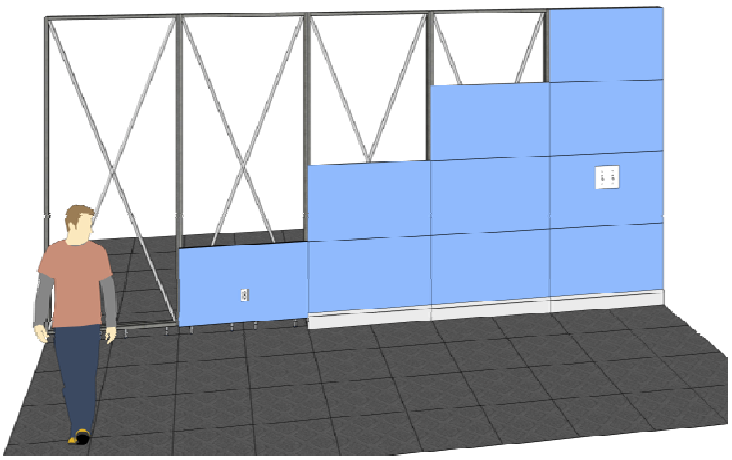
Flexible Floor Plans: A Modular, Reconfigurable, and Sustainable Floor and Wall System



Impact: As buildings become more sustainable, there remains an inevitable need to renovate for more space or reconfigure floor plans. For a variety of reasons, homeowners often have to renovate or move to new homes, which can result in large quantities of material and energy wasted. For green buildings, material reuse is encouraged, but old wall and floor materials are often difficult to reuse. One possible solution is a modular wall and floor system that can provide an abundance of floor plan flexibility, better indoor air quality, and improved energy efficiency.

The proposed flexible floor plan system encourages smaller and smarter building design, allowing for waste-free renovations. Additionally, construction times for new homes could be significantly reduced if interior walls did not need to be placed until the house was ready to move into.

Project Overview: The project team will design and test a modular floor and wall system prototype that is sustainable and appropriate for residential applications. The model will be lightweight to allow for reconfiguration by ordinary residents, allow for customized finishing materials, be soundproof, and maximize the usage of local materials. For the modular floor prototype, Drexel will be adapting a Haworth raised floor. The finished product will allow for future homes that have the potential for inexpensive future renovations that are easy to do and significantly less wasteful. Additionally, the project will develop a guideline for integrating underfloor ventilation and electronics such as light switches and thermostats into the modular floor plan. This underfloor system will reduce residential operational costs by reducing energy usage and minimizing the need for renovations. In turn, residents will feel more encouraged to stay in their homes or apartments longer.

GBA Product Innovation Grant Amount: $20,000

Leadership Team: This project is led by Drexel University's Dr. Jin Wen, an Assistant Professor in the Department of Civil, Architectural, and Environmental Engineering who is actively involved with building HVAC systems, and Jameson Detweiler, a doctoral student in Civil Engineering and President of the Drexel Smart House, a "living laboratory" to test new technology and designs. Haworth Inc.'s project representative is Lisa Teman-Rosenburg, the company's Business Development Director.

Contact: Dr. Jin Wen ▪ Drexel University ▪ (215) 895-4911▪ jinwen@drexel.edu ▪ www.drexel.edu