

DEPARTMENT OF CIVIL, ENVIRONMENTAL  
& GEOMATIC ENGINEERING

CENTRE FOR TRANSPORT STUDIES



# UCL

# PEARL

Person-Environment-Activity  
Research Laboratory



# HEALTH

# 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 4,000m<sup>2</sup> 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 Health-related Projects

## Some examples of our work

### Dementia and Vision: “Seeing what they see”

We were involved in an ESRC/NIHR project “Seeing What They See” (SWTS) which involved clinical neurologists, psychologists, ophthalmologists, social work researchers, statisticians and computer scientists to better understand how people with dementia see, particularly those with Posterior Cortical Atrophy. We conducted controlled experiments in a safe environment in order to observe how they see and move around a variety of environments. By better understanding how they interact with their environments, we can begin to design the urban environment in a more perceptible and accommodating way, an initiative of the NHS Barking Riverside Healthy New Town.

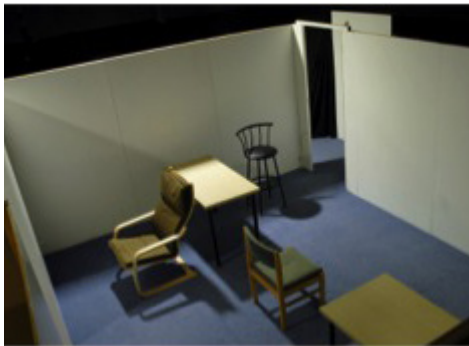


Figure 1. SWTS experiment testing the perception of shadows

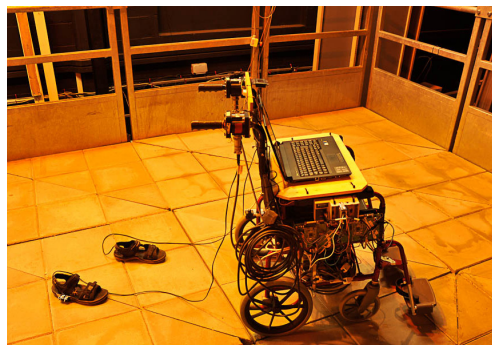


Figure 2. Instrumentation used to measure different interactions

### The Ecological Brain

We are one of the laboratories in UCL’s Ecological Brain Doctoral Training Programme, concerned with how the brain responds to stimuli in the real world, as opposed to responding to stimuli generated in artificial and highly controlled circumstances in research laboratories. Using PEARL we can create simulations of real world environments, including lighting, noise and smell, so that researchers can learn how the brain responds to stimuli in more realistic environments, complementing that of the traditional laboratory.

# PEARL, Health & Your Wellbeing

## Changing the nature of research

With its ability to simulate different environmental conditions, whether lighting, acoustics or smell, PEARL is changing the nature of health-related research, from neurology and psychology, to ophthalmology, audiology and orthopaedics. Our ability to conduct life-sized environmental experiments under controlled conditions means that researchers are no longer limited to the artificial setup of the traditional laboratory and can understand how our senses and the brain respond to stimuli in more realistic environments.

## Testing existing assistive devices

Our ability to simulate environmental conditions also allows us to test existing assistive devices. For example, we have been assisting audiological researchers and clinicians from around the UK to understand how hearing works in a variety of real-world environments, such as in a restaurant or railway station. This enables us to test and improve the effectiveness of devices such as hearing aids.

## More holistic approaches to therapy

By better integrating assistive devices into their urban contexts, we can also improve the design of the city as a whole, making it more accessible to those with different mobility, cognitive or sensorial capabilities. By designing cities which are more sympathetic to these needs, we can utilise the urban environment as a form of therapy.

## Designing 'health-giving' environments

Our long term objective is to inform the design of the built environment so that it can provide a positive impact on health and wellbeing. For example, by making walking more comfortable and attractive, we can achieve the benefits of increased physical exercise as well as improve air quality and reduce stress levels. This will allow us to use urban design to improve health and wellbeing and work towards the prevention of illness and disease, rather than a cure.