

# COMFORT EXPERIENCE

*HOW WE INTERACT WITH RESTING SPACES WITHIN URBAN ENVIRONMENTS*

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**UNNC 2024 - Artificial Intelligence and Advanced Technologies for Smart Sustainable Healthy Buildings and Cities Sustainable Built Environment (SBE)**, Department of Architecture and Built Environment at UNNC in collaboration with Architecture Department at XJTLU and Ningbo Society of Urban Sciences

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### **1. ABSTRACT**

This is an early paper to introduce the idea of “Comfort Experience” . . this is based on a convergent thinking between Architecture and Industrial Design, where certain observations of human behavior are noted to initiate and conceive new prototype experiences and interactions within public environments. From a practical point of view and considering the ergonomics for this type of public furniture, this research approach also recognizes that there are many human ‘resting’ positions that can damage our physical health and well-being, that could benefit from intelligent adaptive systems in the home and work contexts. We will consider how simple visual and haptic feedback can improve behavioral awareness, particularly for sedentary users

When considering how we perceive our public spaces with architectural forms, products and furniture, there are things that are visually created which reflect light and colour in a certain way. Then there are things that are not so carefully considered or that are even made by accident. But as a collective experience, there are deliberate moments that are introduced to our physical world that impress and influence us in many ways. They engage our emotional reaction and responses, to attract or to seduce, to entertain or to communicate, to shock or to reassure, and so on with limitless opportunities to enrich our experiences. Our research ideas explore the different aspects of the ‘intended’ visual quality of physical objects as an appropriate and relative value that contributes to the observer’s pre-interactive awareness. (*the relational field, Baudrillard*). We will consider a series of existing resting situations within modern public places, to compare how effectively the intended visual design becomes an attractive resting experience, and how the visual interpretation communicates and contributes to the urban environment. More functional aims and objectives of this research consider the health problems that are sustained from badly designed seating and poor sitting postures, within the working and domestic environments. Now we propose the development of more intelligent interactive resting systems, that can sense and monitor variable human positions, then with physical feedback and robotic adjustment can achieve a more comfortable and ergonomically improved seating support.

Design Innovations that integrate artificial intelligence, encompass and includes many different technologies, applications, services and industries, but where most specifically adopt faster digital content retrieval and improved operations for the use and consumption of shared products and services, typically within the public environment. Our focus for this research study has scope and vision to include: building design, manufactured products, furniture, internet services, digitally created AI atmospheres, mixed realities and so on, which can all contribute to more sensitive human interaction and comfort experience within our public places.

*Keywords: Comfort Experience, Resting Interaction, Performance Spaces,*

## **RESEARCH TEAM**

To support this research project, we needed to ensure that there will be sufficient professional experience from both product design and architecture practice, so following many discussions about the possible design opportunities, Richard Appleby and Richard Hay decided to lead this exciting new research context to establish a collective framework and prototyping process of industrial design and architectural practice.

**Richard Appleby** is an experienced industrial designer established Atlantic Design Studios in London creating products for manufacturing industries: BT, Siemens, NEC, Psion, Nortel and BNR, Maxon Systems in UK, Canada, Germany and Japan. Richard is currently Professor of Industrial Design and Research Director at the School of Design at XJTLU Xi'an Jiaotong-Liverpool University, where he teaches undergraduate, postgraduate and Phd studies. Richard's design research has been published in international conferences in Paris and the Czech Republic, also featured within China's Art and Design magazine 'Designing Social Interaction and Shared Experiences'. His most recent keynotes "Materials Performance and Interaction" have been presented at the International Conference on Intelligent Design and Innovative Technology (ICIDIT 2022), the 6th China (Dehua) Ceramics Industry Design Competition "He Chaozong Cup" (2023), and ACG International Art and Design Exhibition, (2024) Chengdu University.

**Richard Hay** is an experienced British architect who has with international architectural practices through multidisciplinary design on award-winning typologies including hotels, mixed use, high-rise and airports previously with practices including Norman Foster + Partners, OMA Asia (former), Ove Arup and Ronald Lu. He designed Dubai's Iris Bay for ATKINS; awarded the Best Tall Building, Middle East & North Africa Award of Excellence CTBUH 2016. Richard teaches undergraduate and post graduate modules at XJTLU Xi'an Jiaotong-Liverpool University, he has also been involved in inter-departmental exhibitions in 2024 previously the Zijin College Student Design Exhibition Nanjing 2019, Suzhou Design Week 2020, digital curation for XJTLU for the Chinese Pavilion Venice Biennale 2020, True Colour Museum Architecture and Industrial Design show 2022, he chaired the environmental panel at DimSum Guangzhou 2024.

This team approach will benefit from this combined academic experience and professional practice, to develop the innovative concepts and ideas. Then further to complete the quantitative and qualitative analysis of existing typologies, together with design and prototyping skills to evaluate new hypothetical design concepts and structures, that will improve the 'comfort experience'. Collaboration across the Industrial Design and Architecture subject disciplines will provide the broader knowledge and skills to motivate further research opportunities within the same framework.

## **PARTNER INDUSTRIES:**

**T-LAB** is a multifunctional group providing integrated services for all kinds of decoration space, providing professional services including high-end commercial space planning, construction management, consulting services, foreign procurement, commercial prop research and development, manufacturing, overall customization of high-end furniture, and project research. T-LAB also have a professional design, R&D, manufacturing and construction team, professional services for world famous brands, hotels, office spaces, restaurants etc. They are interested to collaborate within this research to develop intelligent human interactive furniture systems for specific market opportunities within the furniture design market and related consumer and business markets. Architectural Furniture not only adds function and practicality to a space, but they also influence user behavior and emotional atmospheres

**CCL DESIGN** (*material substrates*) CCL Industries Inc. ( The Group of companies) employs approximately 25,300 people operating 205 production facilities in 43 countries with corporate offices in Toronto, Canada, and Framingham, Massachusetts. CCL is the world's largest converter of pressure sensitive and specialty extruded film materials for a wide range of decorative, instructional, functional and security applications for government institutions and large global customers in the consumer packaging, healthcare & chemicals, consumer electronic device and automotive markets.

## **STAGE 1: OBSERVATIONS**

Designing for modern spaces requires a more engaging and interactive research approach to observe the lifestyles and behavior of people and communities in typical situations: such as public parks and waterfronts, also more constructed environments such as airports and railway stations. Spaces don't really change to such a great extent but the interventions of light, sound, movement and other media can radically change the 'feeling' and 'awareness' of the space around us and change the way we perform and move within a space. We are interested to explore adaptive elements (products) and applications (services), that can make spaces more interactive. These can be concerned with direct movement and functional objects, or with more ambient media that is more seductive and within the background context: To what extent do our senses pick up the contextual media and how does this influence your own performance and movement within the space? How can environment media be introduced within the spaces we occupy? How can our movements and interactions intervene and change space? These questions require a greater understanding of human perception and a reflective approach to designing, that considers more immediate experiences and sensations, that are individually relevant to each person and place.

This research project recognizes that there are many more situations concerned with physical health and well-being that could benefit from intelligent adaptive systems in the home and work contexts. We explore how simple visual interaction and user experience within public spaces can provide feedback to improve behavioral awareness, particularly for sedentary users.

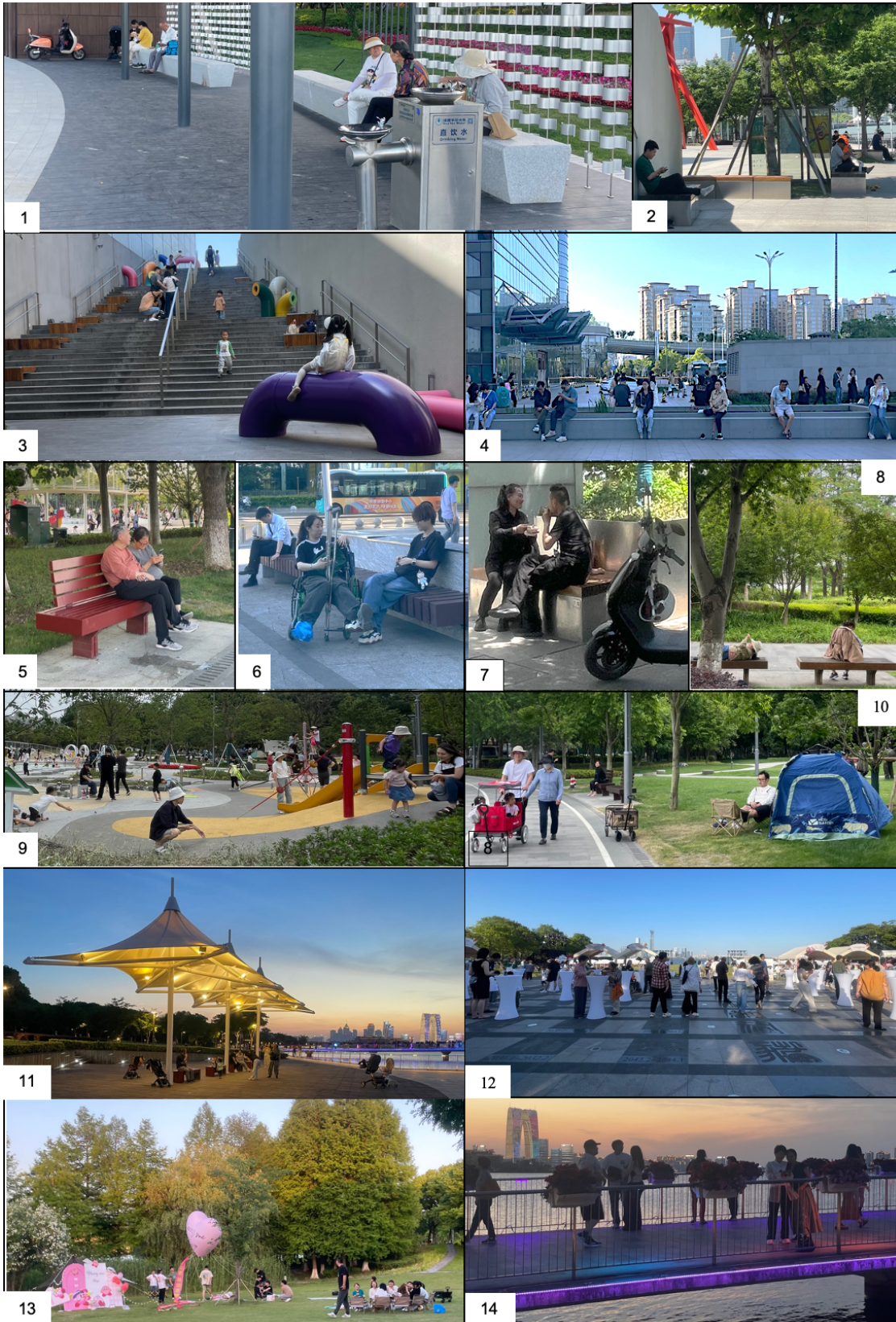
Research Exploration to visit specific contexts, to observe and report all user activity and performance at certain times of the day, considering how the architecture spaces, the facilities, the furniture and other objects, the interactive services and spatial atmospheres, contribute to their overall "Comfort Experience". This can probably be divided into two forms of observation process:

- Observe and Report on Performance Spaces, Fixed Facilities and Services, Objects, Natural Environment, Built Environment, Human-Object relationships (Furniture, Doors, etc.) Atmospheres (Lighting & Sound)
- Observe and Report on Human Interactions with Space— watch and record people's behavior and actions, their performance: Stopping, waiting, sitting, resting, leaning, lounging, hanging, sleeping, meeting each other, talking and looking, eating and drinking, entry and exit points.

### **Observation sites:**

**Suzhou West Jinji Lake Waterfront area** in front of the Zhongyin Crown Plaza hotel and 200m either side of this point, to consider the performance and movement throughout people's visits. b) **Suzhou Museum** both inside and outside of the galleries to consider the performance and movement throughout people's visits. c) **Airports** in many cities in Europe and China.

**a) PERFORMANCE SPACES – INTERACTIVE ENVIRONMENTS** - Spatial Dimensions, Fixed Facilities and Services, Objects, Natural & Built Environment, Steps & Seating Furniture Atmospheres



**b) HUMAN CENTRED SOCIETY – STREET LIFE** - Human Interaction with Space - waiting, sitting, resting, leaning, lounging, hanging, sleeping, meeting each other, talking and looking, eating and drinking,



## REFLECTION AND EVALUATION

	Description	Activity	Time Period
1	Public Area	Sitting and resting	30 minutes
2	Outside the Art Gallery	Mobile Internet activity	20 minutes
3	Inside Art Gallery Staircase	Climbing and Playing on Stairs	1 hour
4	Public Area Wall	People sitting and Talking	30 minutes
5	Outdoor bench	Two people sitting close	1 hour
6	Public Bench	Wheelchair and two people	30 minutes
7	Private outdoor bench	Two people + motorbike	1 hour
8	Public Benches	People lying down to sleep	1 hour
9	Children's Park	People and children playing	30 minutes
10	Park – and people walking	People camping	Several hours
11	Jinji lake evening	People relaxing	Several hours
12	Jinji lake	People dancing	30 minutes
13	Public Park	Glamping and playing	Several hours
14	Railings at Jinji Lake evening	Resting on the railings, talking	30 minutes
15	Shanghai Railway Station	Sitting and waiting for the Train	A few hours
16	Shanghai Railway Station	Sitting and waiting for the Train	A few hours
17	Shanghai Railway Station	Eating and Talking	30 minutes
18	Outdoor bench Art Gallery	Sitting in different 3 x positions	30 minutes
19	Outside the Art Gallery	Watching the river	1 hour
20	Outside the Art Gallery	Sitting and talking with friends	30 minutes
21	Public bench in street	Resting on the bike	15 minutes
22	Zagreb Airport	Sitting and waiting for travel	1 hour
23	Zagreb Airport	Sleeping and waiting for travel	A few hours hours
24	Zagreb Airport	Sleeping and waiting for travel	Several hours
25	Zagreb Airport	Sleeping overnight	8 hours
26	Public Piazza	Musicians playing and dancing	2 hours

### c) SCENARIOS – DAY IN THE LIFE OF . . .

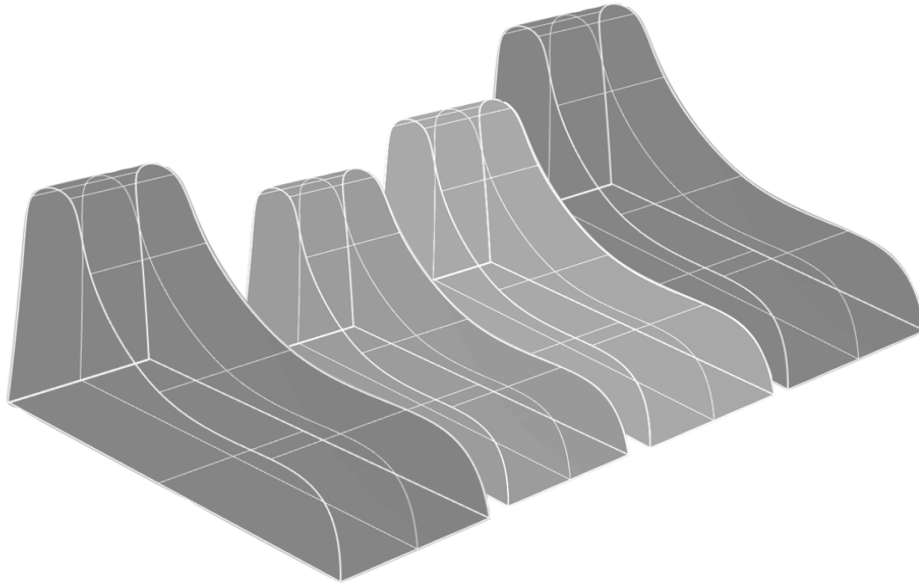


This simple scenario starts to map movements and actions more closely within certain timeframes to observe interactions at a much more detailed level. For a simple action of walking to the table to place an object – there are multiple stages in this process that require moving, stepping, holding, placing objects, - We can see that the basic table and chair structures only provide a functional requirement, Where people adapt their performance according to their own tasks and activities.

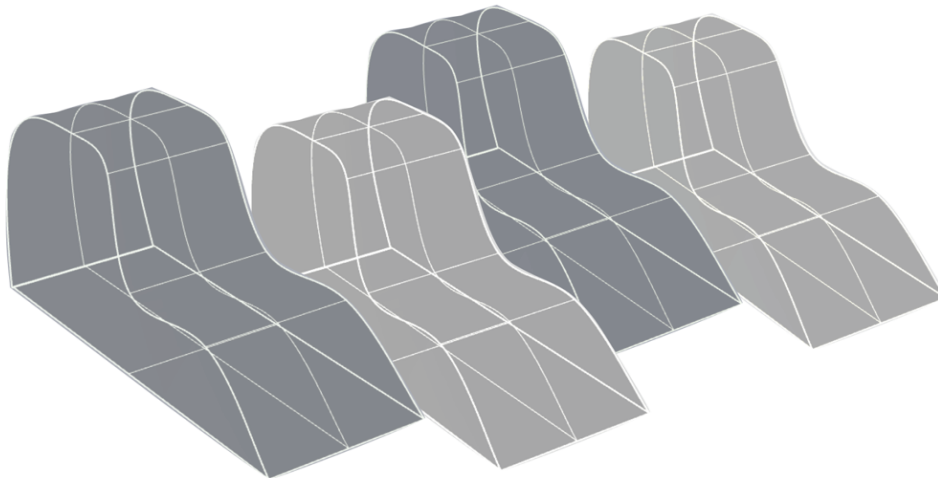
## **COMFORT EXPERIENCE – CONCEPT Sketching process**

Exploring simple forms as a starting point starts to identify all the possible abstracts and interactions that reflect peoples actions and performances within the environment, then following on with materials, structures and integrated media.

Concept 1



Concept 2





## RESEARCH PROGRAMME – FURTHER STAGES

Following on from these early observations and tracking of many different activities within different environments, some decisions will be made to optimize the next stages of development, focusing on perhaps three or four particular scenarios and contexts, In this way we can provide design ideas for more detailed evaluation and testing through physical prototypes with transformative interactions and services,

Stage 2	Development and Exhibition of New Design Concepts for new transformative seating and resting systems.	Design research concept s materials experiments with Partner Companies
	Many full-size models and prototypes in basic materials and finishes to test concept scenarios. Digital adaptive systems and media to support human experience and interactions	Design Exhibitions + test analysis statistics and data
Stage 3	Engineered Prototype Design to test the mechanical function and digital interactive functionality for multi modal experiences, + Manufacturing Design Data (CAD)	Writing up the user test analysis and technology development, completing Manufacturing specification
	Design and manufacturing revisions, development through the production process.	Revised Manufacturing Specification

## CONCLUSION

This is an early foundation and introduction paper to this exciting collaborative and interdisciplinary research, that consider how different social activities through play and resting can lead to new ideas and interpretations of our physical environment and services. Our design process simply prefers to maintain a very human scale observation as the starting point for conceptual ideas, exploring this through repeated prototypes and exhibitions, both to motivate our creative visions and to enable realistic tests and evaluation of the manufactured installations. We would like to acknowledge the support from our partner companies, also the encouragement from our academic colleagues and Xi'an Jiaotong-Liverpool University for their support of our research plans.

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