Khondker Fariha Hossain

Linkedin: Khondker Fariha Hossain
Personal Website: Fariha

Email : khondkerfarihah@nevada.unr.edu
Mobile : +1-775-229-0515

Education

- **University of Nevada, Reno** — Reno, NV, USA
  Ph.D. in Computer Science & Engineering — *Jan 2021 - Present*
- **University of Nevada, Reno** — Reno, NV, USA
  Master of Science in Computer Science & Engineering — *Jan 2021 - Dec 2022*
- **Deakin University** — Melbourne, VIC, Australia
  Master of Data Science — *Mar 2019 - Dec 2020*
- **BRAC University** — Dhaka, Bangladesh
  Bachelor of Science in Computer Science & Engineering — *April 2013 - Aug 2017*

Skills

- **Programming Languages:**: Python, R, C++, Bash (Shell Scripting), Matlab, Git, SQL.
- **Imaging Expertise:**: X-rays, Mammograms, OCT, Fundus, Fluorescein Angiography, MRI, PET, CT, Ultrasound.
- **Libraries & Programs**: NumPy, PyTorch, Monai, OpenCV, Tensorflow, Keras, Scikit-learn, Pandas, Caffe, CoreML,Streamlit, Spark, Tensorboard
- **Systems & Cloud-computing**: Slurm, Linux OS, Singularity.

Work Experience

- **University of Nevada, Reno** — Reno, NV
  Graduate Research Assistant - Prof. Alireza Tavakkoli — *January 2021 - Present*
  - **Space-associated Neuroocular Syndrome (SANS)**: Developed a Super-resolution Transformer based model for identifying SANS degenerative disease in astronauts. **Funded by NASA Grant No. 80NSSC20K1831**.
    Tools: PyTorch, Pandas, NumPy, Monai, OpenCV.
    Codes: Swin-FSR
  - **Adversarial Attack Detection and Mitigation**: Developed two novel generative adversarial networks for adversarial attack detection in ECG. Also, developed a Game theoretical strategy, implemented with convolutional neural network to mitigate adversarial attack
    Tools: Tensorflow-keras, NumPy, Keras, OpenCV
    Codes: ECG-Adv-GAN, ECG-ATK-GAN
  - **Concussion Detection using Virtual Reality**: Collaborating with Neuromechanics Lab to develop a system using Virtual Reality that can detect concussions.
    Tools: Tensorflow-keras, Numpy, Pandas.
  - **2D and 3D Medical Image Segmentation**: Developed a novel Swin-Transformer-based architecture for benign and malignant breast micro-mass segmentation from MRI and Ultrasound images, achieving 3-4% improvement over current state-of-the-art. Also, developed a attention-based Swin-Transformer with feature-similarity loss for 3D OCT fluid segmentation.
- **Ford Motor Company** — Melbourne, Australia
  Artificial Intelligence/Machine Learning Engineer Intern — *Aug 2020 - Oct 2022*
  - **Hierarchical Graphical Network**: Worked as a Team Lead(interns) to create a hierarchical Graphical Network of organization Members using Graphical Neural Network
    Tools: Tensorflow, Pandas, Matploblib, NumPy.
  - **Visualization of analysis**: Implemented "Streamlit" for the dynamic visualization of the Machine Learning Model and the Graphical Network.
    Tools: Tensorflow, Pandas, Matploblib, NumPy.
  - **Research in "Oracle Digital Assistance"** : Created Report on "Oracle Digital Assistance" to create an Economic and Organizational suitability report emphasizing the Policy Maker and Technical perspective.
- **Kyoto Engineering and Automation Ltd.** — Software Engineer Intern
  Software Engineer Intern — *Oct 2017 - Dec 2017*
  - **Organizational Software**: Built Worked in 2 Software(Private)
    Tools: Platform : .NET ; Language : C#.
  - **Microsoft SQL Server**: Designed and implemented in the Company's Software(Private)
    Tools: MySQL.

Selected Publications

- [**C1**]: **Khondker Fariha Hossain**, Sharif Amit Kamran, Joshua Ong, Andrew G. Lee and Alireza Tavakkoli Revolutionizing Space Health (Swin-FSR): Advancing Super-Resolution of Fundus Images for SANS Visual Assessment Technology, *26th International Conference on Medical Image Computing and Computer Assisted Intervention(MICCAI)2023*
- [**C2**]: Sharif Amit Kamran, **Khondker Fariha Hossain** (*equal contribution*), Alireza Tavakkoli, George Bebis, Sal Baker, SWIN-SFTNet: Spatial Feature Expansion and Aggregation using Swin Transformer For Whole Breast micro-mass segmentation, 2022, *20th IEEE International Symposium on Biomedical Imaging,(ISBI)2023*
- [**C3**]: **Khondker Fariha Hossain**, Sharif Amit Kamran, Alireza Tavakkoli, Xingjun Ma, ECG-ATK-GAN: Robustness Against Adversarial Attacks on ECGs Using Conditional Generative Adversarial Networks, 2022, *Applications of Medical Artificial Intelligence, MICCAI 2022*
- [**C4**]: **Khondker Fariha Hossain**, Sharif Amit Kamran, Alireza Tavakkoli, Lei Pan, Xingjun Ma, Sutharshan Rajasegarar, Chandan Karmaker ECG-Adv-GAN: Detecting ECG Adversarial Examples with Conditional Generative Adversarial Networks, 2021, in *20th IEEE International Conference on Machine Learning and Applications (ICMLA)*
- [**C5**]: **Khondker Fariha Hossain**, Sharif Amit Kamran, Prithul Sarker, Philip Pavilionis, Isayas Adhanom, Nicholas Murray, Alireza Tavakkoli Virtual-Reality based Vestibular Ocular Motor Screening for Concussion Detection using Machine-Learning, 2022, *ISVC 2022: Advances in Visual Computing*
- [**C6**]: **Khondker Fariha Hossain**, Alireza Tavakkoli, Shamik Sengupta,A Game Theoretical vulnerability analysis of Adversarial Attack,*ISVC 2022: Advances in Visual Computing*
- [**C7**]: Sharif A. Kamran, **Khondker F. Hossain**, Alireza Tavakkoli, Stewart L. Zuckerbrod, and Salah A. Baker, Feature Representation Learning for Robust Retinal Disease Detection from Optical Coherence Tomography Images, in *MICCAI 2022.*
- [**C8**]: Sharif A. Kamran, **Khondker F. Hossain**, Alireza Tavakkoli, Stewart L. Zuckerbrod, and Salah A. Baker, VTGAN: Semi-supervised Retinal Image Synthesis and Disease Prediction using Vision Transformers, in *ICCV 2021.*
- [**C9**]: Sharif A. Kamran, **Khondker F. Hossain**, Alireza Tavakkoli, Stewart L. Zuckerbrod, Kenton M. Sanders and Salah A. Baker, RV-GAN: Segmenting Retinal Vascular Structure in Fundus Photographs Using a Novel Multi-scale Generative Adversarial Network, in *MICCAI 2021.*
- [**C10**]: Sharif A. Kamran,**Khondker F. Hossain**, Alireza Tavakkoli, Stewart L. Zuckerbrod, Attention2AngioGAN: Synthesizing Fluorescein Angiography from Retinal Fundus Images using Generative Adversarial Networks, in *ICPR 2020.*
- [**J1**]: Sharif A. Kamran, Alireza Tavakkoli, **Khondker F. Hossain** and Stewart L. Zuckerbroad [*Equal Contribution*] A Novel Deep Learning Conditional Generative Adversarial Network for Producing Angiography Images from Retinal Fundus Photographs, 2021, *Scientific Reports, Nature.*

Honors and Awards

- Awarded with Doctoral Research in Innovation, Vision and Excellence(Nevada Drive Scholar) for 2023-2024.
- CSE graduate student out of 4,000+ students to receive UNR Graduate Dean's Merit Scholarship for 2021-2022.
- Received Outstanding International Graduate Student Award Spring'22 and Fall'22 by University of Nevada, Reno.
- Received Institutional Methodology Grant in January 2021, 2022

Academic Services

- **Graduate Mentor**: US Army Educational Outreach Program, Summer'21, Summer'23.
- **Teaching Assistant**:
  - CS791: Mass Detection in Mammograms, Spring'22
  - Course: CS 302- Data Structure, Fall'22
  - Course: CPE 201- Digital Design, Spring'21'23,Fall'21
- **Instructor**: GRAD -778
  - Documentation and Communication (Overleaf)
  - Source Version Control and Visualization
  - Classification with Deep Architectures
  - Segmentation with Deep Architectures

References

- **Dr. Alireza Tavakkoli**
  Associate Professor, Department of Computer Science and Engineering
  University of Nevada, Reno, NV, 89557
  Email: tavakkol@unr.edu