**Comprehensive Assessment of Thermal Comfort**

Thermal comfort in the CUSD home is a top priority for our team. Accordingly, we designed a redundant HVAC system that would carefully manage the comfort of our decathletes and guests throughout the competition and the life of the house. The CUSD home's HVAC system was optimized for Washington, DC, with the cold Ithaca climate in mind. Our design tools included a schematic energy-modeling interface called TREAT, which was built off of the SuNREL platform. TREAT was used to passively condition the space. Our schematic energy modeling helped us properly size window areas, overhangs, and building mass distribution. We used a computation fluid dynamics (CFD) package called AirPak, to refine our design. The home was modeled in both summer and winter design scenarios for Washington, DC.

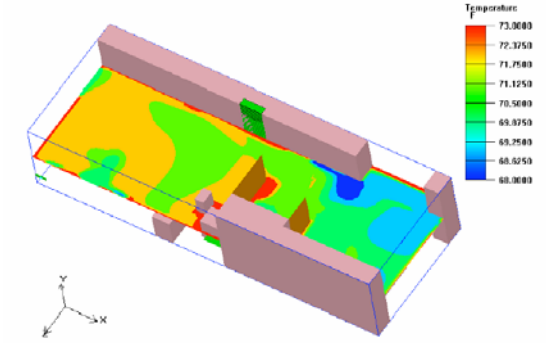


*Figure 6. Summer Temperature*

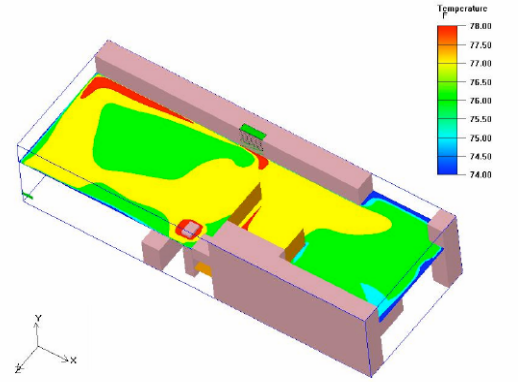


*Figure 10. Winter Temperature*

While the design process of our HVAC system was intricate, we simplified the user controls to accommodate the expectation of the average American. Our HVAC system is centrally controlled by a thermostat, located in the middle of our home.

To heat the CUSD home, we chose to use a radiant floor system with heat supplied by evacuated tube solar collectors. The radiant floor was the most economical and sustainable way to heat the space. To ventilate and cool the space, we chose to use a Trane forced-air split-system reversible heat pump, complemented by a desiccant energy recovery ventilator (DERV). The DERV was custom manufactured by Rotor Source, and is made of a non-toxic silica gel wheel, which exchanges humidity and heat between the intake and exhaust airstreams. The split-system heat pump is oversized to accommodate additional living units and increased system demand. The reversible heat pump supplements the radiant floor heating, providing system redundancy in case the radiant floor is disabled.

Once we specified and sized our HVAC system, we had to model the airflow patterns in the house to make sure there were no cold or hot spots in the house. We also had to make sure there were no spaces with stale air or high pollutant concentrations. We placed our two supply ducts near the largest apertures on the southern and northern sides of the building. This helped to offset downdrafts created by low window temperatures. Placing a return vent in the middle of the house, near the mechanical closet, provided all spaces with balanced temperatures, humidity, and fresh air. Our design tools, technologies and construction methods have provided us with a solid HVAC system that is sure to provide excellent thermal comfort to our visitors.