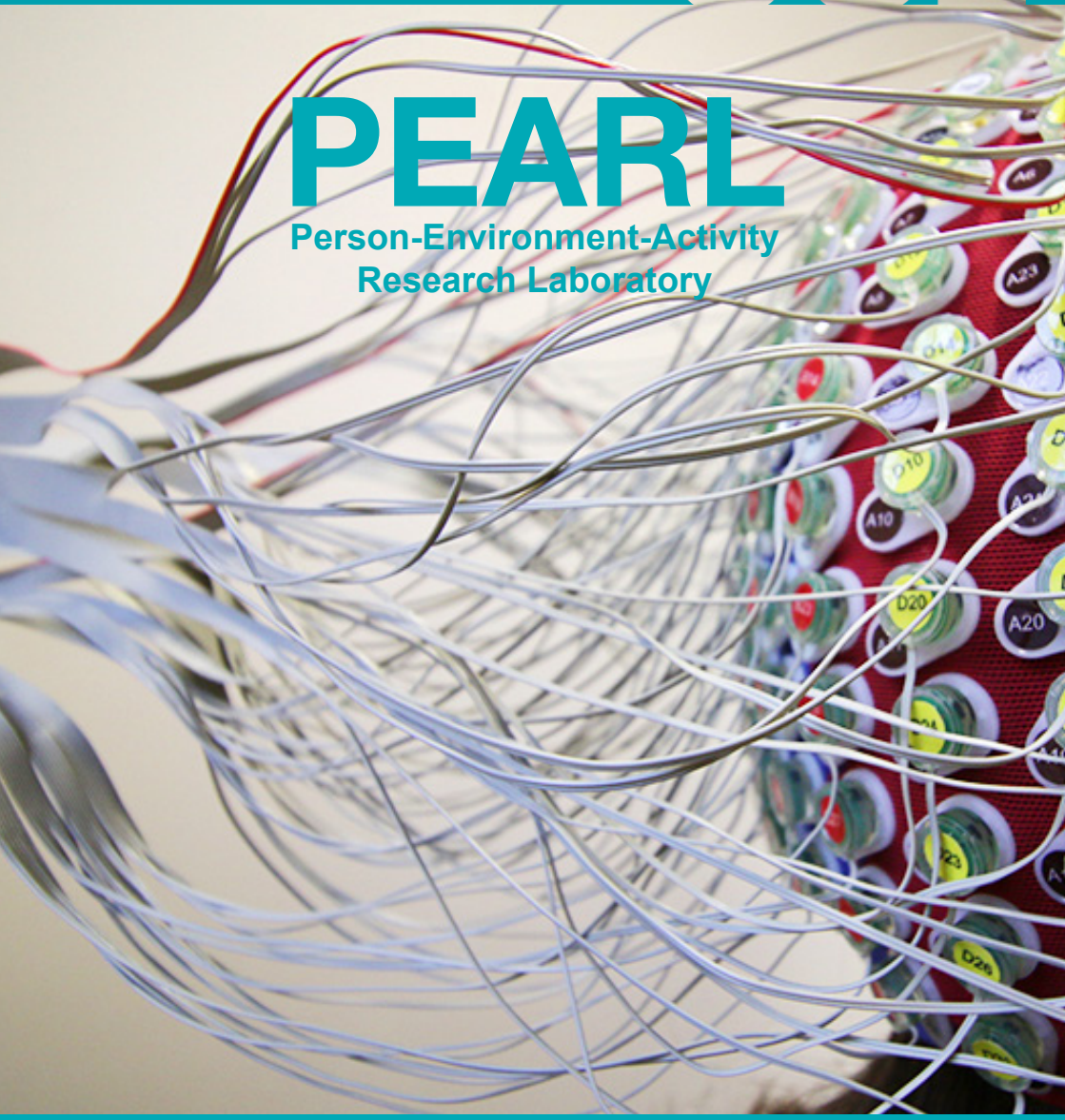
DEPARTMENT OF CIVIL, ENVIRONMENTAL
& GEOMATIC ENGINEERING

CENTRE FOR TRANSPORT STUDIES

UCL

PEARL

Person-Environment-Activity Research Laboratory



RESEARCHERS

The What, Why & How of PEARL

What is PEARL?

PEARL (Person-Environment-Activity Research Laboratory) is a unique facility to explore the ways in which people interact with their environment. It is a massive space – around 4,000m2 and 10m high – in which we can create life-sized environments – a railway station, high street, town square – under controlled conditions, so that we can examine how people interact with the environment and other people in these types of places. We can change the profile, type and material of the floor, simulate lighting of any colour and intensity, create sound from the tiniest bird song to the most massive explosion, include other senses, such as smell, and much more.

Why PEARL?

Much of our understanding about how cities work is based on a lot of assumptions about how people respond to, use and act in the environment. Many of these assumptions are based on experience over many years and are valid in general, but often the models we use just don't represent what actually happens. PEARL enables us to study in detail how people actually interact with the environment and each other, by enabling us to test detailed differences in the environment – such as space, colour, lighting, sound – under controlled conditions, so that we can obtain rich data for use in the design of real urban systems.

How can we use PEARL?

PEARL allows the public, researchers, regulators, implementers and others to see, hear, smell, feel and try out for themselves what operation and design ideas would be like, so cutting the cost of trying out new ideas by testing them in the laboratory before trialling them for real on-street. We can help designers work out how people will respond to their designs, for example, of trains. Sometimes we need to instrument people with sophisticated systems, such as eye trackers, accelerometers and motion detection systems, so that we can track how they move around the environment.

Types of Research Projects

Spatial Memory

Following John O'Keefe's discovery of 'place cells' (brain cells that fire at specific locations in space) in rats, for which he was awarded the Nobel Prize in 2014, the question arose of whether people had a similar system to help their navigation. Experiments had been done to explore this using Virtual Reality, but not in a physical setting. So we set up a physical environment whereby participants were asked to take a stool out of a closed room, and replace it a few minutes later after we had changed the shape of the room. Unlike in the VR experiments, we discovered that the best predictor for the new location was based on the route the participant took when they left the room on the first occasion, showing that their spatial memory could be linked to their memory of a physical route.

Figure 1. Spatial memory test

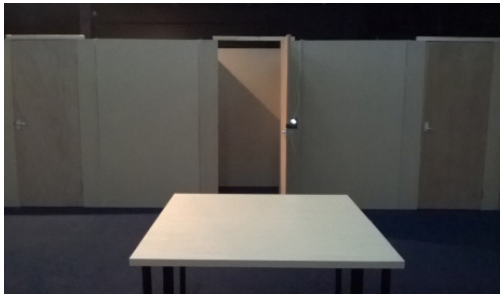


Figure 2. Dementia navigation test

People with dementia in cities

Very little is actually known about how people with dementia actually see and perceive the environment. In a project called 'Seeing What They See", funded by the UK Economic & Social Research Council and National Institute for Health Research, we worked with clinicians, ophthalmologists, neuroscientists and social scientists to understand this challenge. We instrumented people with different types of dementia and a control group so that we could see in detail what they were paying attention to and how they moved as they undertook a number of simple navigational tasks in the laboratory. The results have informed thinking about how to design the urban environment.

How can PEARL help you?

Research Projects

We can work with you to create a research project in which your experimental questions can be investigated. Depending on the nature of the questions, these could be developed by you, by us, or in combination as part of the project. This could be funded by a UK Research Council or other funding agency, or by your own organisation. Where appropriate, these projects could be combined with Doctoral or Masters study.

Research Contracts

Researchers from non-university organisations can contract PEARL to run experiments on their behalf, contributing to the specification and design of the experiments to suit their needs. The data, could be analysed by our team, or made available to the researcher for analysis in their home organisation.

Research Visits

Researchers from organisations outside PEARL can carry out experiments during the course of a visit to PEARL, in which they design and run the experiments with our technical and research staff and analyse the data afterwards, either in PEARL or their home institution.

Remote Control & Observation

We are currently researching techniques to improve remote observations of experiments, so that researchers based overseas can observe them whilst in operation. We are also investigating the possibilities of remote live interaction, so that researchers outside PEARL can access and control the experiments while they are in progress.

Researching for You

Our researchers are committed to understanding your needs so that we can focus our research projects to respond to those needs.

EPSRC Engineering and Physical Sciences Research Council

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