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**Applied Physics 187 - Project Proposal**

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Mobile Phone as Hyperspectral Camera

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# OVERVIEW

An inverse color rendition problem shall be solved using a Machine Learning approach. Taking in RGB as inputs, the architecture shall be able to predict the continuously varying fine-grained spectral response from 400-700 nm in steps of 10 nm. Using the measured spectral sensitivity of the phone and a desired illuminant, munsell reflectances shall be rendered to create 1269 RGB-Reflectance pairs. These pairs will serve as the training data in which the network adjust its weights for an end-to-end mapping with decreasing Root-Mean-Square-Error. For testing, literature Macbeth reflectances will be predicted using the color simulation digital counts. The reflectances will also be predicted using the images from actual captures of the Macbeth color chart. Spectral and Colorimetric accuracy evaluation will be carried out to measure the effectiveness of our hand-held mobile phone hyperspectral images.

# GOALS

1. Measure the spectral sensitivity of a mobile phone and together with a desired illuminant, render the RGB colors of Munsell Reflectances.
2. Apply machine learning to solve an inverse color rendition problem.
3. Predict the spectral response using the model’s saved training weights.
4. Transform our mobile phone’s RGB camera into a hyperspectral camera (If possible, a live-feed one) by implementing a pixel-wise prediction
5. Include applications of hyperspectral imaging [ <https://resonon.com/applications>] \*\*

\*\*If time permits