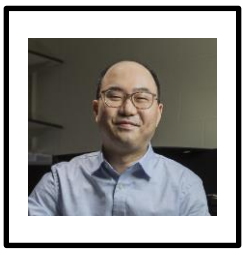
Hyperspectral Learning for Mobile Health Applications

Young L. Kim, PhD, MSCI
Professor and Associate Head for Research, Weldon School of Biomedical Engineering,
Purdue Quantum Science and Engineering Institute
Showalter Faculty Scholar and University Faculty Scholar, Purdue University
Health Scientist, Centers for Disease Control and Prevention (cdc.gov)

206 S. Martin Jischke Dr., West Lafayette, IN
Email: youngkim@purdue.edu | Tel: 765-496-2445 |
https://web.ics.purdue.edu/~kim50

Abstract
One of my current research area focuses on physics/biology-informed machine learning to address large-scale health challenges. This talk will focus on hyperspectral learning that can recover detailed spectra information from a red-green-blue (RGB) image that can easily be taken using smartphone cameras. Hyperspectral learning exploits the idea that a photograph is more than merely a picture and contains detailed spectral information. To overcome limitations of purely driven machine learning, the domain knowledge about tissue optics and machine vision are further incorporated into learning algorithms to ease the requirement of a large training dataset. In this talk, we will discuss mobile health (mHealth) applications with a focus of hemodynamic parameters, such as blood hemoglobin content and oxygen saturation, for several different diseases and disorders. We will also share ongoing mHealth research in sub-Saharan Africa including Kenya and Rwanda. This approach has reciprocal innovation, allowing mHealth technologies developed in the resource-limited settings to be brought back to the US, as demonstrated in our mHealth surveillance study with Centers for Disease Control and Prevention. Overall, AI powered mHealth technologies can potentially offer mobility, simplicity, and affordability for rapid and scalable adaptation in a variety of digital health applications, including telemedicine.

Bio



Young Kim is Professor and Associate Head for Research of Weldon School of Biomedical Engineering at Purdue University. He is a scientist at Centers for Disease Control and Prevention. He has affiliations with Purdue Quantum Science and Engineering Institute, Regenstrief Center for Healthcare Engineering, and Purdue Institute for Cancer Research. His current areas of research include data-centric biophotonics and hybridization of physical and digital properties. He has successfully managed an atypically broad spectrum of work ranging from cancer research, machine learning, optical imaging, spectroscopy, biomaterials, metamaterials, to cryptographic primitives. In particular, he is currently working on reciprocal innovation such that mHealth technologies developed in resource-limited settings can be brought back to developed country settings, which was recognized as the First Prize of the NIH Technology Accelerator Challenge 2020. He has also pioneered cyberphysical biomedical security technology development for medicines and pharmaceutical products, supported by the AFOSR Cybersecurity Program. Young Kim received his PhD and MSCI (Master of Science in Clinical Investigation) from Northwestern University and postdoctoral training supported by NIH NCI Cancer Research Careers program.