Ewa Magdalena Nowara

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EDUCATION

Ph.D. in Electrical and Computer Engineering   **August 2015 – May 2021 (expected)**
Rice University   Houston, TX
Thesis: Imaging Photoplethysmography in Unconstrained Settings
Committee: Ashok Veeraraghavan, Ashutosh Sabharwal, Anastasios Kyrillidis, Richard
Baraniuk, Daniel McDuff (Microsoft Research AI)

Master of Science in Electrical and Computer Engineering   **August 2015 - May 2018**
Rice University   Houston, TX
Thesis: Camera-based Vital Signs: Towards Driver Monitoring and Face Liveness Verification

Bachelor of Science in Physics   **August 2011 - May 2015**
St. Mary's University   San Antonio, TX
GPA: 4.0/4.0 (summa cum laude, Presidential Award Recipient)

SELECTED PUBLICATIONS (Full list on Google Scholar)

1. **Nowara, E. M.**, Marks, T. K., Mansour, H., Veeraraghavan, A. "Near-Infrared Imaging Photoplethysmography During Driving" *ACCEPTED at IEEE Transactions on Intelligent Transportation Systems, 2020*
2. **Nowara, E. M.**, McDuff, D., Veeraraghavan, A. "A Systematic Analysis of Video-based Pulse Measurement from Compressed Videos" *ACCEPTED at Biomedical Optics Express, 2020*
3. **Nowara, E. M.**, McDuff, D., Veeraraghavan, A. "The Benefit of 'Distraction': Denoising Video-Based Physiological Measurements using Inverse Attention" *arXiv:2010.07770*, 2020
4. Nagamatsu, G., **Nowara, E. M.**, Pai, A., Veeraraghavan, A., Kawasaki, H. "PPG3D: Does 3D Head Tracking Improve Camera-based PPG Estimation?" *IEEE Engineering in Medicine and Biology Society (EMBC)*, 2020
5. **Nowara, E. M.**, McDuff, D., Veeraraghavan, A. "A Meta-Analysis of the Impact of Skin Type and Gender on Non-contact Photoplethysmography Measurements" *CVPR Workshops*, 2020
6. **Nowara, E. M.**, McDuff, D. "Combating the Impact of Video Compression on Non-Contact Vital Sign Measurement using Supervised Learning." *ICCV Workshops,* 2019
7. **Nowara, E. M.**, Marks, T. K., Mansour, H., Veeraraghavan, A. "SparsePPG: Towards Driver Monitoring Using Camera-Based Vital Signs Estimation in Near-Infrared." *CVPR Workshops*, 2018
8. **Nowara, E. M.**, Sabharwal, A., Veeraraghavan, A. "PPGSecure: Biometrics Presentation Attack Detection Using Photoplethysmograms" *Automatic Face and Gesture Recognition,* 2017

RESEARCH AND WORK EXPERIENCE

Los Alamos National Laboratory   **November 2020 - Present**
Research Intern (Theoretical Division, T-5)   *Remote*
Mentor: Brendt Wohlberg

- Developed self-supervised learning algorithms for computational imaging (ptychography) with a focus on "internal" learning with limited data and partially known forward models, using LSTM, conditional GANs, and autoencoders

Microsoft Research   **June 2019 - June 2020**
Research Intern (Human Understanding and Empathy Team)   *Redmond, WA*
Mentors: Daniel McDuff, Mary Czerwinski
- Developed a convolutional attention neural network for denoising time signals from video
- Worked on self-supervised machine learning for regression with limited and noisy labels
- Created realistic 3D avatars using computer graphics and physiological signals from video
- Recovered subtle physiological intensity variations from compressed videos using supervised deep learning for regression

Mitsubishi Electric Research Laboratories   **May 2017 - June 2019**
Research Intern (Computer Vision Team)   *Cambridge, MA*
Mentors: Tim Marks, Hassan Mansour
- Developed optimization and denoising algorithms using robust principal components analysis (RPCA), Alternating Direction Method of Multipliers (ADMM), Fast Iterative Shrinkage-Thresholding Algorithm (FISTA)
- Built a driver monitoring system using RGB and NIR cameras, optical and 3D printed hardware, light source synchronized with camera frame capture, face detection, tracking
- Collected and released the first large public driving dataset with face videos and physiology

SELECTED AWARDS AND HONORS
- Invited attendee, Microsoft Research AI Breakthroughs   2020
- Best graduate poster and demo, ECE Corporate Affiliates Day at Rice University   2019
- Ken Kennedy Institute for Information Technology Schlumberger Fellowship   2017 – 2018
- Selected attendee, Doctoral Consortium at Automatic Face and Gesture Recognition   2017
- Selected attendee, CRA-W (Computing Research Association) Grad Cohort   2016
- Texas Instruments Fellowship   2015
- Presidential Award (given to top 14 graduating seniors)   2015

PATENTS
Marks T., Mansour H., **Nowara E.**, Nakamura Y., Veeraraghavan A., inventors; Mitsubishi Electric Corp, Mitsubishi Electric Research Laboratories Inc, assignee. "System and method for remote measurements of vital signs." *United States patent application 16/167,668* 2019

MENTORSHIP AND SERVICE TO COMMUNITY
Vital Sign AI (startup volunteer project)   **April 2020 - Present**
Computer Vision and Machine Learning Research Lead   *Remote*
- Created a free app to measure vital signs remotely with cameras and microphones, and to detect abnormalities in vital signs caused by COVID-19

Research Experience for Undergraduates (REU)   **Summers of 2016, 2020**
Mentor   *Rice University, Houston, TX*

Rice Harvey Action Team - Demolition and Cleanup Crew   **September - November 2017**
Volunteer   *Houston, TX*

- Helped clean and restore flooded houses in the Houston community after Hurricane Harvey and remove damaged drywall, carpets, floors, and furniture.

TOOLS AND SKILLS

Programming: Python, Keras, TensorFlow, PyTorch, MATLAB, HTML/CSS, OpenCV, Docker, Arduino, Shell

Knowledgeable In: Machine Learning, Deep Learning, Computer Vision, Signal Processing, Optimization, Image Processing, Illustrator, 3D Printing, Soldering, Optics, Linux, Windows