


Khandokar Md. Nayem

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Computer science Ph.D. student doing research on machine learning and deep network architectures on speech applications. Experienced in working on speech recognition, natural language processing (NLP), computer vision along around 4 years of experience in the software industry, and academia.

EDUCATION

Ph.D. in Computer Science, *researcher in machine learning on speech* May 2021 (Anticipated)
Indiana University, Bloomington, IN Advisor: [Prof. Donald S. Williamson](#)
Minor in Cognitive Science

M.Sc. in Computer Science, December 2019
Indiana University, Bloomington, IN

B.Sc. in Computer Science & Engineering (CSE), *major in artificial intelligence* July 2014
[Bangladesh University of Engineering & Technology \(BUET\)](#), Dhaka, Bangladesh

EMPLOYMENT

Indiana University, Bloomington, IN, *Research Assistant, Lab ASPIRE* Fall 2016 - Present

- Researched noise cancellation techniques to filter out a wide range of noises from human speech using a masking approach by applying deep neural network models. Also developed a quantized end-to-end speech enhancement model by incorporating language models and evaluated by human with [survey](#). (Python, Matlab, DNN, RNN, LSTM, Qualtrics)
- Formulated prediction models to detect gestational diseases like preeclampsia and hypertension, and to track the physical activity of nulliparous pregnant women. (Python, Random forest, DNN)
- Investigated human emotion detection techniques in speech using deep neural models. (CNN, RNN)

BOSE Corporation, Boston, MA, *Machine Learning/Neural Signal Processing Intern* Summer 2020

- Researched on enhancing speech by self-speech removal to provide better quality sound with low latency to the hearing aid and voice-assistive wearable devices. (Python, TensorFlow)

REVE Systems, Dhaka, Jr. *Software Engineer, Team Media Gateway* January 2015

- Programmed media gateway controller to facilitate both calls and faxes between the telephone network and VoIP network or another telephone network. Also designed front-end panel for VoIP administrators and customers for easy use. (Back-end: protocol megaco 1.0, java; front-end: .jsp framework, JavaScript, Ajax and MySQL).





PUBLICATIONS

- **Khandokar Md. Nayem**, Donald Williamson, "Monaural speech enhancement using intra-spectral recurrent layers in the magnitude and phase responses", in Proc. ICASSP 2020. ([pdf](#), [slides](#), [video](#))
- **Khandokar Md. Nayem**, Donald Williamson, "Incorporating Intra-Spectral Dependencies with a Recurrent Output Layer for Improved Speech Enhancement", in Proc. MLSP 2019. ([pdf](#), [poster](#))
- Shujon Naha, **Khandokar Md. Nayem**, Md. Lisul Islam, "RSGAN: Recurrent Stacked Generative Adversarial Network for Conditional Video Generation", presented at IU computer vision project showcase, 2017. ([pdf](#), [poster](#))

PROGRAMMING SKILLS

Languages	Python, C++, Matlab, C, Java, C#, R, SQL, Assembly, Shell Script, \LaTeX
Frameworks & Libraries	TensorFlow, Keras, NLTK, CImg, Cmake, OpenCV, OpenGL, Qualtrics
Machine Learning	Regression, Clustering, Decision Tree, Ensemble Methods, Naive Bayes, SVM, HMM, GMM, DNN, Autoencoder, CNN, RNN, LSTM, CRNN

SELECTED PROJECTS

- Speech enhancement and separation using auxiliary information like phonemic structure or textual information without alignment to boost performance and speech quality. (*Python, TensorFlow, Attention model*; [code](#) )
- Automatic classification of rhetorical questions with stress detection on our own collected dataset using Recurrent Neural Network (RNN) and Convolutional Recurrent Neural Network (CRNN) models. (*Python, Keras, NLTK*; [code](#) )
- An end-to-end speech recognition system for the English language using bi-directional recurrent neural network architecture without any frame wise labeling. (*Python, Keras, NLTK*; [code](#) )
- Image Matching to match images that are taken from different viewpoints of the same object; detect object like car from aerial snapshot; create a panoramic image stitching multiple images. (*C++, CImg, OpenCV packages*; [code](#) )