# AVIJIT MITRA

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## RESEARCH INTERESTS

• Deep Learning • Machine Learning • Computer Vision • Data Mining

## EDUCATION

**Master of Science in Electrical and Electronic Engineering** (Ongoing) April 2017 - May 2019(Expected)
Bangladesh University of Engineering and Technology (BUET), Dhaka
CGPA: 3.75/4.00, Completed: 18 credits

**Bachelor of Science in Electrical and Electronic Engineering** April 2012 - February 2017
Bangladesh University of Engineering and Technology (BUET), Dhaka
CGPA: 3.78/4.00, 157.5 credits

## WORK EXPERIENCE

**Machine Learning Researcher**, Semion Ltd., Dhaka March,2017 - present

- Providing Deep Learning solutions to potential clients
- Reproducing state of the art results from the literatures and applying them to proprietary datasets
- Design and development of necessary software infrastructures, Android app, Alexa skill

**Intern**, Semion Ltd., Dhaka August,2016 - December,2016

## ONGOING RESEARCHWORKS

• **Deep learning based Sepsis screening system from EHR data**
Detection and prediction (4 hours before the onset) of 3 categories of sepsis by novel deep learning algorithm that uses only six widely available vital measurements; feature ranking and affect of variable number of vital signs

• **Classify subcellular protein patterns in human cells**
Multi label classification of mixed protein patterns from 4-channel (RGBY) confocal microscopy images, explore the effects of adaptive learning rate and different image processing techniques

## RESEARCH ARTICLES ( $R^G$ )

[1] **A. Mitra**, K. Ashraf. "Sepsis Prediction and Vital Signs Ranking in Intensive Care Unit Patients", *arXiv preprint arXiv:1812.06686*, 2018
[2] R. Ahsan, **A. Mitra**, S. Omar, M. Z. R. Khan, M. A. Basith. "Sol−gel synthesis of $DyCrO_3$ and 10% Fe-doped $DyCrO_3$ nanoparticles with enhanced photocatalytic hydrogen production abilities", *RSC Advances*, 2018
[3] **A. Mitra**, T. Mostafiz, R. Ur Rashid. "Photoplay: An Android Application to Stimulate Children's Cognitive Development", *IEEE Region 10 Humanitarian Technology Conference (R10-HTC)*, 2017

## UNDERGRADUATE THESIS

**Sol−gel synthesis of $DyCrO_3$ and 10% Fe-doped $DyCrO_3$ nanoparticles and characterization of their structural, optical, magnetic properties for enhanced photocatalytic activities**
$DyCrO_3$ and 10% Fe-doped $DyCrO_3$ nanoparticles, synthesized by sol-gel method, were characterized using XRD,SEM and UV-visible spectrophotometry. The doped nanoparticles show a reduced band gap (2.45 eV) compared to the undoped ones (2.8 eV). Photocatalytic degradation test shows 17% improved photocatalytic ability for the doped nanoparticles.
**Supervisor:** Md. Ziaur Rahman Khan, PhD, Department of Electrical and Electronic Engineering(EEE), BUET

## SELECTED PROFESSIONAL PROJECTS

- **SemSepsis**, a sepsis detection GUI (Python, pyQt4) 2018
- **SemRad**, a Teleradiology Solution (Java, JavaFX, SQLite, MySQL) 2018
- **Faulty semiconductor wafer detection** from machine logs (Python, Tensorflow) 2018
- **Finding hotspots** in semiconductor wafer logs using LRP algorithm (C++, Python) 2018
- **HealthGeek**, an Android app and **Differential Diagnoses**, an amazon Alexa skill (Java, Node.js, Flask) 2017
- **Risk factors detection** for heart diseases in diabetic patients using bi-LSTM and CRF (Python, Theano) 2017
- Symptoms to disease, organ/body part and specialist **mapping** (Python, R) 2017

## SELECTED OTHER PROJECTS

- Retinal Vessel segmentation via ANN, SVM and CNN Self 2018
- Implementation of GTA and ADDA for VisDA-2018 challenge on Syn2Real dataset Self 2018
- End-to-end speech recognition using Baidu's DeepSpeech architecture Self 2018
- Detection of Arrhythmia based on DWT using ANN, SVM and RF Biomedical Signal Processing 2018

- Gate level design, cell layout and simulation of a 3-bit Multiplier — VLSI II Laboratory 2017
- Hangman for GRE, an android app for GRE students — self 2017
- Gate level design and simulation of an 8-bit Microprocessor (Modified SAP) — Microprocessor Laboratory 2016
- Gesture based pong game implementation on a TFT display — Control System Laboratory 2016
- Home security system via push message service — Communication Laboratory 2016
- Gate level design and simulation of a 4-bit Arithmetic Logic Unit — Digital Electronics Laboratory 2015

## RELEVANT COURSES

**Undergrad Level:** Linear Algebra • Probability and Statistics • Calculus I • Calculus II • Ordinary and Partial Differential Equatioins • Digital Signal Processing I • Continuous Signals and Linear Systems • Digital Logic Design
**Grad Level:** Biomedical Signal Processing
**Self-taught:** Machine Learning (Coursera/Stanford) • Convolutional Neural Networks for Visual Recognition (Stanford) • Deep Learning Specialization-5 courses (deeplearning.ai/Coursera)

## SKILLS

**Programming Languages:** Python, Java, C, C++, MATLAB, Verilog HDL, R, Assembly language
**Machine Learning Frameworks:** Tensorflow, Keras, Scikit-learn, Pytorch, Theano
**Design Tools:** PSPICE, Cadence Virtuoso, Proteus, Quartus
**IDEs:** Android studio, Visual Studio, PyCharm, IntelliJ IDEA, Brackets, Arduino
**Other Expertise:** Weka, Latex, Git, Microsoft Office
**Os:** Linux, Windows

## ACADEMIC HONORS

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| **Dean's List Award** | Awarded for attaining CGPA greater than 3.75 |
| **Board Scholarships** | At Primary, Junior, Secondary and Higher secondary Levels |
| **Admission Test Scholarship** | For securing $83^{rd}$ position among 9000 applicants in BUET admission |

## OTHER ACTIVITIES

**$486^{th}$ among 2236 teams (Top 22%)**, Human Protein Atlas Image Classification, Kaggle — 2019
**$355^{th}$ among 3234 teams (Top 11%)**, TGS Salt Identification challenge, Kaggle — 2018
**$12^{th}$ among 57 teams (Top 21%)**, Bengali Handwritten Digit Recognition, Kaggle — 2018
**$2^{nd}$ Runner up**, Inter University Project Show, BUET — 2015
**$1^{st}$ Runner up**, Inter School & College Science Festival, Rajuk College, Dhaka — 2010
**Volunteer** – EEE day 2017 and RAG Program 2017, BUET — 2016
**Club Affiliations** – Satyen Bose Science Club, BUET Robotics Society

## REFERENCES

**Dr. Mohammad Ariful Haque**
Professor, Department of EEE
Bangladesh University of Engineering and Technology
arifulhoque@eee.buet.ac.bd

**Dr. Khalid Ashraf**
Founder, Semion Ltd.
Co-founder, Deepscale Inc.
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