

FARIA HUQ

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RESEARCH INTEREST

- AI for accessibility
- Human-in-the-loop Software Assistance

I am interested in improving accessibility and usability of modern user interfaces. Inspired by the principle of "Design for everyone", I investigate to promote universal interfaces that benefit all users, eliminating the need for different interfaces catering to specific target groups. To achieve this, I apply my expertise in Machine Learning, Natural Language Processing, Computer Graphics, and Vision to develop novel methods of interaction. Most recently, I have been focusing on the realm of websites and mobile apps to accommodate such affordance.

EDUCATION

- **Doctor of Philosophy** August '22 - Present
🏛 : School of Computer Science, Carnegie Mellon University
Supervisors : [Prof. Jeff Bigham](#) & [Prof. Nikolas Martelaro](#)
- **Bachelor of Science in Computer Science and Engineering** 2016 - 2021
🏛 : Bangladesh University of Engineering and Technology, Dhaka
(Academic Session Delay due to COVID-19 pandemic)
Thesis Dissertation: Review4Repair: Code Review Aided Automatic Program Repairing

PUBLICATIONS & PREPRINTS

1. *graphiti: Sketch-based Graph Analytics for Images and Videos*.
N. Saquib, **F. Huq**, S. A. Haque. **Accepted** at CHI 2022 (direct accept, rate: 12.5%), ([doi](#))
2. *Review4Repair: Code Review Aided Automatic Program Repairing*.
F. Huq, M. Hasan, M.A.H. Haque, S. Mahbub, A. Iqbal, T. Ahmed. **Published** in Information and Software Technology, 2021 ([doi](#))
3. *A Tale on Abuse and Its Detection over Online Platforms, Especially over Emails: From the Context of Bangladesh*.
I. Haque, R. Adnin, S. Afroz, **F. Huq**, S. Mahbub, A. B. M. Islam. **Published** in NSysS 2021 (acceptance rate: 16.67%), ([doi](#))
4. *Riemannian Functional Map Synchronization for Probabilistic Partial Correspondence in Shape Networks*.
F. Huq, A. Dey, S. Yusuf, D. Bazazian, T. Birdal, N. Miolane. ([ArXiv 2111.14762](#)), ([blog](#))
5. *Static and Animated 3D Scene Generation from Free-form Text Descriptions*. **F. Huq**, N. Ahmed, A. Iqbal. ([ArXiv 2010.01549](#))

RESEARCH EXPERIENCE

1. **Graduate Research Assistant, CMU HCII**
👤 Supervisors : [Prof. Jeff Bigham](#) & [Prof. Nikolas Martelaro](#)
👤 Project Members: [Jason Wu](#)
 - (a) **Using LLM to Rank Web elements based on User Intent** April '23 - Present
🔗 : Accessibility, Web Interface, LLM
 - We investigate how LLMs perform in ranking relevant elements in a webpage for a user given tasks. We quantify the accuracy of LLM across a range of task difficulties and the level of detail provided in task descriptions. To ensure the relevance and practicality of our study, we collect a small-scale dataset that represents real-world tasks commonly encountered in everyday use.
 - (b) **Predicting functional Importance in Mobile User Interface** September '22 - Present
🔗 : Accessibility, Mobile Interface, Computer Vision
 - We aim to predict functional importance from mobile application screenshots. Functional importance can be beneficial to infer which elements are the most essential for an application (input fields, buttons etc.) and which are not (for example: advertisement, banner images etc). Using this predicted score, we can create a simplified UI for people with situational and permanent impairment.
2. **Research Intern, CMU HCII**
👤 Supervisor: [Prof. David Lindlbauer](#) ([Augmented Perception Lab](#), CMU HCII)
 - (a) **Chameleon User Interface** September '21 - December '21
🔗 : Mixed Reality, UI/UX Enhancement
 - We aim to reduce visual clutter and distraction in Mixed Reality by camouflaging virtual elements (i.e: changing shape and texture) with nearby environment.
 - I implemented a real-time shape morphing and texture synthesis algorithm in unity to enable seamless motion transition.
3. **Research Assistant, Tero Labs**
👤 Supervisor: [Dr. Nazmus Saquib](#)

(a) **Embodied Graph Analytics** [\[Github\]](#)

October '20 - April '21

🔗 : *Sketching Interface, Embodied Mathematics, Graph Analytics*

Accepted at CHI '22

- We design and implement a framework that allows seamless construction and direct manipulation of graphs and associated analytics on top of images and videos using advanced image processing and computer vision algorithms.
- I led the design and development of our prototype using image processing algorithm following user-centric design principle.

4. **Summer Geometry Institute Fellow, MIT CSAIL**

July '21 - August '21

🏠 : [MIT Geometric Data Processing group](#) (acceptance rate: 5.58%)

👤 : [Prof. Justin Solomon](#) (MIT), [Dr. Tal Shnitzer](#) (MIT), [Prof. Nina Miolane](#) (UC Santa Barbara), [Prof. Tolga Birdal](#) (Imperial London)

I worked on three research projects related to Shape Correspondence and Functional Mapping. These projects are entitled - 1) 3D Shape Correspondence via Probabilistic Partial Synchronization of Functional Maps and Riemannian Geometry [\[Technical Report\]](#); 2) Self-similarity loss for shape descriptor learning in correspondence problems [\[Technical Report\]](#); and 3) Anisotropic Schrödinger Bridge. In these projects, I took the lead role in curating new datasets and implementing novel methods for contextual loss calculation.

5. **Undergraduate Research Assistant, BUET**

🏠 : *Bangladesh University of Engineering & Technology*

(a) **Review4Repair: Code Review Aided Automatic Program Repairing** [\[pdf\]](#)

April '19 - May '20

👤 Supervisor: [Prof. Anindya Iqbal](#) (BUET)

Published in Information & Software Tech.

🔗 : Program Repair, Natural Language Processing

- We proposed a novel problem of generating code changes (i.e, to fix programming bugs) by understanding the code review comment written in natural language.
- By integrating code reviewer's instruction into automatic code repair, we boost the state-of-the-art performance by 20.33% in Top-1 prediction and 34.82% in Top-10 predictions compared to prior studies.

(b) **Static and Animated 3D Scene Generation from Free-form Text Descriptions** [\[Preprint\]](#) [\[code\]](#)

February '20 - May '20

👤 Supervisors: [Mr. Nafees Ahmed](#) (Waymo), [Prof. Anindya Iqbal](#) (BUET)

🔗 : Visual Art, Natural Language Processing, Computer Graphics

- We aim to generate static as well as animated 3D scenes from free-form textual scene descriptions. Our neural architecture exploits state-of-the-art language model as encoder to leverage rich contextual encoding and a new multi-head decoder to simultaneously predict multiple features of an object in the scene. A *non-differentiable renderer* then transfers these features into a 3D scene.

(c) **A Tale on Abuse and Its Detection over Online Platforms, Especially over Emails**

Oct '18 - April '20

👤 Supervisor: [Prof. A. B. M. Alim Al Islam](#) (BUET)

Accepted at NSysS '21

🔗 : Interactive System, Natural Language Processing

- We aim to investigate how users perceive abuse in emails and iteratively develop an AI based chrome extension to filter potential abusive emails.
- I took the lead effort to develop a deep-learning based language model [\[code\]](#) and the chrome extension [\[code\]](#). I also participated in the post-deployment user study to investigate the usability of our tool.

(d) **Novel View Synthesis from blurred images** [\[Project Page\]](#)

June '20 - March '21

👤 Supervisors: [Mr. Nafees Ahmed](#) (Waymo), [Prof. Anindya Iqbal](#) (BUET)

🔗 : Neural Rendering, View Synthesis, Image Deblurring

- Our key insight is to utilize neural rendering to jointly remove motion blur artifact using deblurring technique and synthesize novel views from high-dimensional spatial feature vectors. We used [Stereo Blur Dataset](#) for our experimental analysis.

NOTABLE PROJECTS

PocketAid: Medical Assistance App

[\[Featured Page\]](#) [\[Github\]](#)

👤 Featured as one of the top 12 projects (out of 106) in LearnITGirl, an international mentorship program for international female students.

PocketAid is a medical assistance mobile application that can analyze user-symptoms for disease prediction and provide emergency medical services.

Interactive 3D Interior Design Simulator

[\[Github\]](#)

👤 Supervisor: [Prof. Mohammad Saifur Rahman](#) (BUET)

A 3D interactive interior design tool to explore internal space and how it might be better utilized. The users can navigate around a room and modify furnitures, wall and floor features.

AR_ASL: OCR based reading tool for hearing-impaired people

[\[Demo\]](#)

👤 Presented in the International Women Hackathon, 2020

AR_ASL converts text to American Sign Language in real-time to help hearing-impaired children in reading their textbook.

Tori: A Mental Health Care Tracker and Chatbot using Machine Learning

[Github]

🏆 *First place in the national hackathon, Hack_A_Day, 2018.*

A lifestyle monitoring and mental health care application that tracks users' online activity, analyzes signs of depression and communicates with them.

MoodSong: A ChatBot that Responds According to the Emotional State using Image processing

[Github]

🏆 *First place in the BUET CSE Fest Hackathon, Cloud Computing Category, 2019.*

A chatbot which can communicate with users based on their emotional state. It analyzes the users' facial emotion and suggests user specific genre of songs, memes and jokes depending on the mood of the user.

Hati: Health Awareness Video Game

[Github]

🏆 *Selected to be presented as one of top 25 projects in SS12 Maker Fair, 2017.*

An android game for children to inspire them to eat healthy food and understand the affects of junk food.

AWARDS

November'21 Technica Hackathon (Research Track): Selected to participate in the largest hackathon for underrepresented genders in the US organized by the Department of Computer Science, University of Maryland at College Park, and The Maryland Center for Women in Computing [Demo]

January'19 BUET CSE Fest Hackathon: Champion in 'Cloud Computing' Category

December'18 Banglalink SDG Hackathon: 1st Runners Up and was offered internship for building a solution to curb plastic pollution

May'18 BUET CSE Fest Inter-University Hackathon: Champion in 'Mental Health' Category

April'18 Anita's Moonshot Codeathon 2018: Special Mention for an Augmented Reality application to help women raise awareness against different kinds of vaginal infection (Top 8)

March'18 MobilPro 2018: I was selected for the 5th international competition organized by the Faculty of Electronics, Telecommunications and Information Technology, Bucharest, Romania

March'18 Internationally Featured Project in "Learn It, Girl", Third Edition (Top 12 out of 106). I was the only participant selected from Bangladesh as well.

December'17 Banglalink Ennovators 2017: Finalist and was offered internship for building an application to support women empowerment (Top 20)

December'17 Hackathon for Environmental Migrants: I was selected to participate in this specialised hackathon organized by Dr. Ingrid Boas, Assistant Professor at the Environmental Policy Group, Wageningen University and BBC Media Action

TECHNICAL SKILLS

- **Programming Language:** Python, Java, C, C++, C#, Shell, HTML, CSS, Javascript, Matlab, Intel 8086 Assembly Language
- **Framework:** Pytorch, Pytorch3D, Tensorflow, Geomstats, Pymanopt, OpenCV, OpenGL, Three.js, AR.js, Nuget, Mathematica
- **Tool:** Blender, Unity, Vuforia, Android Studio, Firebase, Google Chrome App Engine

SERVICES

- 1. Student Volunteer at UIST 2021** **October '21**
I worked as a publicity SV and wrote a [blog](#) summarizing the conference.
- 2. Advising Board Member at BWCSE (Bangladeshi Women in Computer Science and Engineering)** **January '21 - January '22**
- 3. Batch Representative at BWCSE** **June '16 - December '20**
I organize keynote seminars with reputed female scientists in CS and mentor junior female students in their academic affairs.
- 4. Student Ambassador at 'Grameenphone GameJam 2017'** **March '17**
I volunteered to organize the first game development competition in Bangladesh - 'Grameenphone GameJam 2017'.