Crowdsourcing software could help us move house and stay where we are

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The concept of moving your house without actually going anywhere isn't new—adaptive architecture has been around since the 1920s. But that was long before sensors and computing. So, how do we bring all those long held ideas and that new technology together?

Dr Holger Schnädelbach an expert in the Mixed Reality Lab in the School of Computer Science at The University of Nottingham, is trying to bridge the gap with a new crowd-sourcing website.

He hopes his Adaptive Architecture Framework (AAF) will provide a catagorised overview of building adaptations and their causes, methods of adaptations and the effects of adaptation in the built environment. The software tool is now online and he needs others to contribute their ideas to complete the picture.

Adaptive architecture is not about the function of buildings; it's about the way our homes, the offices we work in, public buildings react to the people who use them. It is concerned with buildings that are designed to adapt to their environment and to their inhabitants whether this is automatically or through human intervention.

Moving with the times

Back in the 1920s designers looked at the spatial properties of the home. The Rietveld Schröder House used partitions and roof lights to change the way a home could be used. Back then the adaptations required physical effort. Now computers and sensors could do all that for us.

Dr Schnädelbach is looking at the link between modern sensing and actuation to find out how we can adapt our buildings effectively; for instance, what can we do to manage internal climates, spatial adaptations, soundscapes, media—connectivity to mobile devices, TV's, music—or lighting and how buildings can 'learn,' with the use of computer and sensor technology, to adapt to the way we live.

More commonly, eco houses are adaptive, as they respond to the environment and inhabitants. The University's Creative Energy Homes Project is a prime example of how this can be done.

Adaptive Architecture has been the subject of much experimentation by architects and computer scientists, including work in the Mixed Reality Lab, pushing the boundaries of what is possible and what is desirable.

Dr Schnädelbach said: "For me adaptive architecture is this huge historical subject and we need a framework on which everyone can work from. The AAF allows people to explore connections and examples across the emerging field of Adaptive Architecture. When logged in, people can contribute to the crow-sourcing of the information map,

changing, adding and re-publishing information."

Crowd-sourced data set for architects of the future

The aim of Dr Schnädelbach's software is to produce a useful resource and data set for anyone working with buildings that adapt to their environments and for the people who live in those environments to feedback information about what works and what doesn't work.

Adaptive architecture is also known as moving architecture or interactive architecture.

Interest in this area of architecture has grown in the last 10 years. Holger is using the term adaptive to incorporate all aspects of this style of architecture.

He said: "Architecture can have a healing effect on our wellbeing but it can also address other needs. I think the flexibility of adaptive architecture is very useful. In the past some ideas have not proved practical. But sharing ideas and increasing feedback we can help improve the environments we live in and focus on the adaptations that can do that."

Most buildings are adaptable on some level

Dr Schnädelbach said: "Adaptive Architecture is concerned with buildings that are specifically designed to adapt to their environment, to their inhabitants, to objects within them, automatically or through human intervention. This can occur on multiple levels and frequently involves digital technology—sensors, actuators, controllers, communication technologies. In this sense, 'Adaptive Architecture' is used here as an umbrella term, incorporating work that has been labelled as flexible,

dynamic, responsive, reactive, robotic and interactive architecture, with the aim to bring these together and provide a broad overview.

"Buildings could be adapted at a very local level. There are times when we want to be in the same office and collaborate and there are times when we don't. So could we, at the press of a button, partition off our work space and lower the ceiling possibly to temporarily separate us from our work colleagues and alter the soundscape.

I like to think about Adaptive Architecture by considering the feedback loop that emerges. People inhabit buildings. Through their behaviour they trigger some adaptation in a building. For example, they might manually move a partition to create a larger space. More recently with ubiquitous computing, behaviours are detected by computers. For example, the building might detect my mood via my facial expression and adapt the lighting or it might pulse in sync with my breathing. These adaptations change the environment that people inhabit and they feedback people's behaviour. For example, once moving the partition created a larger space, more people fit into the room. Or, once the ceiling moves in sync with my breathing, I might slow down my breathing rate."

The research has been funded by a University of Nottingham Research Fellowship, the Leverhulme Trust and the Engineering and Physical Sciences Research Council. It is a multi-disciplinary research project across Architecture, Computing, Engineering, Design, Psychology and the Social Sciences. InfoPlot, the software tool that underpins the Adaptive Architecture Framework, was developed in a collaboration between the Mixed Reality Lab and Joff and Ollie design agency in Nottingham. Special thanks to Joff Casciani, Robin Shackford and Steve North.

Dr Schnädelbach came to The University of Nottingham as an

undergraduate studying for a five-year diploma in architecture. He stayed on to do a Masters in architecture combining physical and digital architecture using virtually reality. He completed a part time PhD at UCL while working at Nottingham as a researcher with the Mixed Reality Lab. In 2007 he received a Leverhulme Fellowship to look at adaptive architecture and he's now employed as a University of Nottingham Research Fellow.

Provided by University of Nottingham