# Sheraz Hassan

sherazhassan358@gmail.com sh3r4zhassan sh3r4zhassan +1 404-966-1761

## Education

**Georgia Institute of Technology, Atlanta, GA** **Aug 2023 – Present**
*PhD in Computer Science*
*Relevant Courses: Machine Learning, Computer Vision, Deep Learning, Theoretical Machine Learning, Health Sensing*

**Lahore University of Management Sciences, Lahore** **Sep 2017 – May 2021**
*Bachelors in Electrical Engineering*
*Relevant Courses: Machine Learning, Deep Learning, Applied Probability, Principles and Techniques of Data Science*

## Work Experience

**Georgia Institute of Technology** | *Graduate Research Assistant* **Aug 2023 – Present**

- Utilizing resource-efficient machine learning and deep learning solutions for biomedical signals and low-cost hardware at the edge.
- Designing low-cost wearable computing hardware, showcasing expertise in sensor integration, system design, and programming microcontrollers for health monitoring and interventions.

**Smart Data Systems and Applications Laboratory (SDSA)** | *Research Assistant* **Jun 2021 – Jul 2023**

- Engineered an affordable healthcare device and a real-time human activity sensing system, while also implementing deep learning models for data analysis and post-processing.
- Led cross-functional teams in designing ML models for diverse applications, including taxi demand prediction, robust heart rate estimation, noise cancellation, and environmental sound classification.

**Students as Co-Researchers (ScR) Program** | *Co-Researcher* **Jul 2020 – Sep 2020**

- Explored healthcare applications of Photoplethysmography (PPG), emphasizing its potential in wearable health technologies.
- Improved heart rate estimation accuracy by mitigating motion artifacts in PPG signals.

## Projects

**STEF-DHNET** | *Python, Tensorflow, Pytorch, Folium, CNN, LSTM, Time Series Data*

- Developed a grid-based deep learning model, merging Long Short Term Memory (LSTM) and Convolutional Neural Networks (CNN), to forecast ride-hailing service demand and supply, incorporating external variables.
- Deployed the model for a multinational ride-hailing platform, while the research paper is presently under review.

**Does the plate look correct?** | *Python, CV, YOLOv8*

- Retrained the state-of-the-art YOLOv8 for precise segmentation and classification of food items on a plate.
- Developed an end-to-end app for a restaurant QA table, matching plate items with menu items for a similarity score.

**RKF and Extreme Learning Machines** | *MATLAB, Python, Kalman Filters, Extreme Learning Machines*

- Presented a novel approach for heart rate estimation from PPG signals suitable for real-time processing in wearable devices.
- Achieved the lowest computational cost among state-of-the-art algorithms, laying the foundation for a research paper.

**TinyML Benchmarking for Edge Deployment** | *Python, TensorFlow, TFLite Micro, CNN, MobileNet, QAT, PTQ*

- Designed a standardized benchmarking for TinyML using image classification and wake-word detection tasks on microcontrollers.
- Optimized lightweight models via quantization techniques, achieving significant size reduction with minimal accuracy tradeoff.

**Smart Doorbell System with TinyML** | *Python, TensorFlow, Multitenant Models, Knowledge Distillation, Vision & Audio ML*

- Designed a smart system on Nano BLE that detects people via image classification and responds to a "gate open" command.
- Deployed models for real-time image and audio inference, using knowledge distillation to compress the image classifier for high accuracy with minimal memory footprint.

**Sound Classification** | *Python, MATLAB, TensorFlow, tkinter, Simulink, log mel spectrogram, CNN*

- Implemented a Deep CNN model that uses log mel spectrogram for environmental sound classification.
- Deployed a user-friendly graphical user interface for sound input and real-time cancellation after classification.

**Robustness of Heart Rate Estimation** | *Python, Pytorch, Adversarial Attacks, Regularization*

- Assessed the vulnerability of state-of-the-art heart rate estimation algorithms, like CorNet, to adversarial attacks.
- Implemented a curvature regularization solution enhancing model robustness against ML attacks such as FGSM and CW.

## Skills

**Programming Languages**: Python, C/C++, MATLAB, R, SQL, LaTeX

**Softwares**: Jupyter Notebook, Colab, VS Code, Arduino IDE, MiKroC, STM32CUBE IDE, nRFgo Studio, QT Designer, Eagle, Autodesk Fusion360, PIC C, Keil MicroVision

**Packages**: Keras, Tensorflow, Pytorch, Scikit-Learn, NumPy, SciPy, Pandas, Folium, BeautifulSoup, Matplotlib, OpenCV, Zephyr

## Teaching Experience

**Georgia Institute of Technology**
**Artificial Intelligence** | *Graduate Teaching Assistant* **Jan 2024 – Present**
Collaborating with Dr. Thad Starner and Thomas Ploetz in managing a class of over 900 students along with creating assignments, holding office hours, and addressing student concerns.