Dr. Mohammad Heidarinejad

Dr. Mohammad Heidarinejad is an Associate Professor in the Department of Civil, Architectural, and Environmental Engineering at the Illinois Institute of Technology in Chicago.

Dr. Brent Stephens is the Arthur W. Hill Endowed Professor in Sustainability and Department Chair in the Department of Civil, Architectural, and Environmental Engineering at the Illinois Institute of Technology in Chicago.

TEAM MEMBERS

- Kezia Patino, Andrew Marcoux, Jose Muniz, Kevin Ruiz, Andrew Edwards, Brent Stephens, Mohammad Heidarinejad
- ASHRAE Illinois Chapter

FUNDING

ASHRAE Grant: $5,000
Funding Source Name: water-source heat pump (WSHP) donated from Windy City Representatives (~$1,500)

DURATION

24 Months

Training the next generation of architectural engineering and mechanical engineering students to understand the operation of vapor compression cycles

Illinois Institute of Technology, Chicago, Illinois, USA

OUR STORY

The project provided Illinois Tech's architectural engineering and mechanical engineering students with hands-on experience in designing and building a vapor-compression cycle and then operating it. They collaborated throughout this work, beginning with the system design and construction in the Armour Undergraduate R&D program and CAE 208/320: Thermodynamics. By building and operating the system, the team gained a practical understanding of vapor-compression system components, thermodynamic processes, and overall system operation. The completed system has been and will continue to be integrated into Thermodynamics and HVAC systems Design courses, where it continues to support students' applied learning.

OUR PROJECT

The project centers on a small water-source heat pump (WSHP) equipped with instrumentation to monitor temperature, pressure, and flow rate, and to observe the flow behavior in the system. The installation includes a compact water tank, control valves, pumps, and associated piping arranged in a fully closed loop, all mounted on a mobile frame. Students designed the system, calculated pressure losses, and tested its performance under multiple operating conditions. The setup will be used in the Thermodynamics course to illustrate the components of a vapor-compression system and in the HVAC Systems Design course to cover both the vapor-compression cycle and the hydronic side of the system. It is also expected to support future measurement/instrumentation and building controls courses.