

Exterior Window Awnings

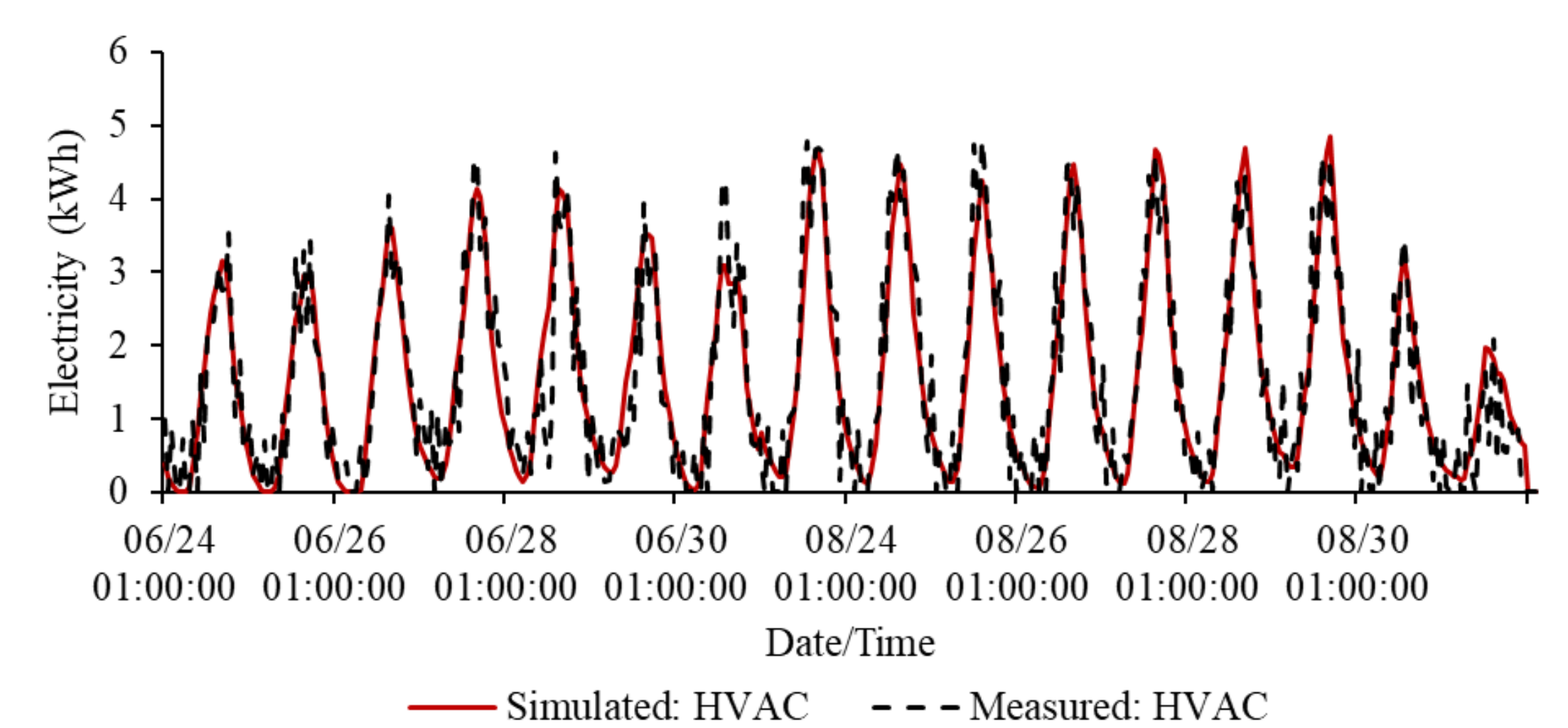
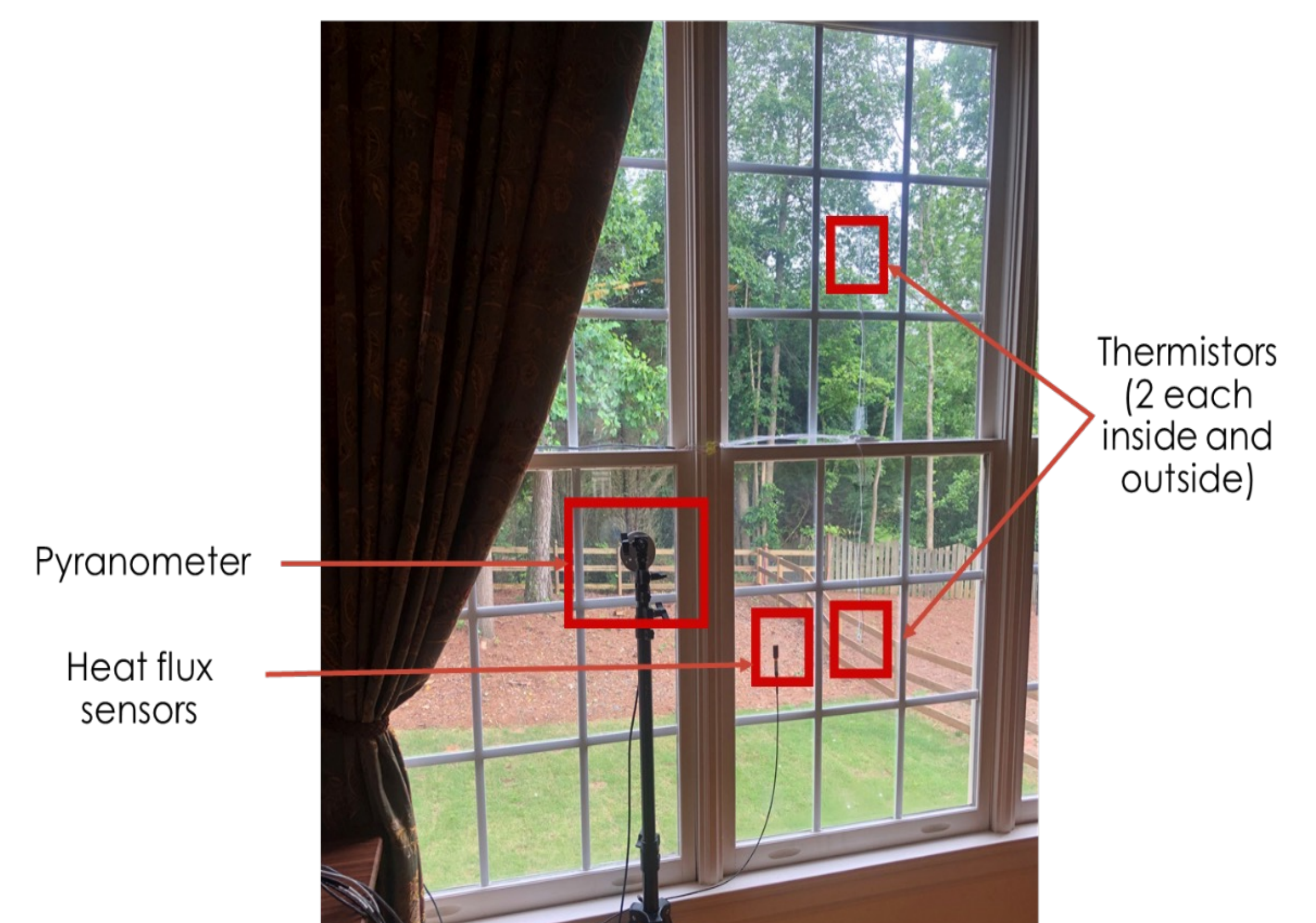
Niraj Kunwar, R&D Associate

Problem Addressed

- Solar heat gain is one of the largest and most variable cooling loads in buildings.
- Shading devices at windows can mitigate solar heat gain.
- The energy savings potential of exterior awnings has not been evaluated using field measurements.
- The performance evaluation of awnings using simulation and field testing helps in their rating and adoption.

Current Research

- Collaboration with Glen Raven Sunbrella Fabrics and Somfy Automation Systems
- Exterior awnings were installed in a real residential home located in Atlanta, GA.
- The house was equipped with sensors for HVAC electricity consumption, solar radiation, temperature, relative humidity, and daylighting.
- An energy model was created and calibrated for the building.
- Energy simulation was performed using DOE prototype residential buildings for performance evaluation in climate zones 1–4.



Major Impacts

- Average daily energy savings from experimental testing was ~4.5 kWh (15.5%) from awnings compared with the case without any shades.
- Model calibration was performed for the building energy model with awnings using hourly data within $\pm 15\%$ mean biased error.
- HVAC energy savings from annual simulation ranged from ~450 to 1,000 kWh.

