**If these walls could talk…**

With the transformation of many everyday objects into smart appliances, more and more space in our homes is being taken over by specialized gadgetry and wall fixtures. We currently choose between form and function. But what if we could seamlessly blend all of these smart technologies into our environment?

Researchers at Carnegie Mellon’s Human-Computer Interaction Institute (HCII) along with Disney Research Pittsburgh have found one potential solution in a ubiquitous, but often-overlooked feature—the standard wall.

“Walls are usually the largest surface area in a room,” said Chris Harrison, assistant professor in the HCII, “yet we don’t make much use of them other than to separate spaces, and perhaps hold up pictures and shelves.” This new smart wall technology, dubbed Wall++, takes advantage of necessary infrastructure by creating a single high-tech installation.

To create smart walls, researchers in the HCII attach a lattice of thin copper wire to ordinary walls and coat them with a diamond grid of a commonly found, nickel-based conductible paint. They connect both a mutual capacitance-sensing circuit board and radio frequency-sensing circuit board to these conductors, allowing users to interact with Wall++ in two distinct modes.

The mutual capacitance mode detects a user’s hands and body pose, similar to the multi-finger touchscreen technology found in tablets and phones. This touch-sensing technology could replace numerous switches and dials, instead allowing users to gesture over Wall++ to seamlessly close blinds, dim lights or turn up music. This mode also has the added benefit of pose tracking, with potential applications in interactive video games, athletic training programs, and medical treatment.

In the second mode, Wall++ senses electromagnetic signals from electrical appliances within the room to map their location and on/off state. This technology is in its nascent stage, but further development could provide real-time data from devices such as heart monitors and insulin pumps.

Although installing the copper wire requires some specialized skills, HCII researchers wanted to ensure Wall++ remains affordable. “Walls are large, so we knew that whatever technique we invented for smart walls would have to be low cost,” said Yang Zhang, a PhD student in the HCII. Overall, the cost is $20 per square meter, more than a regular paint job, but modest compared to other integrated smart technologies like the smart board, which retail around $1,500.