FARIA HUQ

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RESEARCH INTEREST

- Computational Geometry
- Computer Graphics
- 3D Vision
- Interactive Sketching
- Augmented and Virtual Reality

EDUCATION

- **Bachelor of Science in Computer Science and Engineering (2016 - 2021)**
  Bangladesh University of Engineering and Technology, Dhaka.
  CGPA: 3.49/4 (provisional); Major CGPA: 3.56/4 ; Final Two year CGPA: 3.59/4
  (Academic Session Delay due to COVID-19 pandemic)
  Thesis Topic: Review4Repair: Code Review Aided Automatic Program Repairing
  Thesis Supervisor: Prof. Anindya Iqbal, Professor, Department of CSE, BUET

WORK EXPERIENCE

Research Intern **September '21 - Present**

Supervisor: Prof. David Lindlbauer (Augmented Perception Lab, CMU HCII)
I will be working on a project that enables virtual interface elements to be constantly visible without introducing visual clutter and distraction. The work will be on the intersection of Virtual Reality, Computer Graphics and Geometry.

Summer Research Fellow **July '21 - August '21**

Institute: Summer Geometry Institute (MIT Geometric Data Processing group, CSAIL)
I was one of the 34 global participants of this prestigious research program (acceptance rate: 5.4%). Over a span of 6 weeks, I worked on these following projects:

- 3D Shape Correspondence via Probabilistic Synchronization of Functional Maps and Riemannian Geometry, Supervisors: Prof. Nina Miolane and Dr. Tolga Birdal. [Technical Report]
- Self-similarity loss for shape descriptor learning in correspondence problems, Supervisor: Dr. Tal Shnitzer. [Technical Report]
- Anisotropic Schrödinger Bridge, Supervisor: Prof. Justin Solomon. [Technical Report in progress]

Research Programmer **November '20 - June '21**

Supervisor: Dr. Nazmus Saquib (Tero labs)
I have worked on several research projects (currently under review) on the topic of '*Embodied Programming*'. The main goal is to closing the gap between symbolic and embodied cognition in math and computing, by designing pioneering technology in augmented reality, computer vision, and sketch interfaces.

Undergraduate Research Assistant **April '19 - January '21**

Supervisor: Prof. Anindya Iqbal (BUET)
I completed a research project titled - "Review4Repair: Code Review Aided Automatic Program Repairing" which is currently under revision in Information and Software Technology (IST) journal.

Game Developer Intern **August '19 - September '19**

Supervisors: Saikat Islam (Facebook) and Shamim Ashik (Uber)
Under this one-month long internship, I developed the input management system and game environment of an adventure game in Unity Game Engine. [Github]

Mentee **October '17 - January '18**

Organization: Learn IT, Girl!, global mentorship program for international female students
Under this three-month long mentorship programme, I developed a health assistance mobile application that can analyze user-symptoms for disease prediction and provide emergency medical services. My project was featured among the top 12 projects out of 106. [Featured Page] [Github]

PUBLICATIONS & PREPRINTS

1. Review4Repair: Code Review Aided Automatic Program Repairing
   Faria Huq, Masum Hasan, Mahim Anzum Haque Pantho, Sazan Mahbub, Prof. Anindya Iqbal, Toufique Ahmed. Submitted to Information and Software Technology, (https://arxiv.org/abs/2010.01544)
2. Static and Animated 3D Scene Generation from Free-form Text Descriptions
   Faria Huq, Mr. Nafees Ahmed, Prof. Anindya Iqbal. (https://arxiv.org/abs/2010.01549)

RESEARCH EXPERIENCE

Embodied Vector Algebra [Github] **April '21 - Present**
Supervisor: Dr. Nazmus Saquib (Tero labs) *Expected date of Completion: February, '21*
Keywords: Interactive System, Sketching Interface, Vector Analytics

- We aim to develop a design framework and an interactive sketch interface to combine different vector operations with layers of sketched, visually interpretable compositions.
- This is a work in progress. So far we have developed the basic interactions for drawing and modifying vectors. Currently we are working on the implementation of basic vector functions.

Embodied Graph Analytics [Github] **October '20 - April' 21**
Supervisor: Dr. Nazmus Saquib (Tero labs) *Submitted (Under Review)*
Keywords: Sketching Interface, Embodied Mathematics, Graph Analytics

- 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.

Review4Repair: Code Review Aided Automatic Program Repairing [Preprint] **April '19 - May '20**
Supervisor: Prof. Anindya Iqbal (BUET) *Submitted (Under Revision)*
Keywords: Automatic Program Repair, Natural Language Processing

- We, for the first time, aim to generate 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.

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)
Keywords: Visual Art, Natural Language Processing, Computer Graphics

- We aim to generate static as well as animated 3D scenes from different types of free-form textual scene description.
- We design a two-stage pipeline which encodes the free-form text using an encoder-decoder neural architecture and generates a 3D scene based on the generated encoding. Our neural architecture exploits state-of-the-art language model as encoder to leverage rich contextual encoding and a new multi-head decoder to predict multiple features of an object in the scene simultaneously with 98.427% accuracy.

A Tale on Abuse and Its Detection over Online Platforms, Especially over Emails: From the Context of Bangladesh Oct '18 - April '20
Supervisor: Prof. A. B. M. Alim Al Islam (BUET) *Submitted (Under Review)*
Keywords: Interactive System, Natural Language Processing

- We aim to generate a system which analyzes incoming emails and predicts abusive ones. Our graphical interface allows users to take preventive measures and ask for help from corresponding authority.
- In this research project, I contributed to develop a deep-learning based language model using Keras. Our model can handle grammatical and spelling mistakes both at character and word level. [code]
- I also contributed to develop the frontend in Google Chrome Engine Platform. [code]

Novel View Synthesis from blurred images [Project Page] **June '20 - Present**
Supervisors: Mr. Nafees Ahmed (Waymo), Prof. Anindya Iqbal (BUET) *Currently on leave*
Keywords: Neural Rendering, View Synthesis, Image Deblurring

- We aim to synthesize a target image with an arbitrary target camera pose (novel view synthesis) from given a source image of a dynamic scene containing motion blur and its camera pose.
- 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 are using Stereo Blur Dataset for our experimental analysis.

Real-world Anomaly Detection in Surveillance Videos by Analyzing Human Pose and Motion **May '20 - Present**
Supervisor: Dr. Mohammad Saifur Rahman (BUET) *Currently on leave*
Keywords: Explainable AI, Human Pose and Body Keypoints Analysis, Video Understanding

- We propose to investigate the relation of human pose with anomalous activities by utilizing human body keypoints.
- We are building an attention based hierarchical Multi Instance Learning (MIL) model to analyze and interpret anomalous human activities with respect to particular human motions and poses.

NOTABLE PROJECTS

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]**
Achievement: 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]**
Achievement: 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]**
Achievement: 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]**
Achievement: 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

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
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.
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)
December'17	Banglalink Ennovators 2017: Finalist and was offered internship for building an application to support women empowerment and employment (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 with collaboration of 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. **Advising Board Member at BWCSE (Bangladeshi Women in Computer Science and Engineering)** **January'21 - Present**
2. **Batch Representative at BWCSE** **June'16 - December'20**
   I organize workshops and keynote seminars with reputed female scientists from different sub-fields of Computer Science. I also mentor my fellow junior girls in the department to get involved in research works.
3. **Student Ambassador at 'Grameenphone GameJam 2017'** **March'17**
   I volunteered to organize the first game development competition in Bangladesh - 'Grameenphone GameJam 2017'. I arranged workshops and promoted the campaign of the programme in our university. A team from our university became one of the finalists of the competition.
4. **Student Representative at 'Google Developers Group, Dhaka'** **September'19 - present**
   I am a representative of our university at the 'Google Developers Group, Dhaka'. My responsibilities are to arrange national competitions and devfests for Google's Developers community in Bangladesh.

REFERENCE

Available upon Request