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LED Array Design to Simulate Solar Radiation for Indoor Testing of Solar Cells

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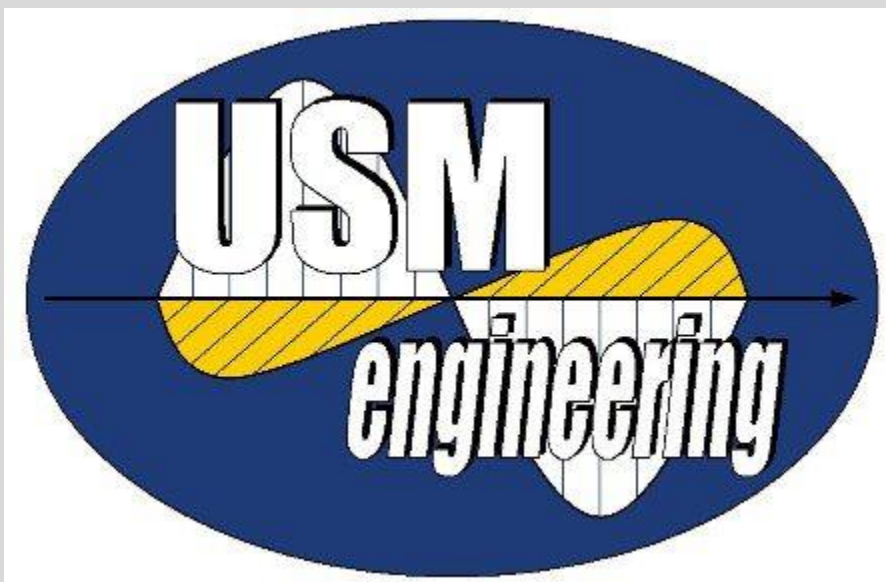
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LED Array Design to Simulate Solar Radiation for Indoor Testing of Solar Cells

EGN 402 / 403 : Senior Design Project

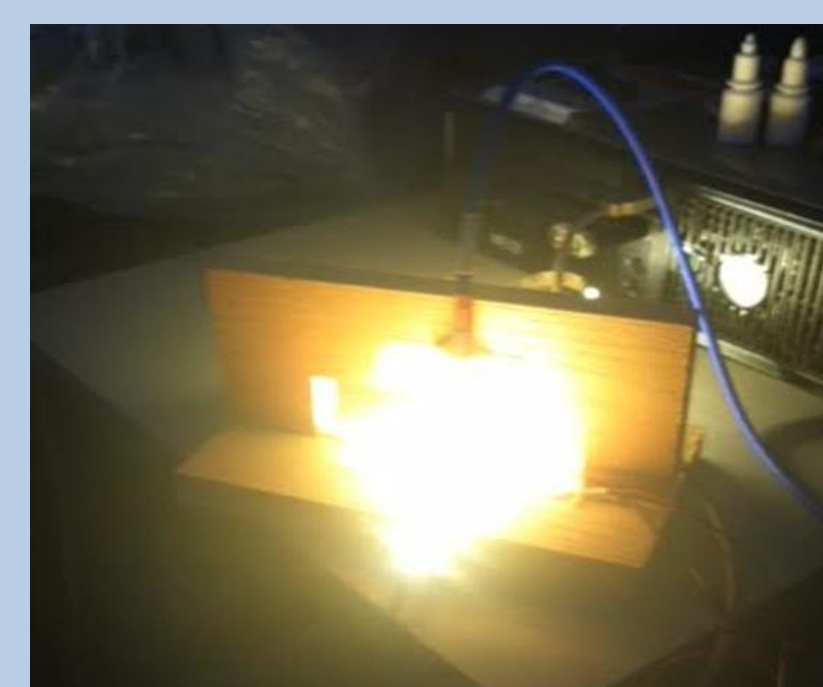
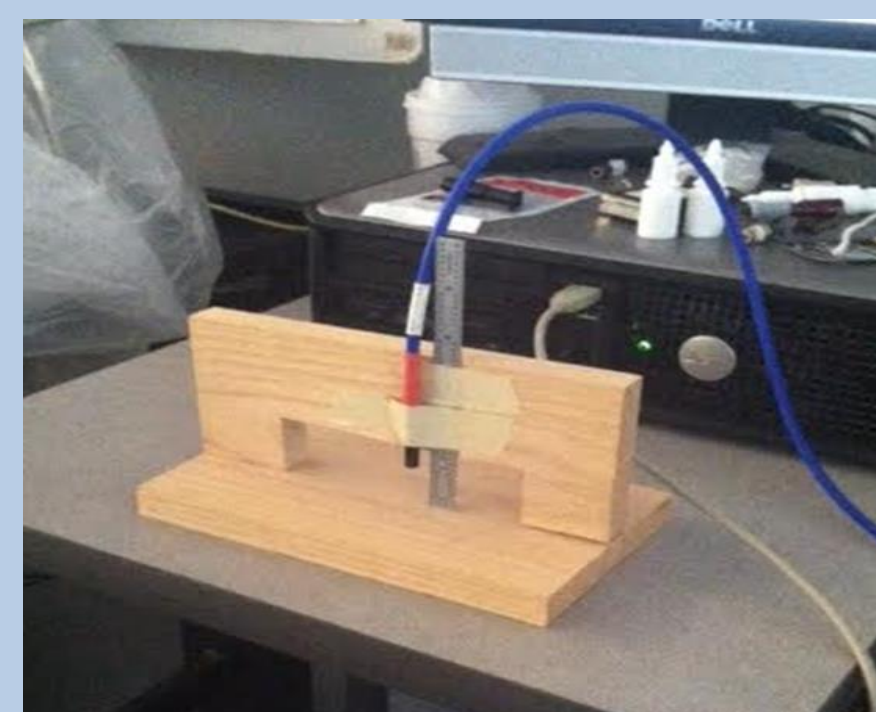
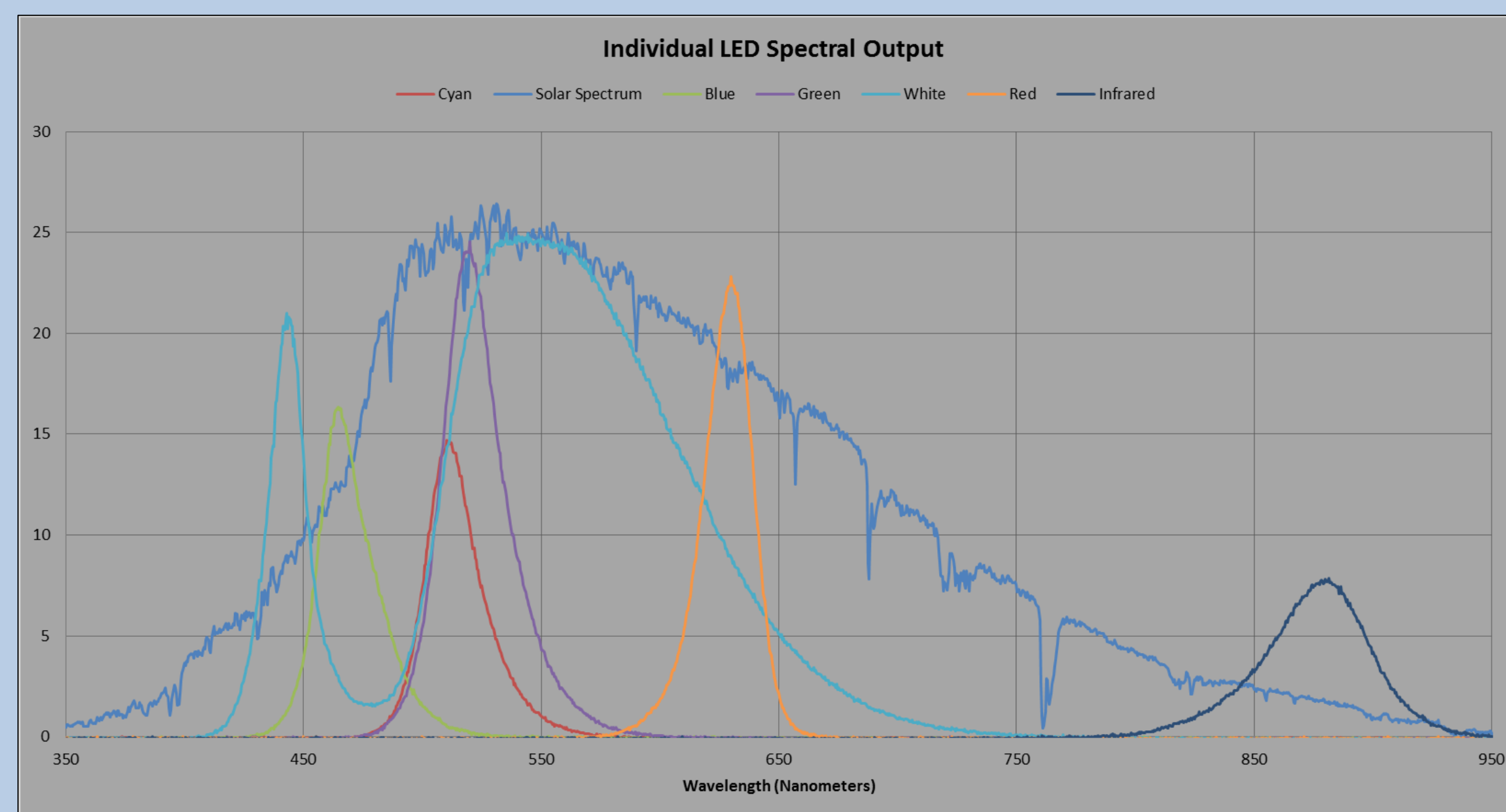


Student: Brent Dube

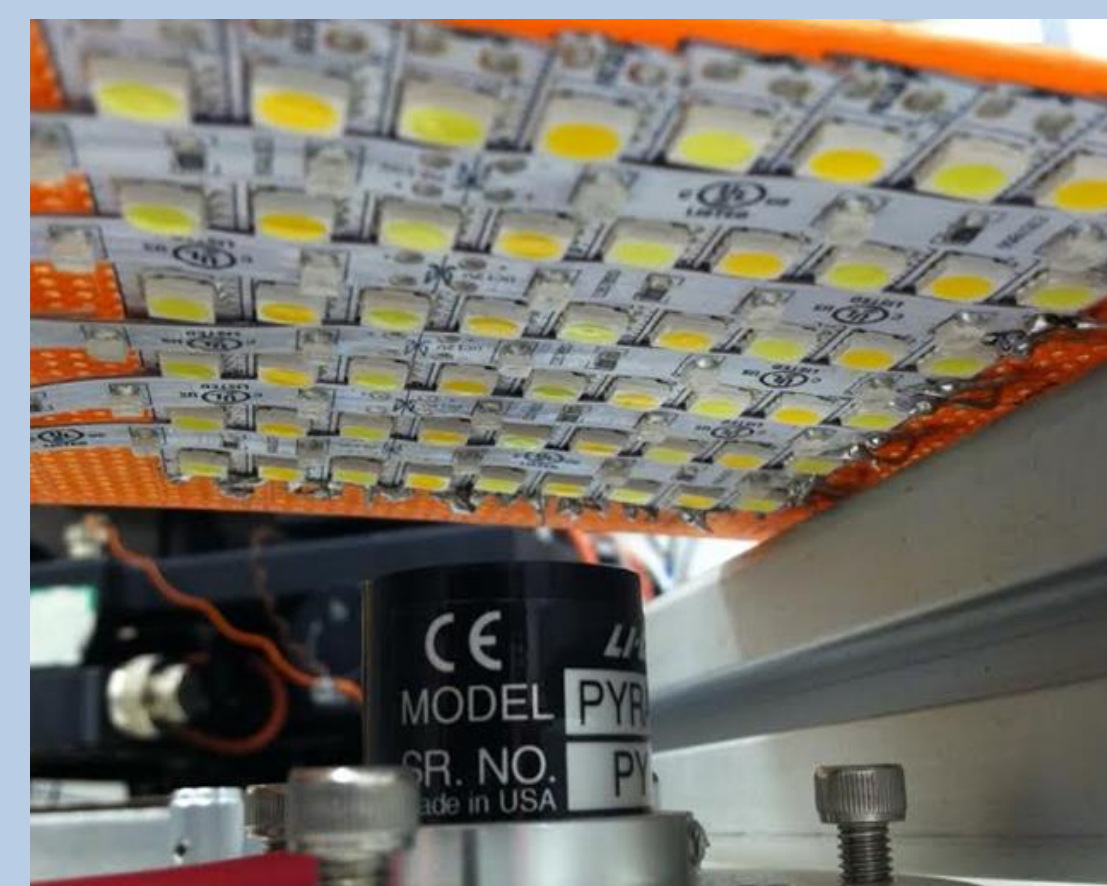
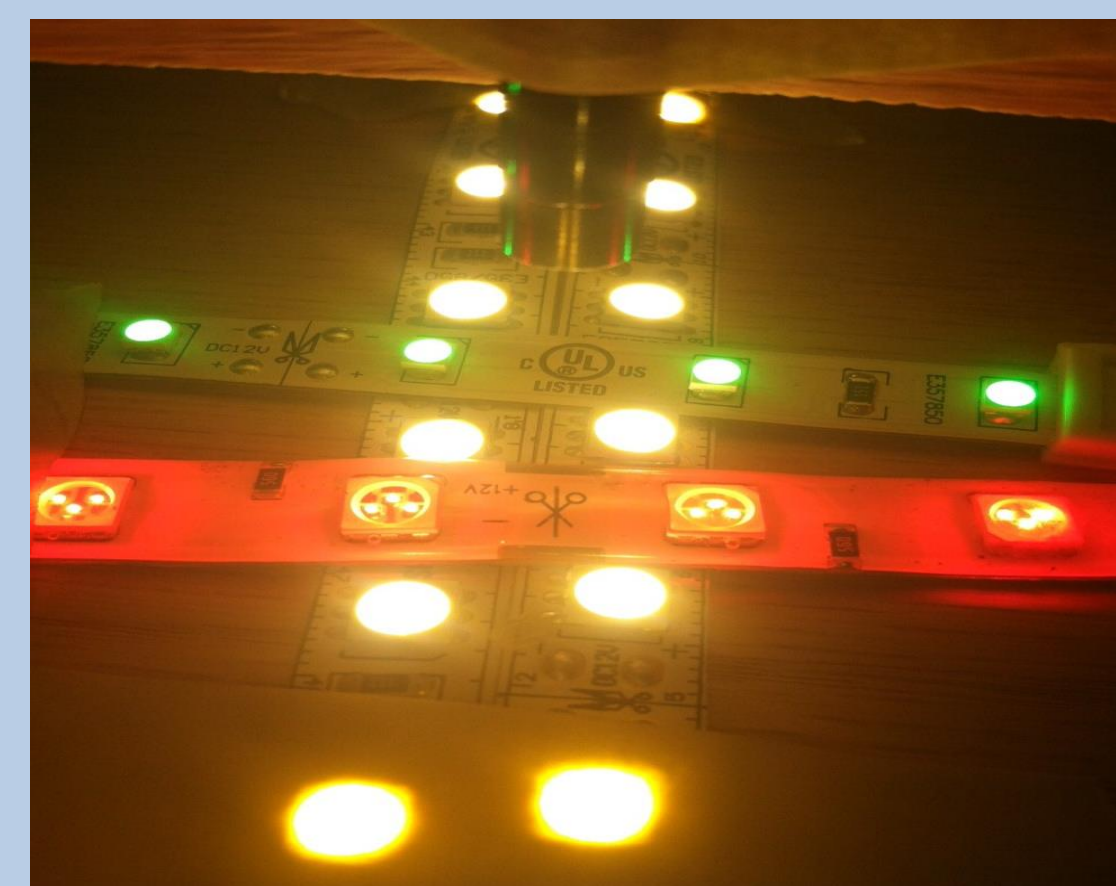
Advisor: Dr. Mustafa Guvench



LED Testing



Previous Design



Problem Statement

Solar Cell Testing is Vital to the Development of New Technologies. However, the Sun's Radiation is Inconsistent over Time of Day, and Season. Therefore, a Reliable Source of Light Energy is Necessary for Consistent and Accurate Testing.

The Goal

The Goal of this Project is to Design, Build and Test a Portable Solar Simulator Constructed of Light Emitting Diodes and Halogen Bulbs. The Simulator Should; Meet the AM1.5 Standard for Intensity and Bandwidth, and Have Uniformity over the Surface (10% Variation or Better).

Conclusion

Due to the Deficiencies in Both Spectral Response and Intensity, the Simulator Built Entirely of LED's Could not Meet the Design Standards Provided. However, the Introduction of a Halogen Bulb Allows for a Reasonable Simulation of the Sun's Intensity and Spectral Response.

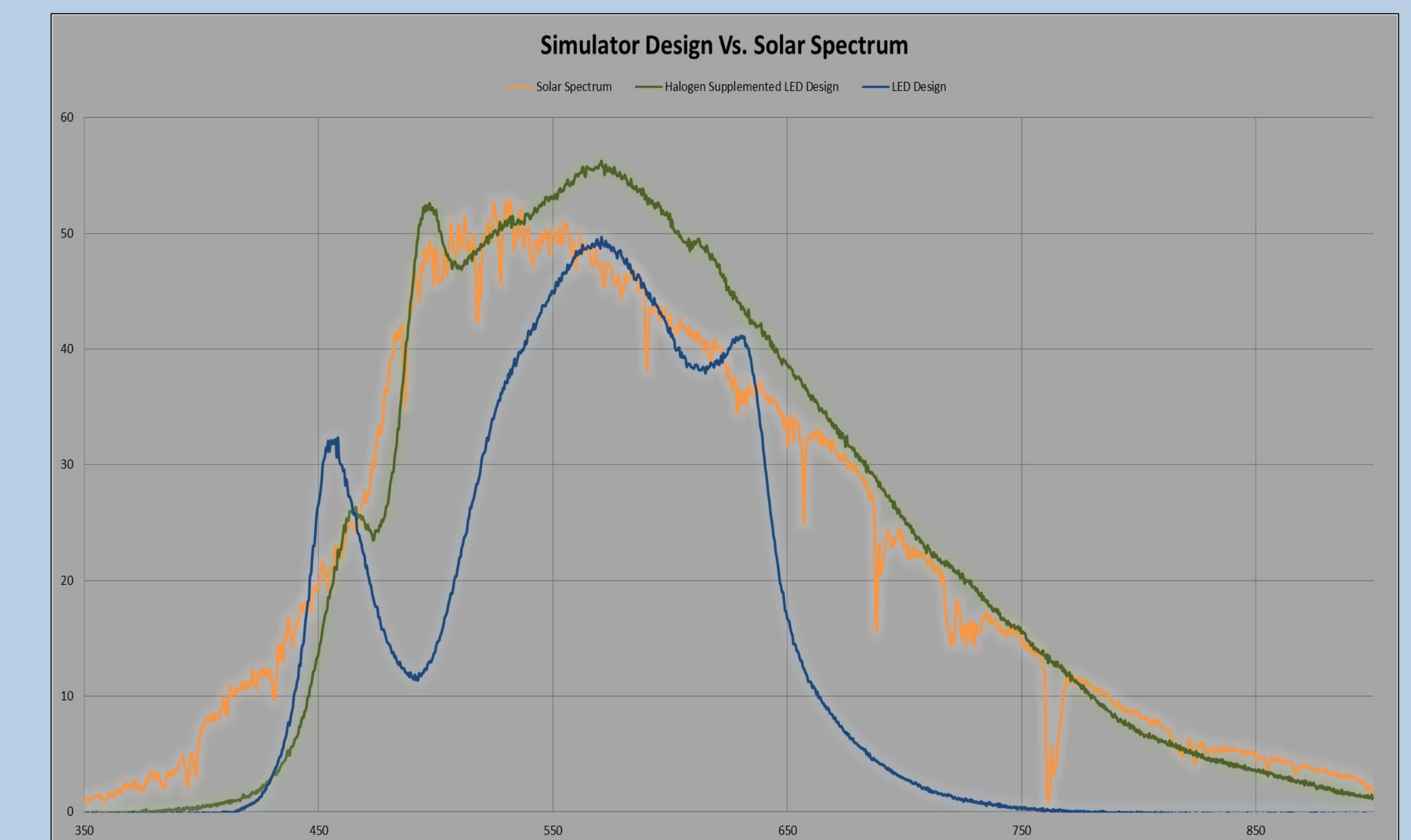
Moving Forward

Heat Management Will be the Biggest Challenge Moving Forward. This Simulator Can Only be Used for Short Periods of Time Without Overheating the Solar Cell. The Next Step in the Development of This Prototype is to Include Heat Dissipation.

Acknowledgements

Thank You Dr. Mustafa Guvench for Your Constant Guidance, along with Dr. James Masi for hints and references along the way. Thank You to my Peers for Support and for Sharing the Journey.

Halogen Supplement



The Introduction of the Halogen Bulb to the Simulator both Increases the Intensity and Fills the Missing Spectrum.

Current Prototype

