Organised by :

UNIVERSITI TEKNOLOGI MARA

RICAEN
Research Industry Community Alumni Entrepreneurship Network

Programme by :

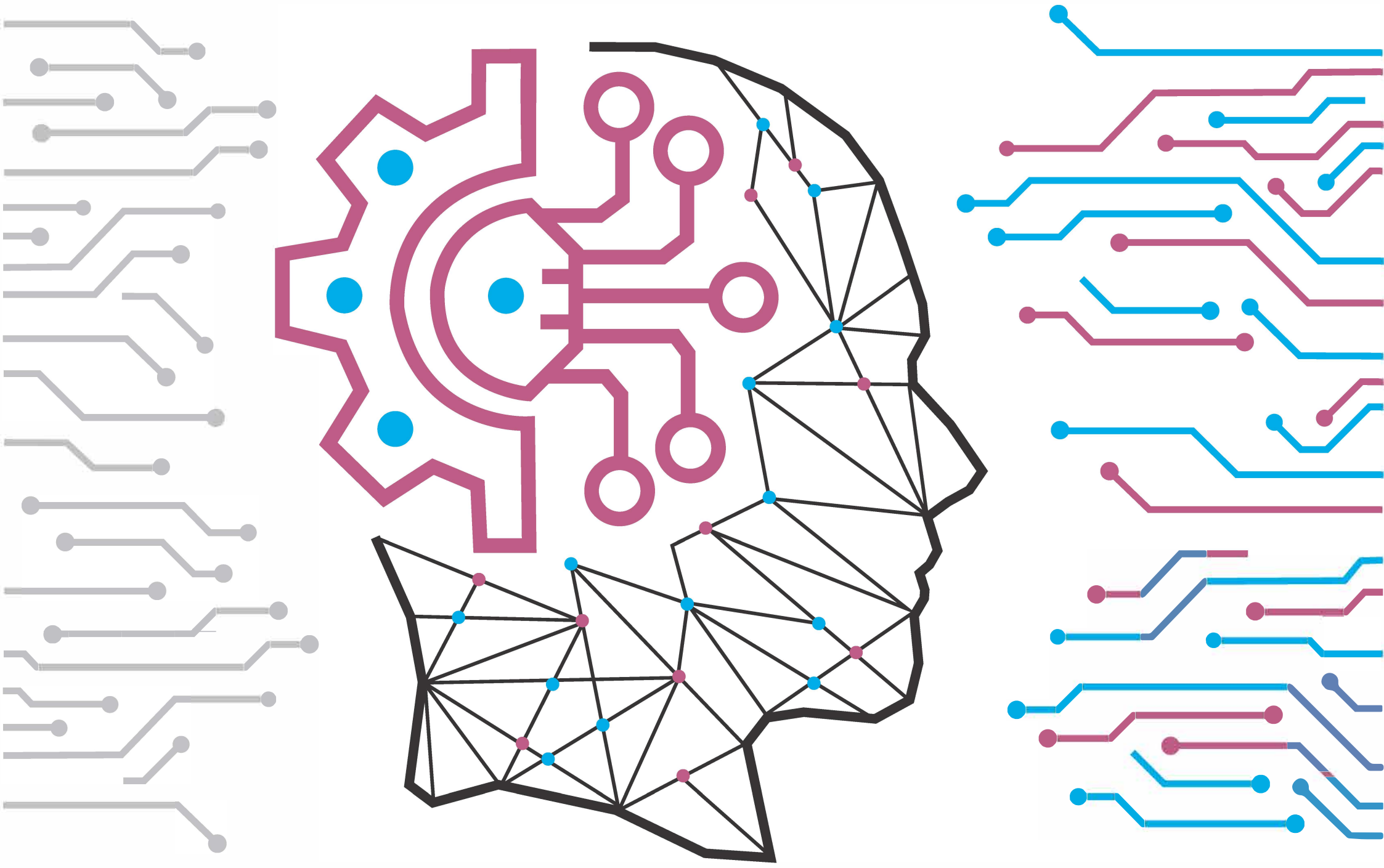
INSPIRED 2024
IPOH INTERNATIONAL SUMMIT ON PROFESSIONALISM, RESEARCH & EDUCATION

In Collaboration With :

BITCOM
BUSINESS INNOVATION & TECHNOLOGY COMMERCIALIZATION CENTRE

MRM
MAJLIS REKABENTUK MALAYSIA

MDEC™



13TH IIDES 2024

ENVIRONMENTAL • SOCIAL • GOVERNANCE

THE 13TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION 2024

EXTENDED ABSTRACTS

e-BOOK

EXTENDED ABSTRACTS e-BOOK

THE 13th INTERNATIONAL
INNOVATION, INVENTION &
DESIGN COMPETITION 2024

Organized by:
Office Of Research, Industry,
Community & Alumni Network
UiTM Perak Branch

Perpustakaan Negara Malaysia Cataloguing in Publication Data

No e- ISBN: 978-967-2776-31-4

Cover Design: Dr. Mohd Khairulnizam Ramlie
Typesetting : Zarinatun Ilyani Abdul Rahman

EDITORIAL BOARD

VIRTUAL PLACE NAVIGATOR: ENHANCING ARCHITECTURAL EDUCATION THROUGH IMMERSIVE VIRTUAL REALITY FOR EXPERIENTIAL LEARNING ON THE SENSE OF PLACE

Izham Ghani[1], Norhafizah Abdul Rahman[2], Mohd Zulhaili Teh[3], Marina Abdullah[4] and Ruwaidah Borhan[5]

[1,2,3,4,5]Programme of Landscape Architecture, College of Built Environment, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610 Seri Iskandar, Perak.

izham025@uitm.edu.my

ABSTRACT

Integrating advanced technologies into architectural education can profoundly transform learning experiences, particularly through Virtual Reality (VR). The 'Virtual Place Navigator' project leverages VR to create immersive virtual environments (VEs) that enhance students' experiential learning and understanding of the sense of place in architectural studies. This project adopts a qualitative approach, utilising in-depth semi-structured interviews and the 'think aloud' method during VR sessions enriched with gamification elements. This project identifies four crucial components of virtual place: settings, activities, meanings, and immersion that could effectively 'transport' users to alternate locations and experiences. These components collectively facilitate a deeper understanding of spatial relationships and design principles. The findings demonstrate that specific criteria must be met before representing contents within a VE to establish a genuine sense of place in architectural virtual environments. By simulating real-world spatial experiences, VR provides a dynamic and interactive platform for architectural education, bridging the gap between theoretical knowledge and practical application. This project lays the groundwork for integrating VR into architectural pedagogies, highlighting its potential to revolutionise the learning process and prepare students for the demands of contemporary architectural practice.

Keywords: virtual reality, experiential learning, architectural education, immersive environments

1. INTRODUCTION

As highlighted in the United Nations Sustainable Development Goals (SDG), technology is increasingly becoming vital to the global agenda. Achieving all SDGs is impossible without integrating science, technology, and innovation (United Nations Division for Sustainable Development Goals, 2018). Architectural education, in particular, stands to benefit significantly from technological advancements, primarily through the integration of Virtual Reality (VR). VR enables the simulation of real place experiences within virtual environments (VEs), offering a transformative approach to architectural learning. Architectural students primarily rely on 3D models to replicate physical environments and convey ideas of place or a sense of place, whether buildings or landscapes.

The term 'sense of place' typically encompasses the distinctive human experience, connection, and emotional attachment to a specific location (Ghani et al., 2020). However, these 3D models

often lack the dynamic and immersive qualities that constitute the richness of a place, leading to a disconnection from the intended experiential learning essence. This gap arises due to the insufficient integration of fundamental elements that contribute to the sense of place within VEs. The 'Virtual Place Navigator' project aims to address this gap by leveraging VR to enhance the experiential learning of architectural students. The objectives of this project are threefold:

1. To identify the elements that constitute the sense of place in both physical and virtual environments;
2. To explore the underlying constructs of the sense of place in architectural VEs;
3. To propose an interactive VR model simulating real place experiences within architectural VEs to support spatial representation in architectural studies.

This project employs a qualitative research methodology, utilising in-depth semi-structured interviews and the 'think aloud' method during the VR sessions. Data gathered from these sessions are analysed, triangulated, and reported. Expert participants from the academic community are selected using purposive sampling to ensure the relevance and depth of the understanding. By providing a foundational framework for applying VR in spatial representation, this project also aims to enhance the efficacy of the learning process in architectural education.

2. METHODOLOGY

The methodology for this project involves several phases, including design, development and evaluation of the VR model. This project adopts a qualitative data collection method based on the phenomenological nature of the project objectives.

2.1 Design and Development

The first project objective is to identify the elements that constitute the sense of place in both physical and VEs. Findings from the literature review were triangulated to extract these elements from both realms to formulate the foundation of the VR model. The findings from this review are also formulated to develop the questions for the in-depth semi-structured interviews, ensuring researchers are well-prepared before conducting the experiment. The initial design and development phase focuses on creating detailed VR models of various architectural spaces using 3D computer graphics game engine software.

2.2 Evaluation

The project's second objective is to explore the underlying constructs of the sense of place in architectural VEs. This is achieved through the evaluation from the VR experiment involving qualitative data collection methods of in-depth semi-structured interviews and the 'think aloud' method. A purposive sampling method is adopted as participants are selected from those with expert knowledge on the topic of 'sense of place' either from personal or academic experiences. The primary testing platform consists of VR equipment and architectural VR content, which consists of a fictional virtual town that includes animated virtual humans, buildings and vegetation replicating a typical real town environment. Participants wore VR headsets during each session and were prompted to offer real-time commentary as they navigated through the VE (Figure 1).

Figure 1 VR experiment session.

Open-ended questions during the interview explore the participant's virtual presence and the constructs of a virtual place experience from their real-time perspectives. The 'think aloud' method captures the real-time participant feedback as they navigate through the VE, providing insights into the elements that constitute a sense of place in a virtual place setting.

3. FINDINGS

The recorded interviews and commentaries underwent verbatim transcription and were analysed using qualitative software (QSR Nvivo) to identify distinctive themes among the diverse descriptions of place experience within an architectural VE. The findings are categorised according to the principal constructs proposed for the design and establishment of virtual spaces aimed at replicating real-world experiences, as outlined in the previously conducted literature review. The description of the proposed virtual place constructs is outlined below.

i. Settings: Authentic, real-world settings, emphasising dynamism and localised features;
ii. Activities: Incorporating interactive objects and avatars;
iii. Meanings: Integration of personally relevant content, allowing for relatable experiences;
iv. Immersion: Utilising fully immersive devices, soundscapes, and tactile feedback controls.

Figure 2 illustrates the outcome of a frequency analysis using a word frequency reference count. This analysis was carried out based on the interview transcriptions, focusing on the four categories of virtual place constructs. The findings revealed a more significant occurrence of words associated with the 'meaning' construct compared to the other constructs.

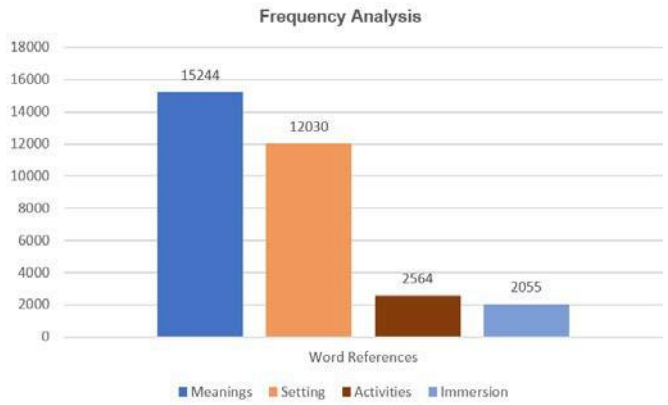


Figure 2 Frequency analysis of virtual place constructs

The results and findings from all analyses are triangulated to develop a model of authentic place experience for architectural VEs, aligning with the third project objective to support spatial representation in architectural studies.

4. CONCLUSION

The findings of this project suggest that specific criteria must be met before representing contents within a VE to the intended audience to establish a genuine sense of place in architectural VEs. These conditions can be classified into two main categories: content and distribution. It could potentially be feasible to convey a sense of place by employing immersive VEs coupled with enhanced content creation and improved VR technology. This project aimed to establish a vital foundation supporting various disciplines in spatial representation using VR technologies, with a focus on experiential learning. The advancement of digital learning content through VR technologies promises to improve pedagogical effectiveness, fostering a deeper understanding and engagement among students in architectural studies.

REFERENCES

Ghani, I., Rafi, A., & Woods, P. (2020). The effect of immersion towards place presence in virtual heritage environments. *Personal and Ubiquitous Computing*, *24*, 861-872.

United Nations Division for Sustainable Development Goals. (2018). *Science, technology and innovation crucial to transformative impact of global goals, un forum hears*. https://www.un.org/en/desa/science-technology-and-innovation-crucial-%E2%80%98transformative-impact%E2%80%99-development

Pejabat Perpustakaan
Librarian Office

Universiti Teknologi MARA
Cawangan Perak
Kampus Seri Iskandar
32610 Bandar Baru Seri Iskandar,
Perak Darul Ridzuan, MALAYSIA
Tel: (+605) 374 2093/2453 Faks: (+605) 374 2299

UNIVERSITI TEKNOLOGI MARA

Surat kami : 700-KPK (PRP.UP.1/20/1)
Tarikh : 20 Januari 2023

UNIVERSITI TEKNOLOGI MARA PERAK
TERIMA
25 JAN 2023
Tindakan
Universiti Teknologi MARA Perak
PEJABAT REKTOR

Prof. Madya Dr. Nur Hisham Ibrahim
Rektor
Universiti Teknologi MARA
Cawangan Perak

Tuan,

PERMOHONAN KELULUSAN MEMUAT NAIK PENERBITAN UiTM CAWANGAN PERAK MELALUI REPOSITORI INSTITUSI UiTM (IR)

Perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pihak kami ingin memohon kelulusan tuan untuk mengimbas (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna perpustakaan terhadap semua maklumat yang terkandung di dalam penerbitan melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

nar

Setuju.

27.1.2023

PROF. MADYA DR. NUR HISHAM IBRAHIM
REKTOR
UNIVERSITI TEKNOLOGI MARA
CAWANGAN PERAK
KAMPUS SERI ISKANDAR