Testing Plan for Different Projects
  - **Security Testing**: I was also responsible of designing and executing security testing for multiple products.
  - **Communication**: Communicate with clients and stakeholders and manage requirements and evaluate changes
  - **Development**: I was responsible of developing testing frameworks for different projects and specific requirements.

- **Therap Services, LLC** Dhaka, BD
  Senior Software Engineer *February 2011 - January 2024*
  - **Requirement Analysis**: I was responsible for requirement analysis and design testing plan
  - **Security and Usability Testing**: I designed security and usability testing according to the requirement and execute them using our designed automation program and tools.

Extra Curricular Activities

- Member of Dimension 5, Finalist, Bangladesh Grand Finale, The HSBC Young Entrepreneur Awards 2008-09
- Member, Rover Scout, BUET, Dhaka, Bangladesh

Professional Memberships

- Association for Computing Machinery (ACM) (2022 - present)