

Title: Passive Heating Strategies for Housing in cold regions: Climate-Responsive Design for Energy-Efficiency

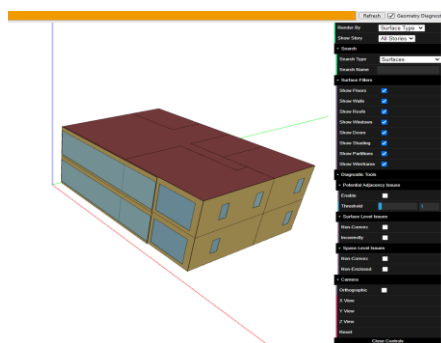
Duration: June 2025 to March 2026

Deliverables:

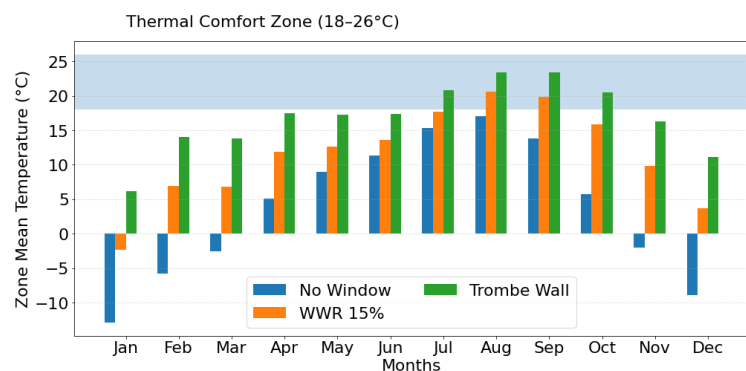
- Conceptual outline of passive heating design recommendations suitable for cold regions

Significant Achievements:

- Systematic evaluation of south-facing window-to-wall ratio (WWR) to quantify its effect on passive solar heat gain and indoor thermal performance for housing in cold-arid climates.
- Performance assessment of unvented Trombe wall systems in enhancing indoor thermal comfort through heat storage and delayed heat release.
- Investigation of glazing configurations in Trombe wall systems to evaluate their impact on thermal retention, temperature stability, and heat-loss reduction.
- Parametric study of Trombe wall façade coverage and development of passive heating design recommendations for climate-responsive residential buildings in cold regions.



Model of a G+1 residential building for numerical simulations



Zone mean temperature for a room from numerical simulations

Team: Dr. M. Keerthana

Date: July 2026