

T M TARIQ ADNAN

Researcher in Healthcare Analytics

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Summary

As a PhD student at the University of Rochester, I work on multimodal learning for AI-driven healthcare. I develop scalable video- and audio-based models for automated screening and personalized management of Parkinsons disease (PD), enabling remote and accessible assessments. Building on these digital biomarkers, I design safety-aligned LLM assistants that contextualize symptom trends, medication history, and lifestyle factors to support individualized, continuous care. By integrating calibrated multimodal models with longitudinal tracking and LLM-driven personalization, my work aims to shift PD care from episodic clinical visits to continuous, at-home, data-guided support.

Work Experience

- **University of Rochester** Rochester, NY, USA
Graduate Research Assistant, Department of CS, UofR August 2022 – Present
- **Bangladesh University of Engineering and Technology (BUET)** Dhaka, Bangladesh
Assistant Professor (on-leave), Department of CSE, BUET May 9, 2021 – August 2022
- **Bangladesh University of Engineering and Technology (BUET)** Dhaka, Bangladesh
Lecturer, Department of CSE, BUET July 3, 2018 – May 8, 2021

Publications

- **Tariq Adnan**, Md Saiful Islam, Sangwu Lee, Wasifur Rahman Chowdhury, Sutapa Dey Tithi, Kazi Noshin, Md Rayhanul Islam, Imran Sarker, M. Saifur Rahman, Ruth B. Schneider, Jamie L. Adams, E. Ray Dorsey, and Ehsan Hoque, Ph.D. “*AI-Enabled Parkinsons Disease Screening Using Smile Videos*”. NEJM AI, Volume 2, Issue 7, Article: AIoa2400950 (2025). [\[Paper\]](#) [\[Code\]](#)
- **Tariq Adnan**, Abdelrahman Abdelkader, Zipei Liu, Ekram Hossain, Sooyong Park, Md Saiful Islam, Ehsan Hoque. “*A Novel Fusion Architecture for Detecting Parkinsons Disease Using Semi-Supervised Speech Embeddings*”. npj Parkinson’s Disease, Volume 11, Issue 1, Article 176 (2025). [\[Paper\]](#) [\[Code\]](#)
- Md Saiful Islam, **Tariq Adnan**, Jan Freyberg, Sangwu Lee, Abdelrahman Abdelkader, Meghan Pawlik, Cathe Schwartz, Karen Jaffe, Ruth B. Schneider, Ray Dorsey, et al. “*Accessible, At-Home Detection of Parkinsons Disease via Multi-Task Video Analysis*”. Proceedings of the AAAI Conference on Artificial Intelligence, Volume 39, Number 27, pp. 28125–28133 (2025). [\[Paper\]](#) [\[Code\]](#)
- **Tariq Adnan**, Md Saiful Islam, Abdelrahman Abdelkader, Zipei Liu, Evelyn Ma, Sooyong Park, Asif Azad et al. “*Remote AI Screening for Parkinsons Disease: A Multimodal, Cross-Setting Validation Study*.” Research Square (2025): rs-3. [\[Paper\]](#) [\[Code\]](#)
- Masum Hasan, Cengiz Ozel, Nina Long, Alexander Martin, Samuel Potter, **Tariq Adnan**, Sangwu Lee, Amir Zadeh, Ehsan Hoque. “*Hi5: 2D Hand Pose Estimation with Zero Human Annotation*”. Proceedings of the International Conference on Affective Computing and Intelligent Interaction (ACII), to appear (2025). [\[Paper\]](#)
- Wasifur Rahman, Abdelrahman Abdelkader, Sangwu Lee, Phillip Yang, Md Saiful Islam, **Tariq Adnan**, Masum Hasan, Ellen Wagner, Sooyong Park, E Ray Dorsey, Catherine Schwartz, Karen Jaffe, Ehsan Hoque. “*A User-Centered Framework to Empower People with Parkinson’s Disease*”. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Volume 7, Issue 4, Article No.: 175, pp 129 (2023). [\[Paper\]](#)
- **TM Tariq Adnan**, Md Mehrab Tanjim, and Muhammad Abdullah Adnan. “*Fast, scalable and geo-distributed PCA for big data analytics*”. Information Systems, Elsevier, Volume 98, Article 101710, May 2021. [\[Paper\]](#) [\[Code\]](#)
- **TM Tariq Adnan**, Md. Saiful Islam, Tarikul Islam Papon, Sourav Kumar Nath, Muhammad Abdullah Adnan. “*UACD: A Local Approach for Identifying the Most Influential Spreaders in Twitter in a Distributed Environment*”. Social Network Analysis and Mining, Volume 12, Issue 1, pp 37 (2022). [\[Paper\]](#)

Research Experience

- **Personalized LLM Assistant for PD Management (In Progress)**
 - Design safety-aligned LLM agent contextualizing severity trends, medication logs, and lifestyle factors.
 - Apply prompt engineering and preference-based alignment methods (RLHF, DPO) for personalization, factual grounding, and reduced hallucination.
 - Support continuous, at-home guidance layered on multimodal digital biomarkers for individualized care.
- **Multimodal Digital Biomarkers for Longitudinal PD Severity Prediction (In Progress)**
 - Model kinematic, acoustic, and facial features to estimate MDS-UPDRS Part III severity.
 - Align digital severity trajectories with medication ON/OFF states and self-reported symptom burden.
 - Integrate calibrated severity outputs into LLM-based assistants for personalized monitoring.
- **PARK: Remote Multimodal AI Screening for PD (Under Review, Nature Communications Med.)**
 - Contributed to a multimodal screening tool using webcam video and speech from 1,865 participants across diverse settings.
 - Demonstrated cross-setting generalization with AUROC up to 0.87 and high user satisfaction in unsupervised use.
 - Benchmarked against movement disorder specialists, showing aligned predictive performance and scalable deployment potential.
- **Accessible, At-Home Detection of Parkinsons Disease via Multi-task Video Analysis (AAAI, 2025)**
 - Built the first large-scale, multi-task PD video dataset (3,306 videos; 845 participants).
 - Developed *UFNet*, a multimodal fusion model achieving 93% AUROC on subject-held-out cohorts.
 - Enabled remote PD screening using only webcam and microphone; released public demo for usability.
- **AI-Driven Screening for Parkinson’s Disease Using Facial Micro-Expressions (NEJM AI, 2025)**
 - Designed a facial micro-expression model for PD detection, achieving 88% accuracy.
 - Built and validated a dataset of 1,452 participants across international clinical cohorts.
- **A Novel Fusion Architecture for PD Detection Using Semi-Supervised Speech Embeddings (npj Parkinson’s Disease, 2025)**
 - Created a speech-based PD screening framework using pangram utterances from 1,306 participants.
 - Developed a multimodal fusion model using Wav2Vec2 & ImageBind achieving 89% AUROC and 86% accuracy.
 - Validated robustness across external datasets, supporting global deployment.
- **Hi5: Zero Human Annotation for 2D Hand Pose Estimation (To appear, ACII 2025)**
 - Generated 583K synthetic hand images without annotation via physics-based rendering.
 - Models trained on Hi5 outperform real-data benchmarks under occlusion & perturbation.
 - Enables scalable motion capture for digital health, AR/VR, and hand-gesture interfaces.
- **Digital Biomarkers for Predicting PD Severity in LRRK2 Carriers (Collaborative Study)**
 - Investigated motor features in LRRK2 carriers to differentiate PD, prodromal PD, and non-carriers.
 - Evaluated potential for early identification of genetic risk using accessible digital measures.
- **User Study on an Empowering Framework for PD Screening and Resource Provision (IMWUT, 2024)**
 - Evaluated user reactions to AI-driven screening results and communication strategies.
 - Demonstrated increased autonomy and community acceptance for remote PD screening tools.
- **UACD: Identifying Influential Spreaders in Twitter at Scale (SNAM, 2022)**
 - Built a distributed influence detection algorithm integrating user & network signals.
 - Achieved 12.5% higher accuracy and 175× faster execution compared to baselines on EC2.
- **Fast, Scalable, and Geo-Distributed PCA for Big Data Analytics (Information Systems, 2021)**
 - Developed a communication-efficient PCA algorithm handling 10× higher dimensionality in 2.9× less time.
 - Enabled scalable analysis across geo-distributed environments.

Education

- **University of Rochester**
Ph.D. in CS (AI in Healthcare; in progress) • M.Sc. in CS (4.0/4.0)
Rochester, NY, USA
Aug 2022 – Present
- **Bangladesh University of Engineering and Technology (BUET)**
M.Sc. in CSE (3.92/4.0) • B.Sc. in CSE (3.95/4.0; ranked 3rd of 150)
Dhaka, Bangladesh
Oct 2013 – Feb 2021

Press Coverage

- **MobiHealthNews (2025):** [Videotaped facial expressions used to screen for Parkinsons disease](#)
- **Newsweek (2025):** [Smart Speakers Like Alexa and Google Assistant Could Tell if You Have Parkinsons](#)
- **WXXI News (2025):** [An AI-powered tool analyzes speech to screen for Parkinson's](#)
- **UR Newscenter (2025):** [Can Amazon Alexa or Google Home help detect Parkinson's?](#)
- **Parkinsons News Today (2025):** [AI speech analysis detects subtle signs of Parkinsons](#)

Awards and Activities

- **Best Poster Award** Conference on Future of Parkinsons Disease (2023)
- **Member of Organizing Committee** International Conference on Networking Systems and Security ([NSysS](#)), organized by Department of CSE, BUET (2018–2021)
- **Coach** BUET International Collegiate Programming Contest (ICPC) Teams (2018–2021)
- **Paper Review** CHI 2024 Late-Breaking Work, CHI 2026, IMWUT 2026

Technical Skills

- **Programming Languages:** Python (primary), C/C++, Java, R, SQL, Bash
- **ML & Deep Learning:** Multimodal ML (vision/speech), Longitudinal modeling, Digital biomarkers, Model calibration & uncertainty estimation, Explainability (SHAP), LLM prompting and preference optimization (DPO, RLHF)
- **Frameworks & Libraries:** PyTorch, TensorFlow/Keras, HuggingFace Transformers, PyTorch Lightning, ONNX, scikit-learn, FastAPI, LangChain
- **Computer Vision & Speech:** MediaPipe (hands/face), OpenFace (FAUs), OpenPose, OpenCV, Wav2Vec2, WavLM, MFCC/SSL-based speech embeddings
- **Distributed Systems & Data:** Apache Spark, Hadoop MapReduce, PostgreSQL, Pandas, NumPy
- **Deployment & DevOps:** Docker, REST APIs, Git, Linux, Container-based model serving, AWS EC2/GPU
- **Hardware & Prototyping:** Arduino, Raspberry Pi, IMU/BLE sensing (working knowledge)

References

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- **Earl Ray Dorsey, M.D.**
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