

Wi-Fi signals can see through walls

October 5 2009, by Lin Edwards

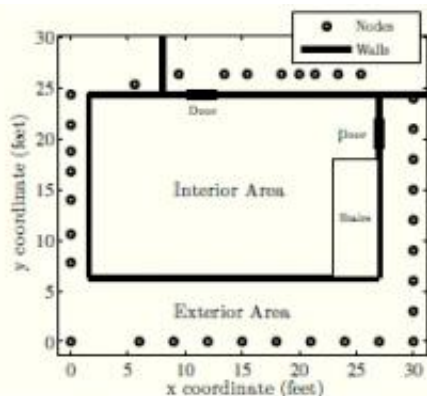


Fig. 2. The layout of a 34-node variance-based RTI through-wall tracking experiment.

Image: arXiv:0909.5417.

(PhysOrg.com) -- Researchers at the University of Utah, USA, have discovered that variations in signal strengths in wireless networks can be used to "see" movements of people on the other side of walls or doors.

The scientists, Joey Wilson and Neal Patwari, detected movements by measuring the [signal strength](#) of the [radio waves](#) between the nodes of wireless network devices. The presence of people moving through the field is registered as a change in signal strength. The space is interrogated by many signals that are picked up by many receivers, and this allows a picture of the movement in the space to be built up. The technique is called variance-based radio tomographic imaging.

Wilson and Patwari set up a 34-node network outside a living room in a house to test the system, and were able to detect movements to about three feet through the wall. At present the scientists are only able to detect movements, and are not yet able to generate images, but they are sure this will be possible in the future. They are equally confident they will be able to improve accuracy, even with fewer nodes. They also say that adding GPS to each node would enable it to work out its own location, and this should improve the imaging process.

The researchers expect the system to find application in search and rescue operations, such as finding people trapped under collapsed buildings after earthquakes. The scientists envisage emergency workers using [Wi-Fi](#) radio technologies to install a network of sensors around an emergency area to detect the presence of survivors and bodies.

According to Wilson and Patwari, the radio sensors could be deployed around a disaster site by the emergency workers, either by dropping them or throwing or launching them in some way. Each sensor would then form part of a network and begin to transmit information about signal strength measurements across the web of [sensors](#) to a base station computer. The computer would correlate the information and determine the likely locations of survivors.

The advantage of this technique over existing systems capable of sensing what is on the other side of a wall is the price, since the nodes in the network are cheap and off-the shelf. The disadvantage of a cheap and simple system is its potential use as a spy tool by nosy neighbors, peeping toms or burglars, and all the privacy and safety issues such uses raise.

More information: Through-Wall Tracking Using Variance-Based Radio Tomography Networks, Joey Wilson, Neal Patwari, [arXiv:0909.5417](#)

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