

Senior Design Project Description for Fall 2018- spring 2019

Project Title: Automated Electroluminescence Characterization Tool (UNCC_ECSED)

Supporter: UNCC ECE

Supporter Technical Representative: ASSIGNED

Faculty Mentor: ASSIGNED TBD (check one)

Single Team Dual Team (check one)

Personnel (EN/ET): 2 E, 2 Cp, Cv, M, SE

(Complete if the number of students required is known)

Expected person-hours: (250 per student)

Description of Project:

Electroluminescence (EL) is an optical/electrical phenomena in which a material emits light in response to the passage of an electric current or to a strong electric field. This technique is used to characterize the series resistance of electronic devices, especially, to ascertain the contacts quality. In this work, an electric current is applied to a device such as solar cell mounted on a stage (Fig. 1) in the dark, with an IR camera mounted atop to capture the image as it lights up. Students will use the low-cost IR camera to capture clear images of a solar cell (multiple busbars) and from these images quantify the series resistance of a solar cell.

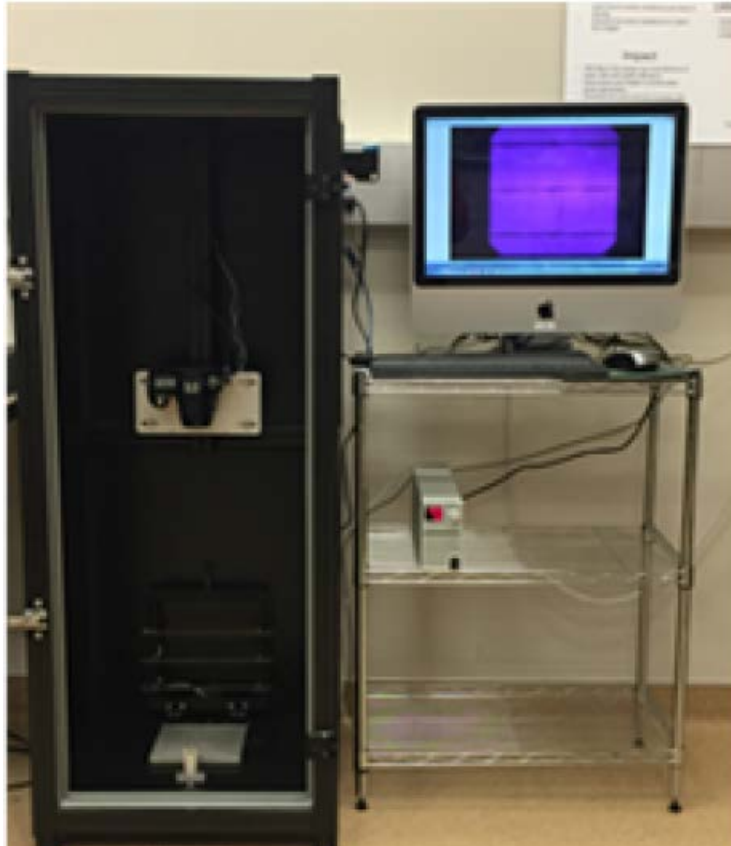


Figure one

Initial Project Requirements (e.g. weight, size, etc.):

- (i) IR camera
- (ii) Solar cell
- (iii) Lenses
- (iv) Power supply (10 A)

Expected Deliverables/Results:

- (i) Use the provided IR camera to take solar cell images at an exposure time of up to 1s. Establish communication between the power supply and IR camera with Labview or MatLab program.
- (ii) Automate the system so that at the press of one button, the data is acquired.
- (iii) Show very clear images that is easy to identify the dark spots that could be due to series resistance
- (iv) Quantify the series resistance to match the images
- (v) Prepare a conference paper for presentation

List here any specific skills or knowledge needed or suggested (If none please state none):

Electrical Engineering or Electrical Engineering Technology

- Circuit design
- Device fabrication and utilization of clean room facilities
- VLSI design
- Communication and wireless
- Power systems and power management
- Robot control and systems

Computer Engineering

- Embedded systems and software development
- Advanced Logic design and computer architecture
- Advanced FPGA development in VHDL and/or Verilog
- Communications
- Robot control and systems