Ewa Magdalena Nowara, Ph.D.

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SUMMARY

Strong experience in leading research and product development in Computer Vision and Deep Learning. Published over 10 publications in top tier vision and machine learning venues. Owner of two patents. Three years of industry research experience in Microsoft Research and Mitsubishi Electric Research Laboratories. Passionate about my research having an impact on products to improve people's quality and enjoyment of life.

EDUCATION

Ph.D. in Electrical and Computer Engineering **August 2015 - May 2021**
Rice University, Houston, TX
Thesis: Imaging Photoplethysmography in Unconstrained Settings

Master of Science in Electrical and Computer Engineering **August 2015 - May 2018**
Rice University, Houston, TX

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)

RELEVANT SKILLS

Programming: Python, Keras, TensorFlow, PyTorch, MATLAB, HTML/CSS, OpenCV, Docker, Arduino, Shell
Expertise In: Machine Learning, Deep Learning, Computer Vision, Signal Processing, Optimization, Image Processing
Experience In: Illustrator, 3D Printing, Soldering, Optics, Linux, Windows
Competencies: Strong interpersonal skills, excellent communicator, team player, data analytical skills, detail-oriented

RESEARCH AND WORK EXPERIENCE

Johns Hopkins University **May 2021 - Present**
Postdoctoral Research Fellow in Electrical and Computer Engineering, Baltimore, MD
Mentor: Prof. Rama Chellappa

- Building computer vision and machine learning algorithms for geo-localization from a single RGB image in a classification setting, including Transformer, Resnet, and Triplet Network architectures
- Designing multi-modal models leveraging both RGB images and corresponding semantic segmentation maps to improve the model's invariance to appearance changes

Los Alamos National Laboratory **October 2020 - February 2021**
Research Intern (Theoretical Division, T-5), Los Alamos, NM
Mentor: Brendt Wohlberg

- Developed Encoder-Decoder and Long-Short-Term Memory (LSTM) architectures to reconstruct high resolution images obtained from multiple ptychographic measurements without access to ground truth

Microsoft Research **June 2019 - June 2020**
Research Intern (Human Understanding and Empathy Team), Redmond, WA
Mentors: Daniel McDuff, Mary Czerwinski

- Built a novel Convolutional Attention Neural Network to denoise temporal intensity signals from video
- Created realistic 3D avatars using computer graphics and physiological signals obtained from video
- Recovered physiological intensity variations from heavily compressed videos using supervised deep learning

Mitsubishi Electric Research Laboratories **May 2017 - June 2019**
Research Intern (Computer Vision Team), Cambridge, MA
Mentors: Tim Marks, Hassan Mansour

- Collaboratively designed a driver monitoring system using a joint design of hardware and algorithms

- Built a hardware system by using RGB and NIR cameras, optical and 3D printed components, light sources synchronized with camera frame capture
- Developed optimization and signal processing algorithms using Robust Principal Components Analysis (RPCA), Alternating Direction Method of Multipliers (ADMM), Fast Iterative Shrinkage-Thresholding Algorithm (FISTA), face detection, tracking
- Collected and released the first large public driving dataset with face videos and physiology

SELECTED RECENT PUBLICATIONS (Full list on Google Scholar)

1. **Nowara, E. M.**, McDuff, D., Veeraraghavan, A. "The Benefit of 'Distraction': Denoising Video-Based Physiological Measurements using Inverse Attention" *ICCV,* 2021
2. **Nowara, E. M.**, McDuff, D., Veeraraghavan, A. "Combining Magnification and Measurement for Non-Contact Cardiac Monitoring" *CVPR Workshops*, 2021
3. **Nowara, E. M.**, McDuff, D., "'Warm Bodies': A Post-Processing Technique for Animating Dynamic Blood Flow on Photos and Avatars" *ACM CHI Conference on Human Factors in Computing Systems, 2021*
4. **Nowara, E. M.**, McDuff, D., Veeraraghavan, A. "A Systematic Analysis of Video-based Pulse Measurement from Compressed Videos" *Biomedical Optics Express,* 12.1 494-508, *2021*
5. **Nowara, E. M.**, Marks, T. K., Mansour, H., Veeraraghavan, A. "Near-Infrared Imaging Photoplethysmography During Driving" *IEEE Tr1ansactions on Intelligent Transportation Systems, 2020*
6. **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
7. **Nowara, E. M.**, Sabharwal, A., Veeraraghavan, A. "PPGSecure: Biometrics Presentation Attack Detection Using Photoplethysmograms." *Automatic Face and Gesture Recognition (FG),* 2017

PATENTS

1. 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 of a Person in a Volatile Environment." *US Patent App. 17/199,696, 2021*
2. 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

SELECTED AWARDS AND HONORS

- Invited speaker, 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**

LEADERSHIP AND MENTORSHIP

Vital Sign AI (startup volunteer project) **April 2020 - December 2020**

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

Reviewer **August 2019 - Present**

- Served as a reviewer for top tier computer vision, machine learning, and biomedical engineering conferences and journals, including CVPR, ICCV Workshops, AAAI, Face and Gesture Conference, Biomedical Optics Express, Journal of Biomedical and Health Informatics

Research Experience for Undergraduates (REU) **Summers of 2016, 2020**

Mentor, *Rice University, Houston, TX*

- Mentored undergraduate students in research projects in Computer Vision and Computational Photography