Micro-goniophotometer
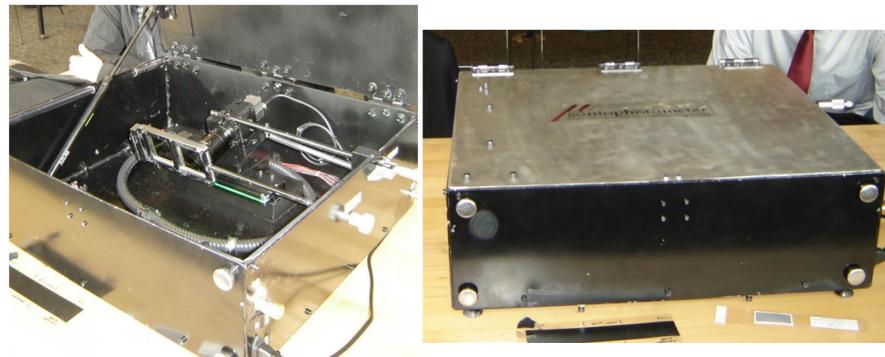## Micro-gloss Measurement Device

Team Members: Ahmed Alfadhel (EE), Jason Smith (ME), Tim Salter (ME), Mike Neurohr (CE)
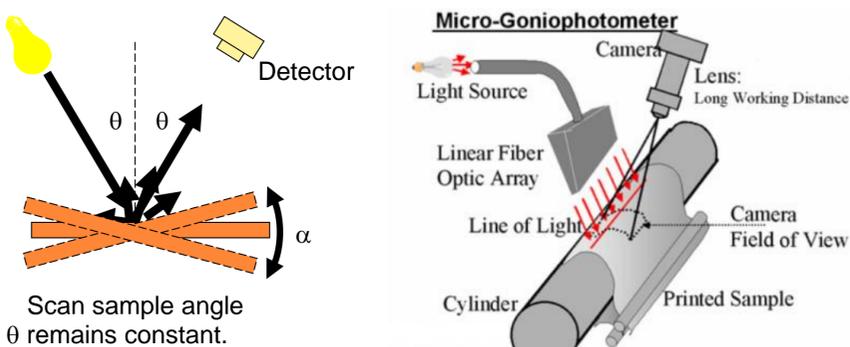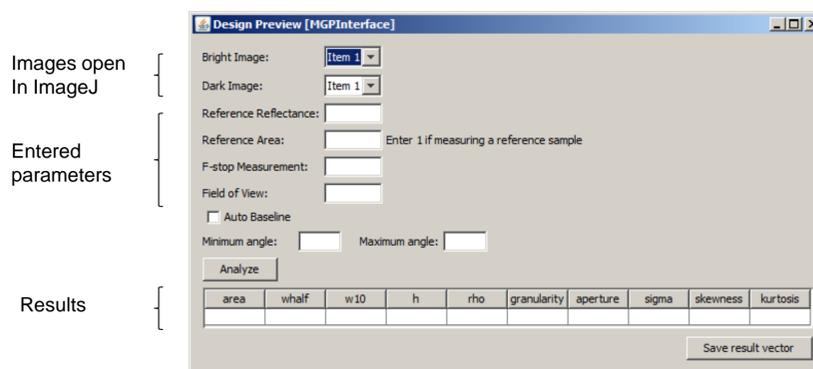**Faculty Guide:** Gerry Garavuso

Project Summary

The word "gloss" is intuitively easy to understand, but making an optical measurement that correlates well with the perception of gloss remains a challenge. The hypothesis behind this project is that both spatial resolution (micro) and angular resolution (gonio) are required of an instrument in order to correlate meaningfully with visual perceptions of gloss and also with the underlying causes of gloss. Thus, a micro-goniophotometric instrument has been developed and demonstrated. This instrument collects polarized and un-polarized reflections from a sample wrapped in a cylindrical shape to extract the specular and diffuse components. This instrument has been successful in collecting more information than a traditional gloss meter, and the device output was correlated to human visual perception.
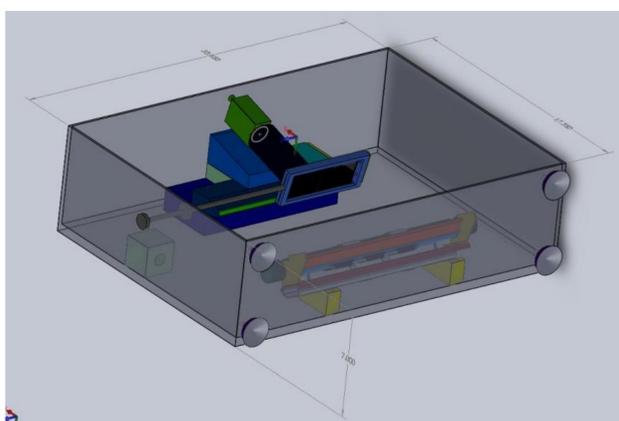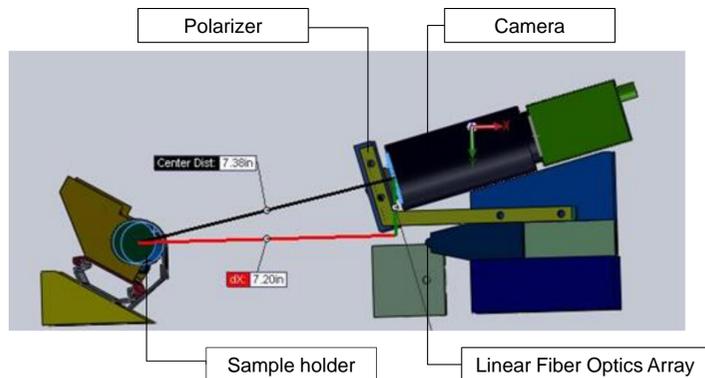

Detector

Scan sample angle θ remains constant.

Micro-Goniophotometer

Concepts

Hardware:

Software:

Data analysis and Easy to use GUI programmed in Java

Images open In ImageJ

Entered parameters

Results

Test Results

Bright Image

Dark Image (polarized)

Results Consistency:

Probability Plot
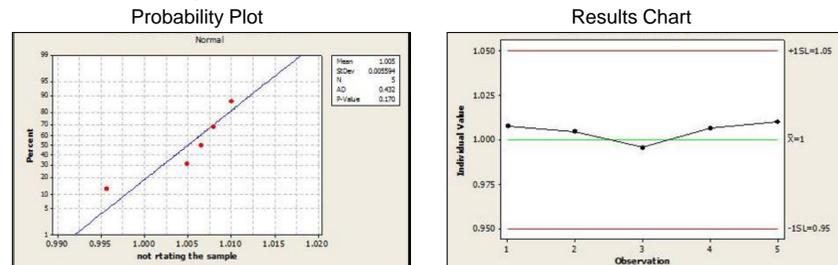
Results Chart
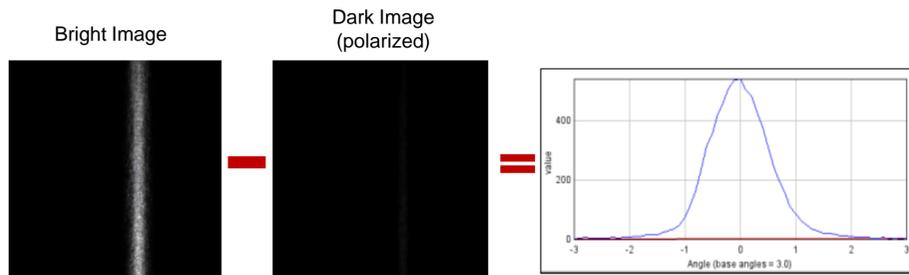
• High gloss samples will have a narrow curve (smaller angle) and higher magnitude than low gloss samples

• Results are analyzed and computed with respect to a reference sample

Potential Future Improvements

• Miniaturize the device by using a smaller camera, using only spaces needed and using a different sample loading mechanism

• Simplifying the device operation by:

    • Designing a self sensing mechanism for saturation adjustment

    • Using a controller to slide the polarizer

    • Automate the mechanism of determining the field of view

    • Integrate these processes in the Java code

Acknowledgments

Tim Salter   Ahmed Alfadhel   Mike Neurohr   Jason Smith

Website:

https://edge.rit.edu/content/P10541/public/Home

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