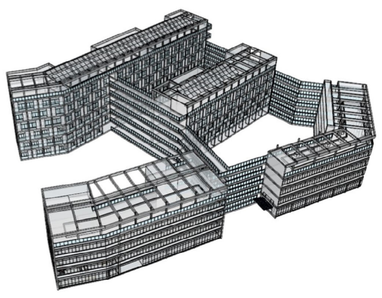
XXXVI SALÓN TECNOLÓGICO DE LA CONSTRUCCIÓN EXCO 2022
INTERNATIONAL EXHIBITION "RESEARCH IN BUILDING ENGINEERING EXCO'22"

物联网时代的建筑设计——设计范式的转型

NEXT Design in the IoT Era ——the transformation of architectural design paradigm

A Collaborative IoT Design Research Workshop 2021 in Shenzhen University (Duration: May ~June 2021)
Instructors: Stephen Siuyu LAU，Yi QI，Yiqi TAO ; Assistants: Hongzhan LAI, Amy LI, Yijia MIAO, Yineng MA
Collaborators:LWK architects, IsBIM data, Accentrix IT, EBSL sensing.

Aims: the design research workshop refined a design protocol and framework Industry-University-Research Collaboration. The exercise aimed to combine human-oriented design and architectural scenarios by integrating technology, aesthetics, human factor, function, and space. In response to the opportunities avail by the emergence of 5G technology, the workshop intends to refine new architectural design language and methods, to seek the transformation of design prototypes, and in making the future of intelligent design.



Stage 1 : Contextual Study - challenges of IoT for architects, challenges for Caring for the Elderly

Literature review & 3 rounds of questionnaire are adopted to help students to understand the background and development trend. Developments in information technology and digital advancement has prompted a quantum change in QoL regarding 'urban livability', 'wellbeing' and 'productivity'. Alas, contemporary technological advancements have brought forth a new dimension beyond that of 3-dimensions. Rapid advances in visualization technology have enabled one to communicate with the past, the present, and future, through various mediums of virtual reality. Such novel ways forge stimulation, inspiration and aspiration for mind and physical contacts.

Stage 2 : Deep Learning - Cognitive and Experiential Learning

In this course, the students carried out an experiential teaching activity in order to experience the daily living of elderly. Students were asked to discuss the simulation activity plan and start the activities of daily living (ADLs or ADL) experience of the elderly. The plan includes: 1) Props needed to simulate the life scene experience of the elderly. 2) Development of simulation scenarios. 3) Group arrangement. The course discusses the rationality of the scene setting, and clarifies the division of tasks such as experience, recording, and video shooting. This stage further improve students' understanding of the physical and mental needs of the elderly for subsequent architectural design.

Stage 3 : Learning IoT Technology - Sensing, Data and Analytics

After perceiving the background of the course, the course starts with an in-depth explanation of IoT technologies. Experts from various partner companies were invited to explain how emerging technologies change the way of life, such as big data, IoT, BIM, artificial intelligence, virtual reality, and so on. Based on their understanding of the experts' lectures, each group selected relevant cases for comparison and analysis. This link emphasizes two-way communication and real-time feedback between teachers and students, fully mobilizing the enthusiasm and initiative of both parties. Students need to clarify design requirements and conceptualize design solutions at this stage.

Stage 4 : A Day into the Elderly's daily life

The field research of the Shenzhen Social Welfare Center Elderly Care Home is conducive to the student's direct experience of the living environment of the elderly and to optimize the design of the architectural environment for this research objective. After the group visit, the groups conducted on-site research to explore apparent issues through experience and integration into the elderly's living environment. In this process, we need to follow the principle of "introducing IoT as a resource, not an intervention" to help the elderly move freely and use the space.

Stage 5 : Scenario Construct & Imagining and Imagineering

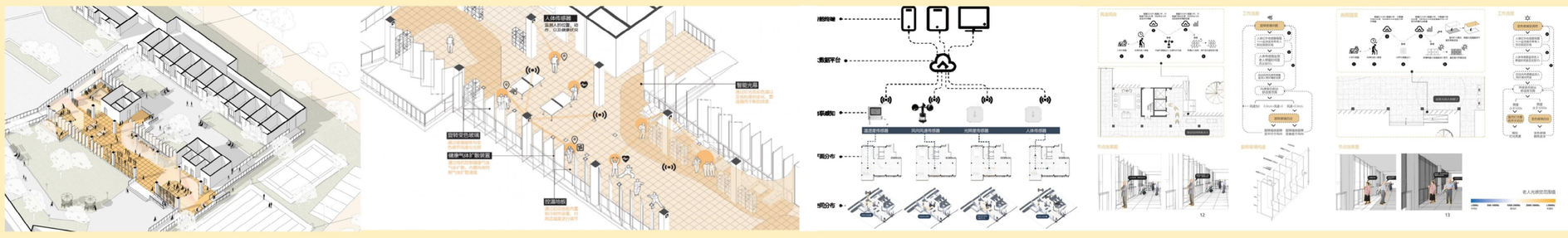
Firstly, advancing the scenario construct: students clarified the need for the design scenario and specify the research scenario. They selected specific architectural spaces by thinking about addressing the current behavioral issues of the elderly.

Finally, the imaginative construct: We invited experts in IoT sensing systems to advance the design with students at this stage. Students are thus guided to advance their specific research into scenario design by acknowledging relevant IoT data sensing systems. The process enabled students further to refine the factors of scene collection and data analysis, and learn how to use data to systematically and intelligently express scene requirements.

Stage6 : creating of Future ——student work Presentation

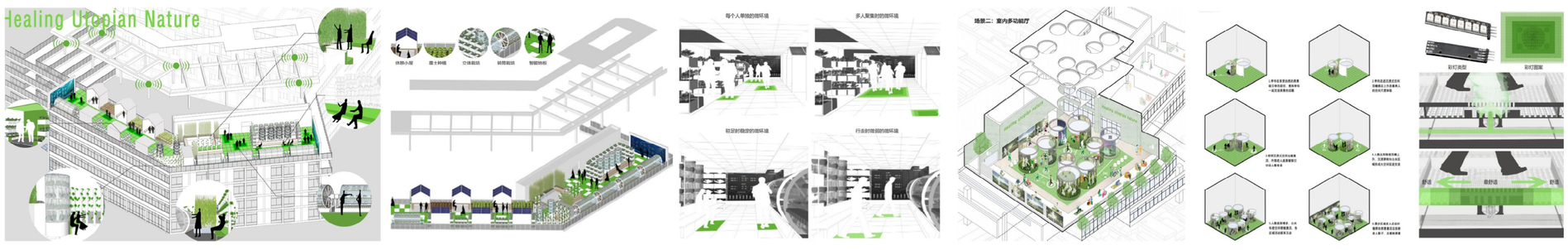
01 Breathing LOHAS
Yineng MA & Yanqiao ZHANG

Taking the ADLs of the "mobility" category as a clue, this design is implemented in the semi-open space of the elevated floor, focusing on improving the comfort of the physical environment and space to promote the activities and socialization of the elderly.



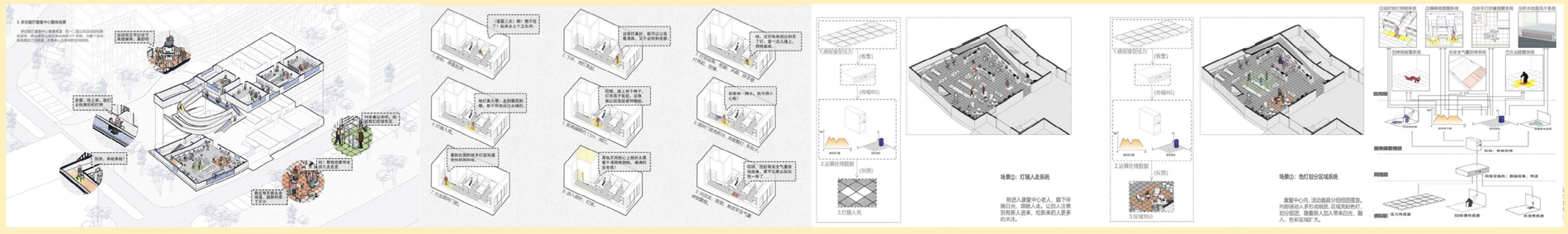
02 Healing Utopian Nature
Pei LI & Guang LI

The rooftop garden is used as a guide to focus on "object interaction" in ADL for the elderly. We provide a diverse and comfortable outdoor garden for the elderly by adding smart devices.



03 Protect the future with light
Fuhua LIAO & Pei TANG

The program will start from the pressure-sensing system, combined with lighting, to form a pressure-sensing light-emitting floor tile, trying to solve the tiny contradictions of the elderly who go to the toilet late at night but do not want to turn on the lights.

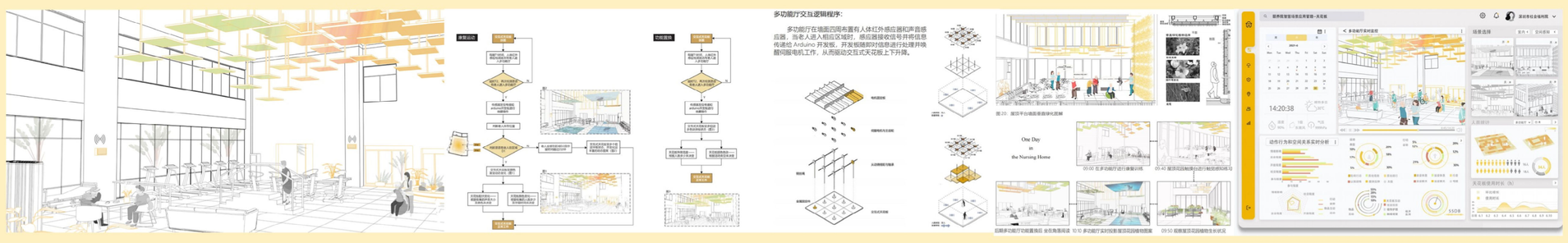


04 Space of Memory
Iifang ZHAO & Yixuan ZHANG

Combining the psychological "nostalgia therapy" with the architectural space, a "memory saving system" is established to store and display the memories of the elderly, which is connected to the architectural space by means of the Internet of Things to provide psychological healing for the elderly.

05 Visible Sound
Juhu WU & Yu ZHANG

Older people's ability to perceive sound decreases with age. This design attempts to collect and transcribe sounds in space and convey sound information through dynamic changes in the interactive ceiling to activate the attention, autonomy and cognitive abilities of the elderly.



06 Smart corridor
Jun ZHANG & Yu CHEN

Intelligent corridor platform, which around the three points of elderly safety, elderly social and elderly psychological. To create a full range of health management, security and life assistance service system for the elderly to meet their diversified needs.