XIN TIAN

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EDUCATION

Ph.D., Electrical and Computer Engineering *Expected May 2022*
University of Maryland, College Park, MD, USA
GPA: 3.8/4.0 Advisor: Prof. Min Wu

B.S., Optoelectronic Information Science and Engineering *June 2017*
Huazhong University of Science and Technology, Wuhan, China
GPA: 91.3/100 (Top 4%)

PUBLICATIONS AND PATENTS

X. Tian, Q. Zhu, Y. Li, and M. Wu, "Cross-domain Joint Dictionary Learning for ECG Reconstruction From PPG", IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP20), Barcelona, Spain, May 2020. [Selected as **lecture session**]

Q. Zhu, **X. Tian**, C.-W. Wong, and M. Wu, "ECG Reconstruction via PPG: A Pilot Study", IEEE International Conference on Biomedical and Health Informatics (BHI'19), Chicago, IL, May 2019. [**10.9%** acceptance rate for oral presentation]

Q. Zhu, **X. Tian**, C-W. Wong, and M. Wu: "Reconstruction of ECG from PPG Signals for Continuous Monitoring and Analytics," provisional patent filing March 2019.

Q. Zhu, **X. Tian**, C.-W. Wong and M. Wu, "Learning Your Heart Actions from Pulse: ECG Waveform Reconstruction From PPG", under preparation for journal publication.

RESEARCH EXPERIENCE

Heart Rate (HR) Estimation From Wrist-Type Photoplethysmography (PPG) 2018 - 2019

- Implemented adaptive filter algorithms for PPG signal denoising with the motion cue.
- Conducted an iterative dynamic programming algorithm to estimate HR from the cleaned PPG and achieved comparable accuracy with state-of-the-art.
- Designed a graphic user interface (GUI) for result visualization in MATLAB.

Inferring Electrocardiogram (ECG) From Photoplethysmography (PPG) 2018 - Present

- Assisted in designing a detailed signal model for the relation of ECG and PPG with deep biomedical insights.
- Gathered and analyzed data of 157 patients from a large-scale real-world clinical database with Python and SQL.
- Proposed a novel joint dictionary learning (DL) framework for inversely reconstructing clinically interpretable ECG from the more easily measured PPG signals with 24% improved reconstruction accuracy to the state-of-the-art.
- Compared related DL frameworks, including coupled DL, semi-coupled DL and projective DL.
- Constructed convolutional neural networks and a generative model of conditional VAE using Pytorch (GPU) with further improved reconstruction accuracy.

Remote Vital Signs Monitoring Using Regular RGB Cameras 2019 - 2020

- Tested a Python-based remote PPG prototype on a range of lighting, motion and skin conditions with an average heart rate tracking accuracy of 1%.

INTERN EXPERIENCE

PhD Software Engineer Intern, Machine Learning June - August 2020

Facebook, Inc.

- Applied machine learning techniques and best practice to video recommendation system to improve the video consumption time.
- Assisted in the industrial-level data pipeline generation and query in Presto and Hive.

TECHNICAL PROJECTS

Machine and Deep Learning UMD, Sept. - Dec. 2018

- Constructed PCA, LDA, Bayesian classifier, k-NN and SVM for facial expression classification.
- Applied transfer learning based on VGG net for monkey-species classification.

Multi-rate and Parametric Signal Processing, Spectrum EstimationUMD, Sept. - Dec. 2018

- Constructed a quadrature-mirror filter (QMF) bank for image decomposition and reconstruction.
- Built a linear predictive model based on Wiener filter for speech signal analysis.
- Implemented periodogram, AR model and MUSIC algorithm for spectrum estimation of real-world audio signal.

TEACHING EXPERIENCE

ENEE 489I: Solar Energy Conversion Fall 2017

ENEE 307: Electronic Circuits Design Laboratory, Spring 2018, Fall 2018

ENEE 222: Elements of Discrete Signal Analysis, Spring 2019

ENEE 633: Statistical Pattern Recognition, Fall 2019

ENEE 627: Information Theory, Spring 2020

SKILLS

Computer Languages	Python, MATLAB, SQL
Public Libraries	PyTorch, Microsoft Kinect API

HONORS AND AWARDS

National Scholarship	2014-2015, HUST
National Endeavor Fellowship	2015-2016, HUST
The Graduate Fellowship	2017-2018, UMD
Teaching Assistant Training and Development fellow mentor	2018-2020, UMD
Winner of Three-Minute Thesis Competition (Seven awardees in university)	2020, UMD