

# idea

investigating  
design in  
architecture  
2023 edition

edited by  
Gaia Leandri

foreword by  
Angelo Schenone







Conference Proceedings  
IDEA – Investigating Design in Architecture  
2023 Edition  
April 17, 2023  
Università degli Studi di Genova. In presence and Online.

This meeting stemmed out from studies, investigations and PhD lectures, in particular:

- 2022, Departamento de Expresión Gráfica Arquitectónica, Universitat Politècnica de València (UPV) and Dipartimento di Neuroscienze, Riabilitazione, Oftalmologia, Genetica e Scienze Materno Infantili (DINOEMI), Università degli Studi di Genova (UNIGE): Gaia Leandri, PhD thesis *Freehand digital drawing: a boost to creative design the observer's eye and the draftsman's brain*;
- 2022, Dipartimento Architettura e Design (DAD), Università degli Studi di Genova (UNIGE), lectures to PhD students in Architecture, Design, Digital Humanities and Neuroscience;
- 2023, Post Doc Consolidator Scholarship: *Ideazione dell'immagine e neurofisiologia: l'apporto creativo e gli strumenti per la comunicazione visiva*, Dipartimento Architettura e Design (DAD), Project Supervisor: Prof. Ruggero Torti; Research Fellow: Dr. Gaia Leandri.

The promoting committee is composed by professors, lecturers, PhD students and researchers from Italy, Spain, the US and the UK:

Angelo Schenone, Marco Testa (DINOEMI, Unige); Maria Linda Falcidieno, Andrea Giachetta, Gaia Leandri, Linda Buondonno, Elisabetta Canepa (DAD, Unige); Francisco Juan-Vidal, Susana Iñarra Abad (UPV); David Sunnucks (Queen Mary University of London).

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Niccolò Casiddu, Maria Linda Falcidieno, Andrea Giachetta,  
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(DINOEMI)

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*è il marchio editoriale dell'Università di Genova*



I contributi qui pubblicati sono stati selezionati dal Comitato Scientifico del Convegno.

Impaginazione, editing e revisione del presente volume a cura di Gaia Leandri.

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# Foreword

This book is a collection of papers presented at the first workshop on Investigating Design in Architecture (IDEA '23). Aim of the event is to promote an interchange of ideas and expertise from several sources to tackle the issue of architecture and design on one side and neuroscience and psychology on the other. This meeting is a unique opportunity to define scientifically sound experimental bases to the mental process of design, craft creation and the perception of architectural spaces and forms. Different from the unilateral approach of neuroarchitecture, where the object of investigation is the well-being of the user, in IDEA '23 the main interest shifts towards the relationship between the author, architect or designer, and the project, a notion well expressed in the words “Investigating design”, suggesting that it is the design process itself that is the object of investigation. This is a prospective project based on a joint PhD program awarded by the Department of Graphic Expression in Architecture University of València, and the departments of Neurosciences, Rehabilitation, Ophthalmology, Genetic and Maternal and Infantile Sciences (DiNOGMI) and Architecture and Design (dAD), University of Genova.

The topic of the program, conducted by Dr. Gaia Leandri, was focused on the cerebral activity of the designer according to the method used to lay down the project. At the end of the doctoral path, Dr. Leandri presented a thesis entitled “Freehand digital drawing: a boost to creative design. The observer’s eye and the draftsman’s brain”. Since then, further research has been carried out, and is still being developed, with the essential and very active collaboration of the dAD, University of Genova, where lectures have been held to students and seminars organized for discussing and planning future interdisciplinary projects. In the course of these meetings, a rather widespread interest was discovered from various sources which went from local and international Ph.D. students in architecture and neuroscience to academics of both fields. Therefore, a promoting committee was established, formed by professors, lecturers, PhD students and researchers from Italy, Spain, the US and the UK (A. Schenone, M. Testa (DINO GMI, Unige); N. Casiddu, E. Bistagnino, M.L. Falcidieno, A. Giachetta, G. Leandri, L. Buondonno, E. Canepa (dAD, Unige); F. Juan-Vidal, S. Iñarra Abad (UPV); D. Sunnucks (Queen Mary University of London)), and it was decided to send a call to present papers for this first symposium.

# Technology and neuroarchitecture

Mario Ivan Zignego, Alessandro Bertirotti, Paolo Gemelli, Laura Pagani

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## Abstract

This paper is part of an ongoing research project involving the Department of Architecture and Design at the University of Genoa, as well as entities from both the professional training and industrial worlds.

The primary objective of this research is the development of a tool that is useful both for designers and for users.

Based on the concept of smart mock-ups, previously developed by the authors, the focus has been declined on the world of nautical design, with the aim of measuring, through qualitative parameters, the user experience in a built environment, whether it is a relaxing or working environment.

The first and fundamental step involves defining the "state of the user" through a vector of measurable variables using a network of sensors that do not significantly alter the UX with the surrounding space. This article presents the state of the art of techniques and sensors that can be used for research purposes, as well as the proposed experimental setting to verify the initial working hypotheses. Then we will describe how research will move on to obtain an affordable and efficient tool for nautical designers.

Here, we will describe different types of methods that can be used in neuroscience, from standard ones (like emotions recognition software based on FACS, or biometric sensors like heart rate variability, galvanic skin response), to modern ones (like the use of electroencephalography, functional magnetic resonance imaging) and eye tracking.

## 1. Contribution

The fields of neuroscience and architecture have long been thought of as separate entities, but recent research has shown that the two disciplines can work together to create spaces that promote mental and physical health and the new term "neuroarchitecture" has been recently coined.

Neuroarchitecture is the study of how the built environment affects the brain and behaviour, while neuroscience is the study of the structure and

function of the nervous system. By combining these two fields, researchers are trying to use sensors to measure emotional responses to the built environment to understand how different environmental stimuli impact emotional responses (Medhat Assem *et al.*, 2023). Research has shown that exposure to natural environments can have a positive impact on mental health. Natural environments have been associated with decreased levels of stress, anxiety, and depression. By incorporating natural elements into the built environment, such as plants and water features, architects can create spaces that promote relaxation and well-being.

Research has also shown that exposure to certain types of lighting can impact emotional responses: brighter lights have been associated with increased arousal and decreased relaxation, while dimmer lights have been associated with increased relaxation. By designing spaces with adjustable lighting, architects can create environments that promote different emotional states, depending on the needs of the occupants. In addition, research has shown that exposure to music can impact emotional responses. Music with a slow tempo and low pitch has been associated with relaxation, while music with a fast tempo and high pitch has been associated with arousal. By incorporating music into the built environment, architects can create spaces that promote different emotional states, depending on the needs of the occupants.

Technology has the potential to revolutionise the field of neuroarchitecture by providing new tools for measuring and analysing the impact of built environments on human behaviour, cognition, and well-being. We have:

- Sensors and Wearables, which can be used to measure physiological responses such as heart rate, skin conductance, and brain activity in response to different architectural stimuli and whose data can be used to develop evidence-based design principles that promote well-being in buildings and urban environments.
- Eye Tracking, whose technology can be used to measure visual attention and gaze patterns in response to different architectural features. This can help to identify which features are most salient to people and inform designers of wayfinding systems that are more intuitive and effective.
- Virtual Reality (VR) systems, which can be used to create realistic simulations of different built environments, allowing researchers to test the impact of architectural features on human behaviour and cognition in a controlled environment. In further research this could be particularly useful for studying the impact of inaccessible or hazardous environments on different populations, such as people with disabilities.

- Artificial Intelligent Tools, such as machine learning or neural networks algorithms, which can be used to analyse large datasets of human behaviour, providing insights into patterns and trends that are difficult to discern through traditional methods. Besides, AI that can be used to develop predictive models of human behaviour in different built environments, allowing designers to simulate the impact of different design features before construction. This can help minimize the risk of costly design mistakes and ensure that buildings and urban environments are optimized for human well-being.



Figure 1 - Interaction between man and artificial intelligence. Canva Edu Licence.

## 2. FACS

Facial Action Coding System (Ekman & Friesen, 1978) is a tool that is widely used in neuroscience research to objectively measure and analyse facial expressions.

Unlike subjective ratings of facial expressions, which can be influenced by factors such as observer bias or individual differences in perception, FACS provides a standardized and objective method for measuring facial movements, because it uses a series of codes to describe the movements

of different facial muscles, such as raising the eyebrows, wrinkling the nose, or pulling the lips back. By coding facial movements in this way, researchers can objectively quantify and compare facial expressions across individuals and across different experimental conditions with greater accuracy and precision.

FACS has been used in a wide range of neuroscience research, including studies on emotion, social interaction, and decision-making. It has been used to study the neural mechanisms underlying emotion regulation by measuring changes in facial expressions in response to emotional stimuli (Wager *et al.*, 2008) and it is also useful to study the neural basis of social interaction by measuring facial expressions during cooperative and competitive interactions .

By using FACS, neuroarchitects can objectively measure and analyse facial expressions in response to different architectural features, such as lighting, colour, and spatial configuration. This allows researchers to identify which design elements elicit positive or negative emotional responses, and to develop evidence-based design principles for creating buildings and urban environments that promote well-being.

On the other hand, one limitation of using FACS in neuroarchitecture is that it can be difficult to control for individual differences in facial expressions and emotional responses. Participants may vary in their baseline levels of facial expressivity, which can affect the interpretation of facial expressions in response to architectural stimuli.

This problem can be easily overcome by using software trained with machine learning algorithms and multicultural databases. Additionally, FACS only measures facial expressions and does not provide information on other modalities, such as physiological responses or subjective ratings of emotional experience (Clark *et al.*, 2020).

### 3. Eye tracking

Eye-tracking technology has become increasingly popular in the field of neuroarchitecture as it provides valuable insights into how people perceive and interact with their built environment, because it measures the movements of the eyes and it records how people perceive, react, and navigate through different sites (Duchowski, 2002, pp. 455-470).

There are different types of eye-tracking systems:

- *Remote systems* which use cameras to track the movement of the eyes from a distance, while
- *Head-mounted systems* which use glasses or headsets that are equipped with cameras to track eye movement from a closer distance.

Both systems use infrared or corneal reflection methods to track the movement of the eyes (Rayner & Castelhana, 2007). Another application of eye-tracking technology is to measure cognitive load, or the amount of mental effort required to perform a task. One limitation of eye-tracking technology is that it only measures visual attention and does not provide information on other sensory modalities, such as touch or smell. Additionally, eye-tracking data can be influenced by factors such as fatigue, cognitive load, and individual differences in eye movement patterns.

#### **4. Electroencephalography (EEG)**

EEG is a non-invasive technique that measures the electrical activity of the brain using electrodes placed on the scalp. It has been used for many years to diagnose neurological disorders and to study brain function, while more recently, it has been used to study emotional responses to the built environment, since it can measure different types of brain waves, including alpha, beta, delta, and theta waves (Harmony, 2013). These waves are associated with different mental states, such as relaxation, arousal, and attention. By measuring changes in brain waves, researchers can identify emotional responses to different environmental stimuli (Aspinall *et al.*, 2015).

#### **5. Functional Magnetic Resonance Imaging (fMRI)**

Functional Magnetic Resonance Imaging (fMRI) is a non-invasive technique that uses magnetic fields to measure changes in blood flow in the brain. Similarly to EEG, fMRI has been used extensively to study brain function and to diagnose neurological disorders, but it can be used to identify areas of the brain that are activated in response to different environmental stimuli, such as colours, sounds, taste, paintings and photographs. fMRI has also been used to study the emotional responses of participants to different types of music that induced strong emotional responses, such as sadness or joy (Logothetis, 2008).

#### **6. Heart Rate Variability (HRV)**

Heart Rate Variability (HRV) is a measure of the variation in time between consecutive heartbeats. It is a non-invasive measure that has been used to study the autonomic nervous system, which controls functions such as

heart rate, blood pressure, and digestion. More recently, it has been used to study emotional responses to the built environment.

HRV can be used to identify changes in the autonomic nervous system that are associated with different emotional states (Stegagno, 2020).

## 7. Galvanic Skin Response (GSR)

GSR is a measure of the electrical conductance of the skin, which is influenced by the activity of the sweat glands. GSR has been used for many years to study emotional responses and is commonly used in lie detection tests. More recently, it has been used to study emotional responses to the built environment.

## 8. Natural Language Processing (NLP)

NLP can be used in neuroarchitecture to analyse written or spoken language related to architectural design, such as user feedback, design briefs, or building codes.

One potential application of NLP in neuroarchitecture is sentiment analysis. This technique involves analysing text to determine the emotional tone behind it. In the context of architecture, sentiment analysis could be used to evaluate how people feel about certain building designs or spaces, and whether those emotions are positive or negative. This information could then be used to inform future designs that better align with people's emotional needs (Warikoo *et al.*, 2022).

## 9. Experimental setting

In the initial stage of our experiment, we will involve a group of second-year high school students in a physics lab experiment called "Black Box".

The class will be divided into two groups: *experimenters* and *observers*. Paired-up students will play the roles of observed and observer, respectively.

The observed will use their senses and some available magnets to decipher the contents of a black box, without opening or breaking it, while the observer will record the stage of Galileo's experimental method the experimenters is in, every 120 seconds, selecting among: observation/research/hypothesis/experiment/collect data/analysis/conclusion, along with the emotional state they believe the experimenter is experiencing, selecting one of the options of a pre-defined list of emotions (enthusiasm,

satisfaction, fun, surprise, curiosity, uncertainty) (Smith & Bellocchio, 2017).

At the end of each two-minute period there will be a break of about 30 sec. so that the observed student can also fill in the same form on his mobile phone, indicating the phase of the method performed and the emotions perceived. An acoustic signal will indicate the end of each period and then the beginning of the following one.

The experiment will last for about 20 minutes, after which the experimenter will have to declare their conclusions. Each pair of students will repeat the same experiment. Data collection will also be carried out in audio-visual format, for a subsequent analysis through an artificial intelligence software that allows estimation of emotions through apposite software for FACS recognition and a NPL analysis.

Students will be recorded by HD quality video cameras and cell phones placed on a tripod about one meter away from the observed. Observers will have to check that their peer do not move too much and do not cover their faces.

The experiment's objective, which has already been widely used in scientific literature, is to compare the observer's data with the data collected by software for automatic emotion recognition and analysis, as well as the data collected by EEG and wearable sensors and software for sentimental analysis based on machine learning algorithms.

Secondly, we would like to test our sensors in a smart mock up (Zignego, & Gemelli, 2020). The eye tracking glasses will be used for analysing the user's fixations, while the EEG helmet and the biometric sensors will allow us to analyse which areas have generated interest in our user and what feelings they have generated.

These data will be compared with those extracted using standard questionnaires for detecting a user's experience. The advantage of using biometric sensors together with eye tracking and EEG helmet is to be able to obtain data that are not influenced by cognitive biases such as response bias, self-evaluation bias and researcher bias.

Finally, the last phase of our research (Zignego *et al.*, 2022) will proceed with the analysis of the data collected in a virtual environment, using a pair of augmented and virtual reality glasses, through which the user will be able to navigate within a reconstructed environment and add objects, modify them in terms of colour, shape, and material. In this case too, biometric and neural data will be collected in order to study which environment has generated greater liking and interest, and a format for sharing with the designer and nautical project manager who will take charge of customizing the vessel for the client will be developed.

## References

- Aspinall, P., Mavros, P., Coyne, R., Roe, J. (2015). The urban brain: Analysing outdoor physical activity with mobile EEG. *British Journal of Sports Medicine*, 49(4), 272-276. DOI: <https://doi.org/10.1136/bjsports-2012-091877>.
- Barrett, L. F. (2017). *How emotions are made: The secret life of the brain*. New York: Houghton Mifflin Harcourt.
- Clark, E. A., Kessinger, J., Duncan, S. E., Bell, M. A., Lahne, J., Gallagher, D. L., O'Keefe, S. F. (2020). The Facial Action Coding System for Characterization of Human Affective Response to Consumer Product-Based Stimuli: A Systematic Review. *Frontiers in Psychology*, 11. <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.00920>
- Duchowski, A. T. (2002). A breadth-first survey of eye-tracking applications. *Behavior Research Methods Instruments and Computers*, 34(4), 455-470.
- Ekman, P., Wallace, V. F. (2019). Facial Action Coding System. *American Psychological Association*. DOI: <https://doi.org/10.1037/t27734-000> (open access).
- Gärbling, T., Ettema, D., Connolly, F. F., Friman, M., Olsson, L. E. (2020). Review and assessment of self-reports of travel-related emotional wellbeing. *Journal of Transport & Health*, 17, 100843. DOI: <https://doi.org/10.1016/j.jth.2020.100843> (open access).
- Harmony, T. (2013). The functional significance of delta oscillations in cognitive processing. *Frontiers in Integrative Neuroscience*, 7. DOI: <https://doi.org/10.3389/fnint.2013.00083> (open access).
- Logothetis, N. K. (2008). What we can do and what we cannot do with fMRI. *Nature*, 453(7197), 869-878. DOI: <https://doi.org/10.1038/nature06976>.

- Medhat Assem, H., Mohamed Khodeir, L., Fathy, F. (2023). Designing for human wellbeing: The integration of neuroarchitecture in design - A systematic review. *Ain Shams Engineering Journal*, 14(6), 102102. DOI: <https://doi.org/10.1016/j.asej.2022.102102>
- Rayner, K., Castelhana, M. (2007). Eye movements. *Scholarpedia*, 2(10), 3649. DOI: <https://doi.org/10.4249/scholarpedia.3649>.
- Smith, T. W., Bellocchio, V. (2017). *Atlante delle emozioni umane: 156 emozioni che hai provato, che non sai di aver provato, che non proverai mai*. Torino: UTET.
- Stegagno, L. (2020). *Il cuore psicologico: Psicofisiologia cardiovascolare* (1. ed). Roma: Carocci Faber.
- Wager, T. D., Davidson, M. L., Hughes, B. L., Lindquist, M. A., Ochsner, K. N. (2008). Prefrontal-Subcortical Pathways Mediating Successful Emotion Regulation. *Neuron*, 59(6), 1037-1050. DOI: <https://doi.org/10.1016/j.neuron.2008.09.006> .
- Warikoo, N., Mayer, T., Atzil-Slonim, D., Eliassaf, A., Haimovitz, S., Gurevych, I. (2022). NLP meets psychotherapy: Using predicted client emotions and self-reported client emotions to measure emotional coherence. *Computer Science*. DOI: <https://doi.org/10.48550/ARXIV.2211.12512>.
- Zignego, M. I., Gemelli, P. (2020). A Smart Mockup for a Small Habitat. *International Journal on Interactive Design and Manufacturing (IJIDeM)*, 14 (2): 467-79. DOI: <https://doi.org/10.1007/s12008-019-00629-9>.
- Zignego, M. I., Gemelli, P. A., Bertirotti, A. (2022). A Smart Mockup for an Innovative Interior Yacht Design Approach. In E. Rizzuto & V. Ruggiero (A c. Di), *Progress in Marine Science and Technology*. IOS Press. DOI: <https://doi.org/10.3233/PMST220055>.

## Sites

- EDA/GSR (Electrodermal Activity)—IMotions. (2022, giugno 15). <https://imotions.com/products/imotions-lab/modules/eda-gsr-electrodermal-activity/>
- FMRI Acquisition | NordicNeuroLab. (s.d.). Recuperato 7 marzo 2023, da <https://www.nordicneurolab.com/product/fmri-acquisition>

Marconi, V. (s.d.). Neuromarketing ed EEG - NeuroWebDesign. Recuperato 10 marzo 2023, da <https://www.neurowebdesign.it/en/neuromarketing-elettroencefalogramma-eeeg/>

Measuring the Heart - How do ECG and PPG Work? - IMotions. (2017, marzo 21). <https://imotions.com/blog/learning/research-fundamentals/measuring-the-heart-how-does-ecg-and-ppg-work/>

Publications—Eye tracking research using Pupil Labs—Pupil Labs. (s.d.). Recuperato 7 marzo 2023, da <https://pupil-labs.com/publications/>

What is EEG (Electroencephalography) and How Does it Work? - IMotions. (2021, luglio 13). <https://imotions.com/blog/learning/research-fundamentals/what-is-eeeg/>

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The first IDEA symposium created the opportunity to compare hypotheses, procedures and proposals to evaluate and understand the potentiality in creativity, visuality and perception. This volume highlights the interest in these aspects and the subdivision into the three macro areas: *Body, Mind and Emotions*; *Technology and Human Perception*; *Modelling and Living Spaces*, shows that the research path is full of possible insights and new interpretations of only apparently consolidated and acquired topics.

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