Contribution ID: **71** Type: **Poster**

Toward Affordable Multispectral Methods for Optical Glucose Detection Using Sugar Solutions and Blood-Like Tissue Phantoms

Saturday 1 November 2025 11:45 (1 hour)

Accurately measuring blood glucose levels without drawing blood remains difficult because glucose has weak optical absorption and biological tissue introduces strong background interference. In this work, we explore whether a compact, low-cost multispectral sensor (SparkFun Triad AS7265x, 410–940 nm) can detect glucose-related optical changes. Sugar solutions ranging from 5–35% w/v were measured at several sensor–sample distances, with an 8 mm spacing yielding the most consistent spectral data. After normalization, Partial Least Squares (PLS) regression produced excellent calibration performance ($R^2 \approx 1.00$; RMSE ≈ 0.10%), demonstrating sensitivity to concentration-dependent changes stemming from scattering and refractive index variations. To better mimic physiological conditions, glucose was added to tissue-like optical phantoms composed of Intralipid and India ink. Preliminary measurements show subtle yet detectable spectral trends in the visible to near-infrared region. Overall, these results suggest that pairing low-cost multispectral sensing with multivariate analysis can provide coarse glucose estimates and represents a promising step toward portable, non-invasive monitoring technologies.

Authors: Dr CHETIA, Dipankar (North Lakhimpur University); Mr BORAH, Nikunja Ranjan (North Lakhimpur University)

Presenters: Dr CHETIA, Dipankar (North Lakhimpur University); Mr BORAH, Nikunja Ranjan (North Lakhimpur University)

Session Classification: Poster Presentations

Track Classification: Track 02: Electronics & Photonics, Computational Physics, Applied & Engineering Physics