

# SUBANGKAR KARMAKER SHANTO

Dhaka, Bangladesh

Email: [subangkar.karmaker@gmail.com](mailto:subangkar.karmaker@gmail.com) ◊ Website: <https://subangkar.github.io/> ◊ [LinkedIn](#) ◊ [Github](#)

## RESEARCH INTEREST

---

Security & Privacy - Machine Learning - Data Mining - Ubiquitous Computing - Human Computer Interaction

## EDUCATION

---

**Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh**

2016 - 2021

BSc. in Computer Science and Engineering

**Thesis:** Atrial Fibrillation Detection from Noisy Photoplethysmography Signals

Supervisor: **Dr. Atif Hasan Rahman**, Associate Professor, Department of CSE, BUET

**CGPA:** 3.88 out of 4 (*Ranked 8<sup>th</sup> in a class of 143 students*)

**Major CGPA:** 3.95 out of 4

## PUBLICATIONS

---

**BayesBeat: Reliable Atrial Fibrillation Detection from Noisy Photoplethysmography Data**

**Published in:** [[UbiComp 2022](#)] [Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies](#), 6, 1, Article 8 (March 29, 2022) [[URL](#)] [[arXiv](#)]

**Authors:** Sarkar Snigdha Sarathi Das, **Subangkar Karmaker Shanto**, Masum Rahman, Md. Saiful Islam, Atif Rahman, Mohammad Mehedy Masud, Mohammed Eunus Ali

## RESEARCH EXPERIENCE

---

**BayesBeat: Reliable Atrial Fibrillation Detection from Noisy Photoplethysmography Data**

- Co-Supervised by [Dr. Atif Hasan Rahman](#) and [Dr. Mohammed Eunus Ali](#), Professor, Department of CSE, BUET
- Accepted in UbiComp 2022, Published in IMWUT
- **Description:** This work focuses on reliable prediction on Photoplethysmography (PPG) signals that noisy due to motion artifacts. We have used Bayesian Deep Learning Model implemented in Python using PyTorch framework to provide an uncertainty estimate along with the prediction. We have also implemented a Tizen Native and Background Service App in C for continuous and timed raw signal data collection from Smartwatch. Our Model beats the state of the art work both on the largest publicly available dataset and on the MIMIC-III dataset. It was the first application of Bayesian Deep Learning in this domain.

**Privacy risk of Machine Learning Models**

- Supervised by [Dr. Shagufta Mehnaz](#), Assistant Professor, Department of CSE, School of Electrical Engineering and Computer Science, Pennsylvania State University, USA
- Project in progress
- **Description:** In this work we are experimenting on vulnerabilities/privacy risk of Trained Classification Models introduced particularly from Model Explainability. We explore potential application of various model explanation techniques like LIME, SHAP, Counterfactual Explanation etc. for implementing model inversion attacks.

**Contrastive Learning Based Approach for Patient Similarity**

- Co-Supervised by [Dr. Atif Hasan Rahman](#) and [Dr. Mohammed Eunus Ali](#)
- Project in progress
- **Description:** In this work we are experimenting on contrastive learning to learn patient similarity from physiological signals, particularly Photoplethysmography (PPG) signals. Due to limited availability of dataset, we are currently conducting a case study on Atrial Fibrillation Detection from PPG signals. It is the first application of Contrastive Similarity Learning in this domain.

## TECHNICAL SKILLS

---

**Programming & Scripting Languages:** C, C++, Python, Java, Bash Scripting, Assembly (iAPX 86), MATLAB

**Markup Languages:** HTML,  $\LaTeX$ , Markdown

**Machine Learning Frameworks & Libraries:** PyTorch, Keras, Scikit-Learn, Numpy, Pandas, SciPy

**Development Tools & Frameworks:** Django, Django REST Framework, Postgres, MySQL, JavaFX (Java GUI)

**Project Management Tools:** Git, Github, Slack, Docker, Docker Hub

**Design Tools:** Proteus circuit simulator, Logisim circuit simulator and CISCO packet tracer

**Hardware Tools:** Atmega32 Microcontroller

**Miscellaneous:** MS Word, Powerpoint, Excel

## SELECTED PROJECTS

---

**Image Captioning**

In this project, we experimented with several deep learning models to generate single line caption given an image. We experimented with Resnet-101 & LSTM with Attention Mechanism and trained on Flickr8k Image dataset.

**Programming Language:** Python, **Deep Learning Framework:** PyTorch; [[Github Repo](#)]

## FoodSquare

In this project we developed a web app for an online restaurant hub on the perspective of Dhaka City of Bangladesh. This system provides restaurants a platform to manage their own restaurants and put their products on display. On the other hand, food-lovers get the opportunity to browse food items as per their taste and budget from hundreds of restaurants. Deliveryman also have access to this system to pickup orders submitted by the customers.

**Programming Language:** Python, **Web Framework:** Django, **Backend Database:** Postgres; [[Github Repo](#)]

## Samsung Gear Fit 2 Pro PPG Logger

A tizen native UI app and native background service to collect raw sensor data from a tizen OS based smartwatch device. The logger service activates sensor periodically using timers. The recorded data are saved into a single CSV file for that segment with device id as part of the filename for identifying individuals uniquely. After each recording, the logger service checks for Wi-Fi availability and tries to upload all the csv files present locally to a remote server via Wi-Fi or to a paired smartphone via bluetooth. Successfully uploaded files are deleted from watch storage.

**Programming Language:** C, **SDK:** Tizen 2.3.1, **Device:** Samsung Gear Fit 2 Pro Smartwatch; [[Github Repo](#)]

## ICMP Ping Spoofing

A project to demonstrate security exploitation by sending ping with spoofed IP. Victim's source IP is spoofed to send a ping to server from Attacker. As the source IP is spoofed server takes it as a original IP and hence ping reply is sent to victim instead of attacker who send the actual ping request. Also a sniffer using pcap is built to sniff ICMP packets for verification.

**Programming Language:** Python, **Libraries:** libpcap; [[Github Repo](#)]

## C Compiler

A very simple subset of C Compiler(Lexical Analyzer, Syntax Analyzer, Semantic Analyzer & Intermediate Code Generator) was implemented as an assignment of compiler LAB course in undergraduate studies.

**Programming Language:** C++, **Libraries:** Flex, Yacc-Bison; [[Github Repo](#)]

## Real-Time Audio to Frequency Spectrum Transformation on Atmega32 Microcontroller

A hardware project to demonstrate frequency spectrum visualization from real time audio via time domain to frequency domain conversion on Atmega32 microcontroller using 32-Point Integer Discrete Fourier Transform (DFT). Amplitude plotted on two Dot Matrices consist of uniformly distributed 16 frequency bins over 0-4kHz. Each bin has amplitude height of 8. Lower amplitude frequencies cause dot matrix to have green bars on corresponding bin columns while red is for the higher amplitudes.

**Programming Language:** C, **Microcontroller:** Atmega32, **Output Device:** LCD, Dot Matrix; [[Github Repo](#)]

## University Hall Management System

Database Sessional Project focussing on Raw SQL to manage several activities for academic dormitory of students in a university. Frontend developed as a desktop app in JavaFX

**Programming Language:** Java, **Framework:** JavaFX, **Backend Database:** Oracle; [[Github Repo](#)]

## WORK EXPERIENCE

---

### Lecturer

Dept. of CSE, United International University (UIU) [[Faculty Profile](#)]

Feb 2021 - Present  
*Madani Ave, Dhaka, Bangladesh*

- **Courses Conducted:** Structured Programming theory and lab, Object Oriented Programming theory and lab, Artificial Intelligence theory and lab, Bioinformatics, Algorithms, Computer Networks lab, Human Computer Interaction and Society, Technology & Engineering Ethics

### Lecturer (Part-time)

Dept. of CSE, Bangladesh University of Engineering and Technology (BUET) [[Faculty Profile](#)]

Jan 2022 - April 2022  
*Dhaka, Bangladesh*

- **Courses Conducted:** Structured Programming Language Laboratory, Programming Lab (C, C++)

### Research Assistant (Part-time)

Datalab, Dept. of CSE, Bangladesh University of Engineering and Technology (BUET)

Mar 2021 - Dec 2021

- Worked as a graduate research assistant under supervision of [Dr. Atif Hasan Rahman](#) and [Dr. Mohammed Eunus Ali](#). Multiple research projects in this lab are funded by the government of Bangladesh.

## ACHIEVEMENTS AND AWARDS

---

**Themes Category Winner**, Blockchain Olympiad Bangladesh

February, 2021

**Winner**, National Hackathon on Frontier Technologies

February, 2020

**Merit Award Winner**, International Blockchain Olympiad

June, 2020

**University Merit Scholarship**, Bangladesh University of Engineering and Technology

2017, 2018, 2019

**Dean's List Scholarship**, Bangladesh University of Engineering and Technology

2016, 2017, 2018

## OTHER ACTIVITIES & SERVICES

---

### Supervised the Gold Winner team of [International Blockchain Olympiad 2023 Final](#)

Hosted in Amsterdam, The Netherlands, EU from 15th to 17th of November 2023

Certificates Link: <https://drive.google.com/drive/folders/110dlpfZZWQBYijhYVt-2dD7Lewbd8hhP>

### Problem setter of UIU Intra University Deep Learning Sprint Fall 2022

Prepared Dataset to Distinguish between Relevant/Irrelevant Image Captions using Deep Learning

Kaggle Contest Link: <https://www.kaggle.com/competitions/uiu-intra-university-deep-learning-sprint-fall-22>