the LINK

Computer Science at CMU underpins divergent fields and endeavors in today's world, all of which LINK SCS to profound advances in art, culture, nature, the sciences and beyond.

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 University'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 attached a lattice of thin copper wire to ordinary walls and coat them with a diamond grid of a common, nickel-based conductive paint. They connected both a mutual capacitance-sensing circuit board and radio frequency-sensing circuit board to these conductive, 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 multifinger touchscreen technology found in tablets and phones, which could allow gestures over Wall++ to seamlessly close blinds, dim lights or turn up music. In the second mode, Wall++ senses electro-magnetic signals from electrical appliances within the room to map their location and on/off state, which could eventually provide real-time data from devices such as heart monitors and insulin pumps.

"Walls are large, so we knew that whatever technique we invented for smart walls would have to be low cost," said Yang Zhang, a Ph.D. 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 for around $1,500.