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YOUTHOPIA: DEVELOPING AN IMMERSIVE REALM FOR IR 4.0 DIGITAL COMMUNITY AT JALAN COCHRANE, KUALA LUMPUR, MALAYSIA

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ABSTRACT

In line with the 4th Industrial Revolution (IR 4.0), this design research seeks to develop a speculative immersive architectural realm for the digital community at Jalan Cochrane, Kuala Lumpur, Malaysia. Named YOUTHOPIA, this architectural design proposal-a Digital Community Centre is a solution for youth to equip themselves with the digital skill set and for the government to develop future talents. The research has three (3) objectives: to create awareness and knowledge of IR4.0 in the youth community to speed up the digital transformation, to design the required spaces and adequate facilities for digital edutainment, and to establish a platform for the youth community to upskill and produce future talents. The youth reportedly have difficulties adapting to the rapid digital transformations in IR 4.0. due to the absence of training facilities and the lack of exposure in the current educational system. Hence, the development of "Youthopia" as an architectural solution could enhance the community centre's functions in the future. Using the immersive technology of Extended Reality (XR), the users of "Youthopia" would come and experience an immersive realm with the manifestations of the digital and physical spaces. This design facility encompasses virtual reality (VR), augmented reality (AR), and mixed reality (MR) to make learning an entertaining endeavor. Hence, this architectural design proposal provides inclusive edutainment spaces in time for Industrial Revolution 4 (IR4.0) transformation.

Keyword: Industrial Revolution 4.0, Digital Technology, Edutainment, Immersive Realm, Extended Reality.
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INTRODUCTION

The Fourth Industrial Revolution (IR4.0) has rapidly progressed, and technology such as cloud computing, the Internet of Things (IoT), e-commerce platforms, and advanced human-machine interfaces have integrated into human life. From using a computer to mobile-phone, now everyone can virtually interact and digitally do their work from anywhere, at any time. The world is witnessing the changes from the physical world to a digital one, as everything is becoming digitalized as the Fourth Industrial Revolution continues evolving.

Everything uses digital technology and gadgets, such as computers, tablets, and smartphones. Some physical work has become digital work, where machines have replaced humans in the workforce. Almost everyone works by facing the digital screen for a broad range of purposes, including long-distance communication and virtual interaction between co-workers.

The rapid progress of the Industrial Revolution is yet to have the same pace as the development of the educational and learning industries. However, students and staff in educational institutions are still struggling to cope with the advancement of digital technology. Moreover, with the emergence of the Covid-19 Pandemic, the struggle is even more significant as online teaching and learning enforcement is inevitable. Though most people are not ready for the changes, everything is becoming digital and touchless.

INDUSTRIAL REVOLUTION 4.0

The fourth industrial revolution (IR 4.0) involves the digital transformation of the industry with the integration and digitalisation of all the industrial processes. This advancement makes up the value chain, characterized by its adaptability, flexibility and efficiency. IR 4.0 allows the industries to mass-produce products and cater to customers' demands and needs in the current markets.

The Nine (9) pillars of Industrial Revolution 4.0 drive the digital transformation - Internet of Things, Big Data Analytics, Augmented Reality, Cybersecurity, System Integration, Autonomous systems, Simulation, Additive Manufacturing and Cloud Computing.

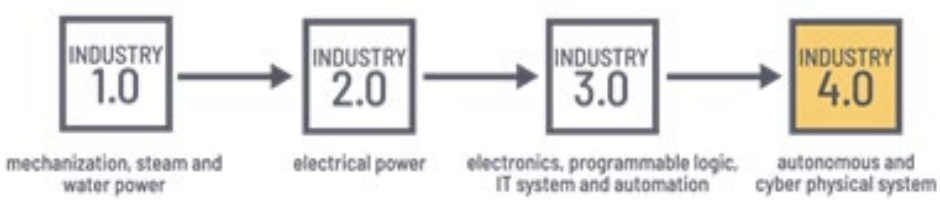

Figure 1: The components of changes of industry from IR 1.0 to IR 4.0
(Source: Authors)

INDUSTRIAL REVOLUTION 4.0)

Based on the statistics of the high-skilled job by Malaysian Standard Classification of Occupations (MASCO-08), before 2011, there were only 18% high-skilled jobs, 75% and 7% with semi-skilled and low-skilled jobs, respectively (Department of Statistics, 2022). This statistic becomes the main concern when the world is rapidly entering the digital era. Therefore, the Malaysian government aspires to raise the proportion of skilled workers to 50% of the workforce by 2020 (Ibid, 2022). The situation was speculated by McKinsey Global research report (2022) that digital literacy and computational thinking will be among the most demanded skills in 2030. Figures 2, 3, and 4 show current trending skills, future demanded skills and top 10 future tech jobs.

Figure 2: The current trending skills
(Source: Authors)

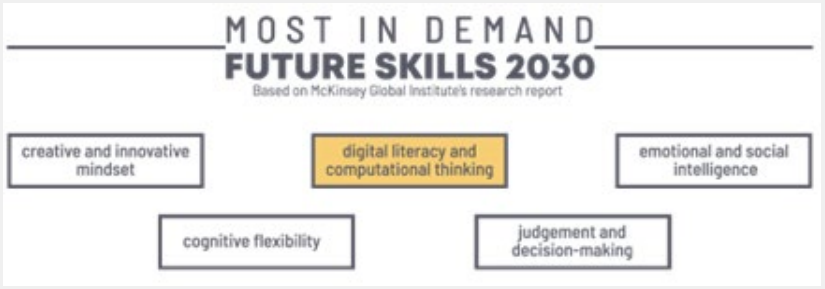

Figure 3: The most in demand future skills
(Source: Authors)

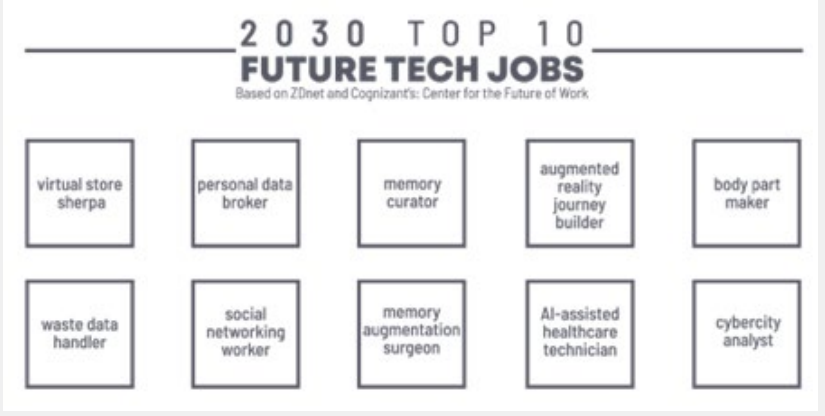

Figure 4: Top 10 future tech job
(Source: Authors)

BACKGROUND ISSUES AND PROBLEMS

Prior to the development of Youthopia as a speculative immersive architectural facility, background research to investigate the issues related to digital skills requirements for youth for IR 4.0. was conducted. The research found that issues categorised in educational and social aspects were significantly predominant. As shown in figure 5, both categories are the major concerns for the transformation of youths that will affect the youth community

Figure 5: The current issues categorised for transformation of youths
(Source: Authors)

Prior to the development of Youthopia as a speculative immersive architectural facility, background research to investigate the issues related to digital skills requirements for youth for IR 4.0. was conducted. The research found that issues categorised in educational and social aspects were significantly predominant. As shown in figure 5, both categories are the major concerns for the transformation of youths that will affect the youth community

EDUCATION: INADEQUATE FACILITIES AND TRAINING INSTITUTIONS

Malaysia lacks Industrial Revolution 4.0 training facilities to re-skill and up-skill the future youth. The existing youth centre is generally unable to keep up with technological advancement and the needs of the future youth generation. The insufficient awareness and knowledge of IR 4.0 among the community have slowed down the process of technological transformation. Figure 6 illustrates that Malaysia can inspire to upskill the youths, yet the facilities provided are not able to provide the necessary support.

SOCIAL: TECHNOLOGICAL CHANGES CREATE CHALLENGES

The rapid technological changes create challenges and competition for youth to embrace high-skilled jobs, and these transformations create competitiveness in the industry. The increasing demand in the digital technology industry affected the youths' capability to adapt to the changes in the world, especially in choosing their career path to meet IR 4.0 demands.

DESIGN RESEARCH AIM AND OBJECTIVES

In line with the 4th. Industrial Revolution (IR 4.0)'s aspiration, this design research aims to develop a speculative immersive architectural realm for the digital community at Jalan Cochrane, Kuala Lumpur, Malaysia, - the YOUTHOPIA. The three (3) objectives formulated to achieve the thesis aim are:

1. To create awareness and knowledge of IR4.0 in the youth community to speed up the digital transformation,
2. To design the required spaces and adequate facilities for digital edutainment,
3. To establish a platform for the youth community to upskill and produce future talent.

SITE INTRODUCTION

The design research proposed site for YOUTHOPIA is at Jalan Cochrane, Taman Maluri, Kuala Lumpur, Malaysia. The site location was chosen based on the three (3) main design criteria, which are its accessibility, its capability to engage the public, and institutional strategic location. Figure 6 shows the site justification, while Figure 7 and 8 show the site's location and surrounding context.

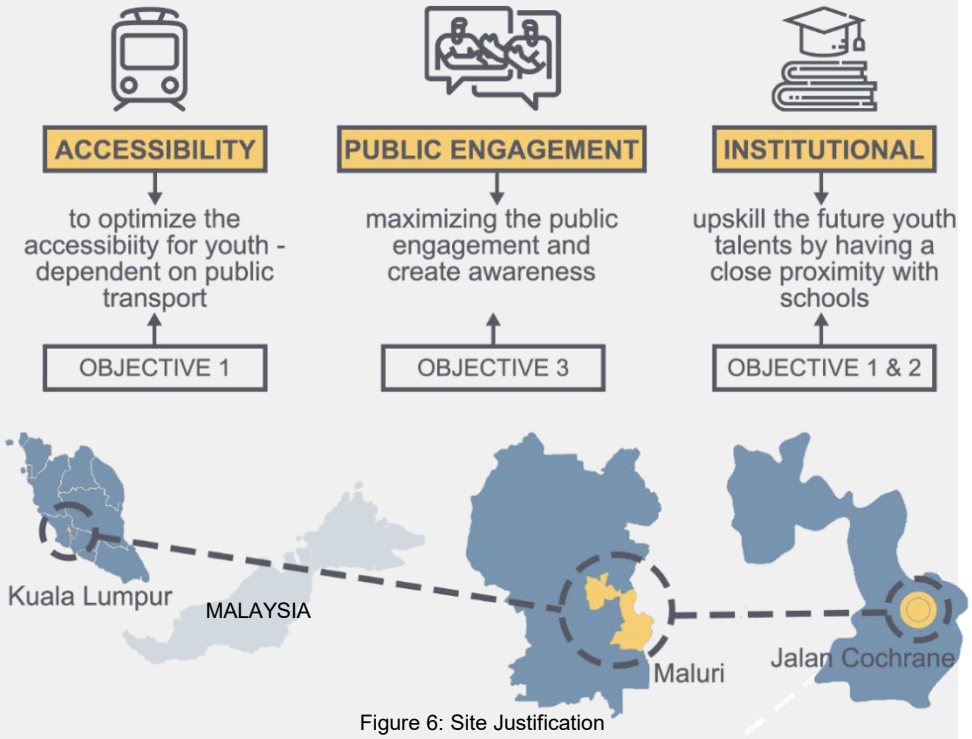

Figure 6: Site Justification

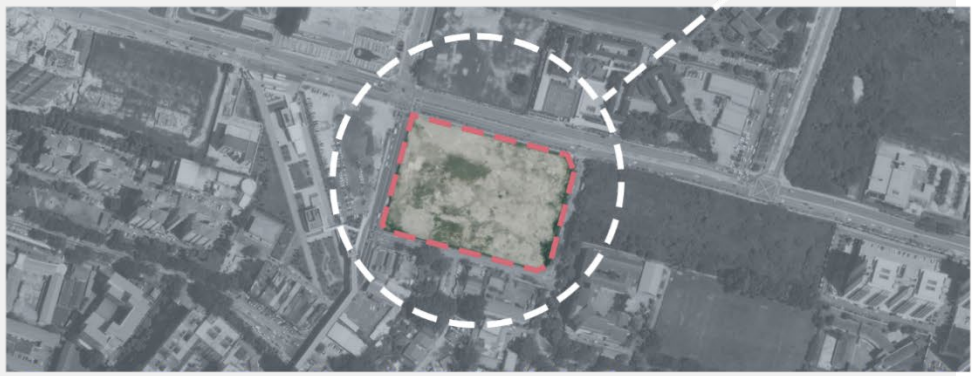

Figure 7: Key plan that indicates the location of the site

Figure 8: Site Context

SITE SYNTHESIS

The proposed site synthesis was formulated based on rigorous site analysis for two months. Based on these findings, the designer directly connects the existing underground passageway, MRT Station at Jalan Cochrane and MyTOWN Shopping Centre. Youthopia is planned and designed to have the frontage with direct engagement to major landmarks of the surrounding area to ensure the maximum opportunity for the public's engagement..

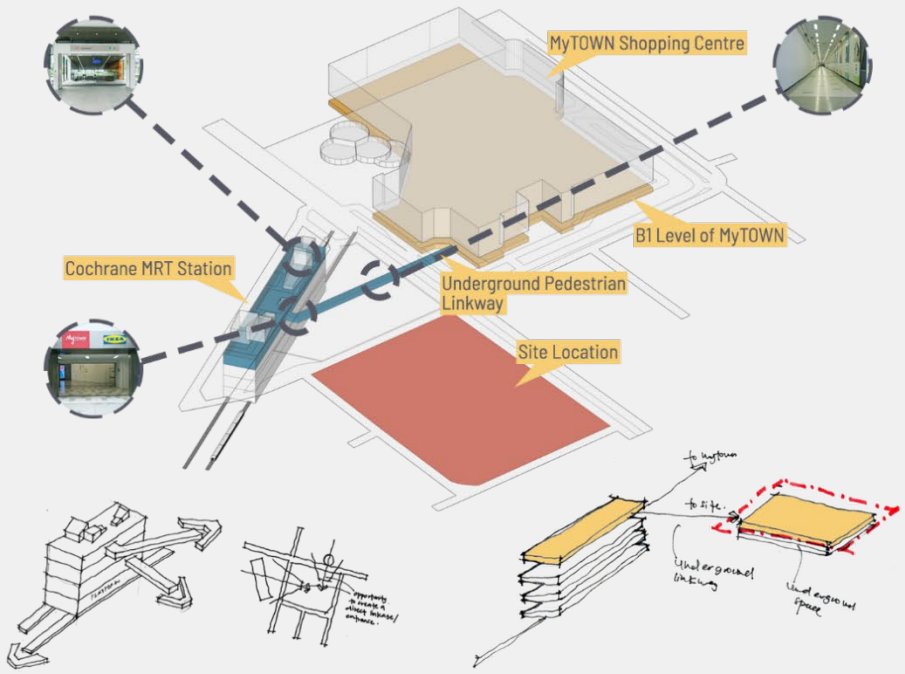

Figure 9: Illustrations of site synthesis

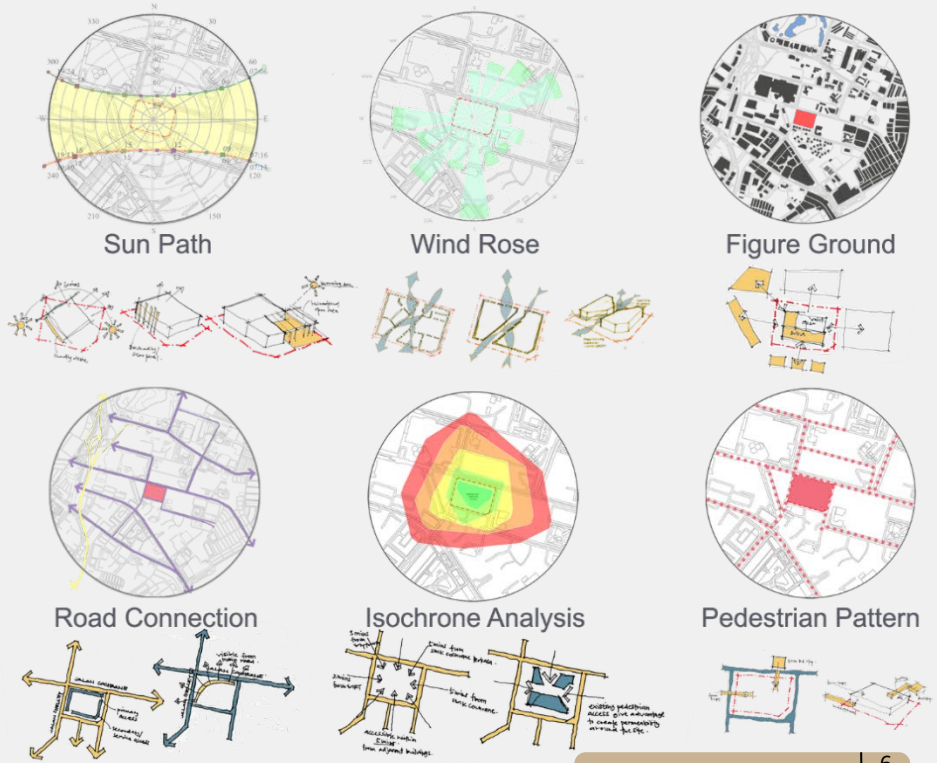

Figure 10: Diagrams to show the site analysis

Integrated School 6 4 8

DESIGN CONCEPT

The concept of this architectural design project is "convergence", which means combining or merging two things into one. Convergence could also be defined as the flow of digital transformation as everything moves toward cyberspace. In the design, the convergence focuses on three aspects: the physical and virtual space, digital and analogue, and human and technology, thus resulting in the digital environment of the future.

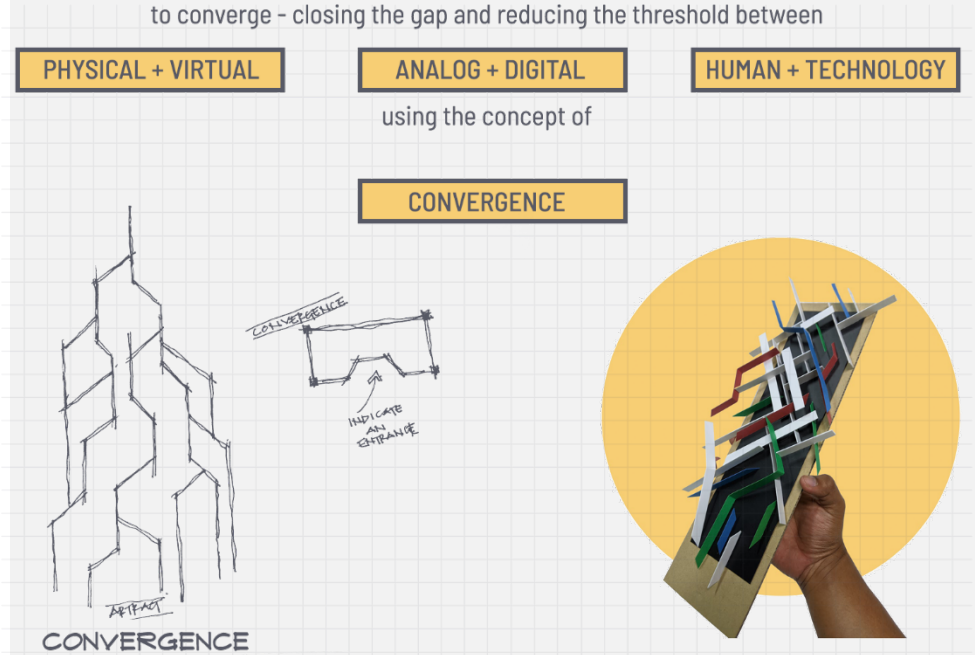

Figure 11: Conceptual sketch and model

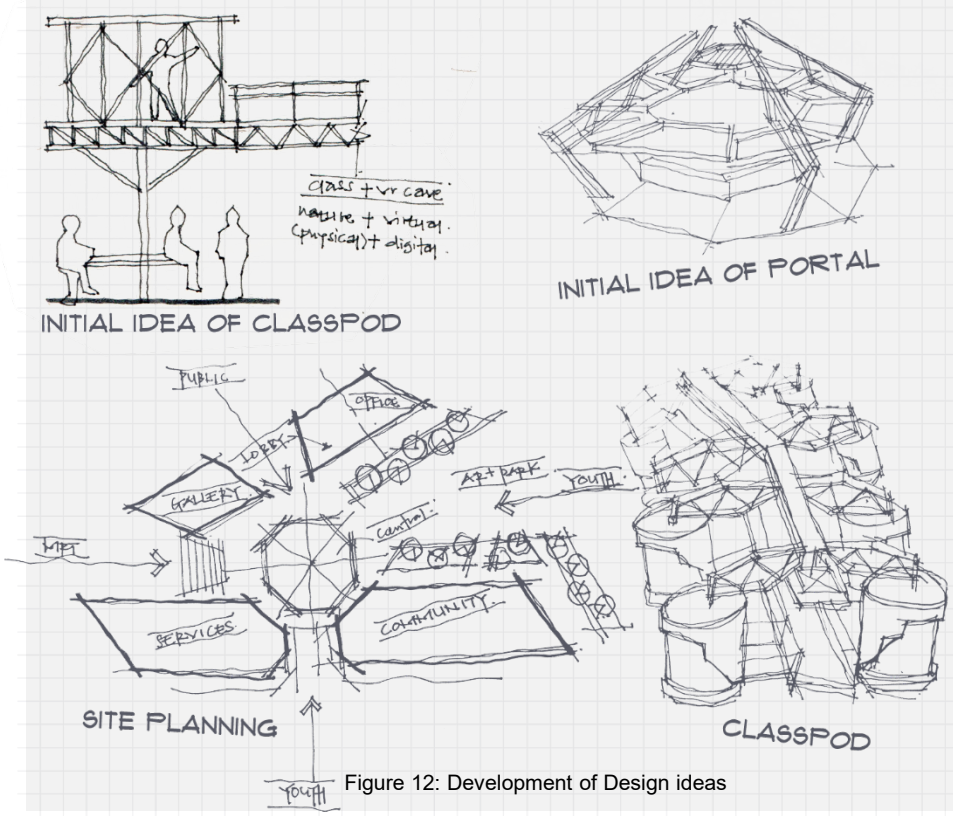

Figure 12: Development of Design ideas

SITE ZONING

The site is strategically divided into three (3) zones; the public, edutainment, and computer games. The public zone is located on the ground level. The public zone is further divided into two (2) zones on the ground level: the visitors and the community. The visitors' zone is located on the north side as it is near the main road and landmarks, as the space serves to have facilities for creating awareness among visitors. On the other hand, the community's zone is on the south side, near the adjacent schools and residential areas. The public zone is divided by two building blocks and intersects with a community plaza to create a community interaction at the centre of the complex. The edutainment zone is located on the first and second floors because the space requires privacy. In the edutainment zone, the game zone is located on the east side of the site adjacent to the neighborhood community.

SITE PLANNING

The site is organised into three zones. The first zone: the public zone, consists of a Digital Gallery, a Simulation Room, an Immersive Plaza and a Digital Art Gallery. This public zone is located both at the lower ground floor and the ground floor level to ease and enable the public to experience the spaces. The second zone: the Edutainment Zone, consists of a Programming Lab, an Additive Manufacturing Lab, an Autonomous System Lab, a Digital Resource Room, and Class-Pods. These spaces are located on the first and second floors to accommodate the users, the youth, and students with privacy by separating them from the ground level – the public area. The third zone: the augmented reality game zone, consists of two types of the portal: the AR+ Portal and the XR Portal. These portals are located at the open AR+ Park on the site's eastern side. The portals are arranged to the S2 cell grid, i.e. resembling the digital location for a portal in the virtual environment. The architecture that made up the physical building blocks is interconnected via the class-Pod bridge and the Immersive Bridge. Figure 13 shows the proposed design morphology.

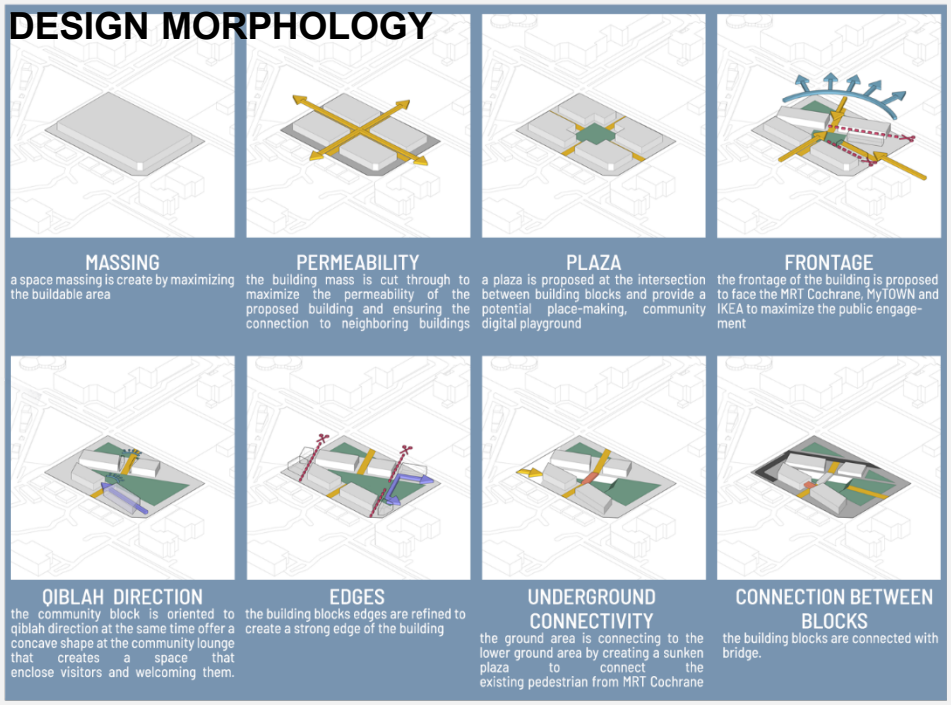

Figure 13: Design Morphology

THE FINAL DESIGN

SITE PLAN

The main idea of the site plan is to create a central plaza and open park at the centre. The ground level is connected to the lower level with a sunken plaza to invite users from the underground passageway to the ground level. The users will experience the central community plaza with supporting facilities at the side of the space.

Figure 14: Site plan

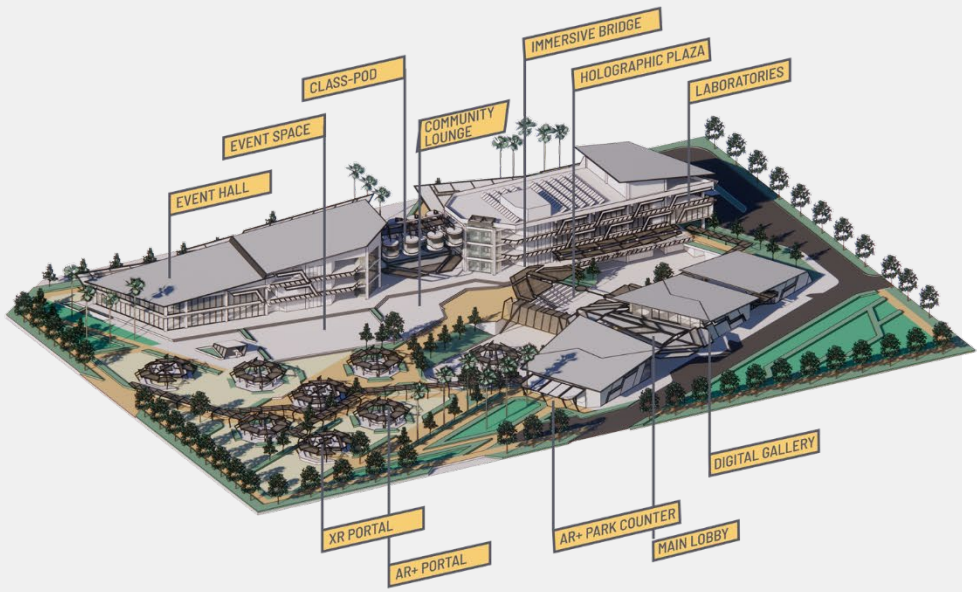

Figure 15: Axonometric view of the YOUTHOPIA masterplan

GROUND FLOOR LEVEL

The ground floor level is designed for public access. The facilities on the ground floor include the lobby, immersive gallery, digital gallery, community plaza, event hall, cafeteria, kiosk, outdoor event space, and AR+ park. AR+ Park is the open park for the users cum the players that will play the augmented reality games using the portals. The Community Plaza is located at the centre of interconnected building blocks of the complex. The plaza separates the function of the community area from its services area.

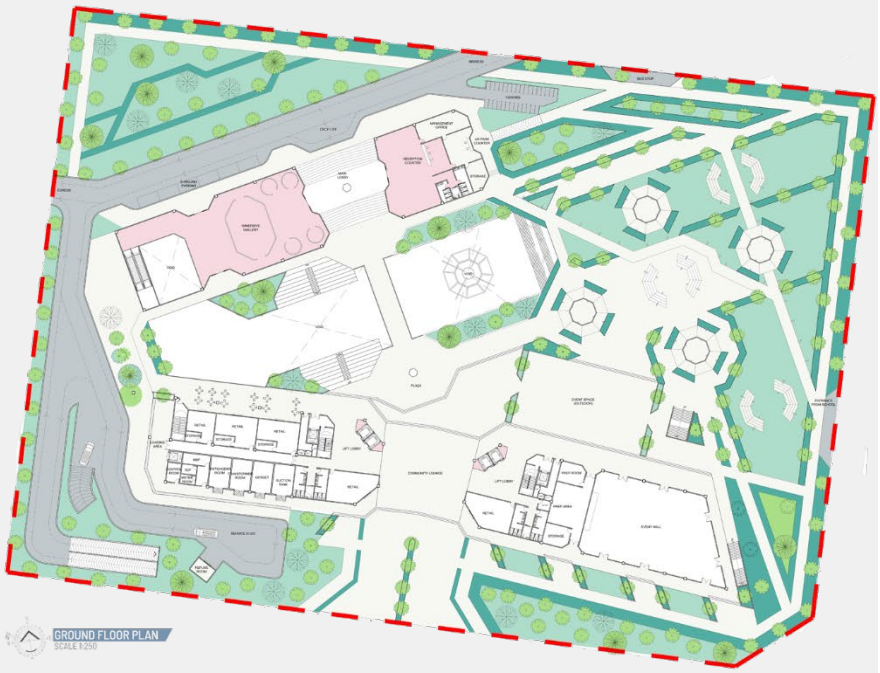

Figure 16: Ground Floor Plan

LOWER GROUND LEVEL

The lower ground level is designed to connect the underground passageway and the ground floor level to welcome users from the existing underground passageway to the proposed building. The idea is to implement the sunken plaza to give a direct linkage to the open park at the ground level for the pedestrian users to flow through. The lower ground level creates compelling digital spaces- the simulation room and digital gallery that do not require natural daylight.

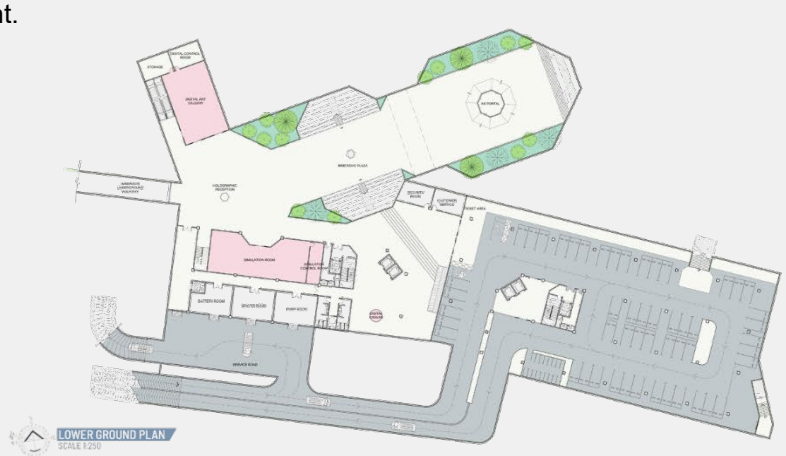

Figure 17: Lower Ground Floor Plan

THE FINAL DESIGN

FIRST FLOOR LEVEL

The first-floor level is designed to be a semi-private zone, with community facilities, such as musolla, programming lab and co-working spaces for rental. The spaces are located at the first-floor level to ease circulation and to allow for privacy.

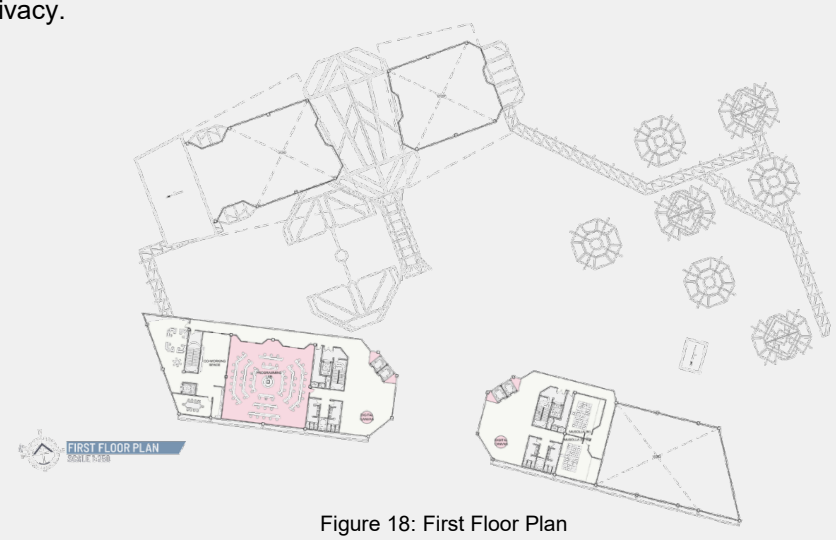

Figure 18: First Floor Plan

SECOND FLOOR LEVEL

The second-floor level consists of the private zone - the digital resource room and the interconnected laboratories – the additive manufacturing lab and the autonomous system lab. The future classroom and the Class-Pod are located at the centre of the development, which connects both building blocks.

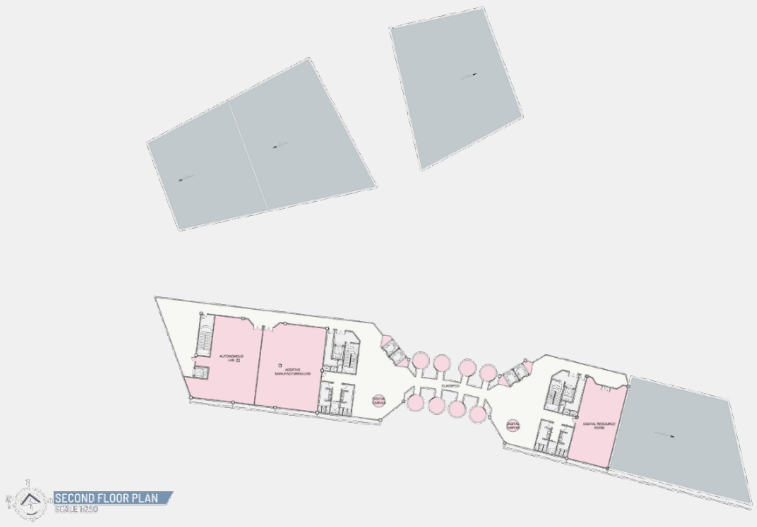

Figure 19 Second Floor Plan

THIRD FLOOR LEVEL

The third-floor level consists of services areas such as the VRF room, motor room, water tank room and solar panel area.

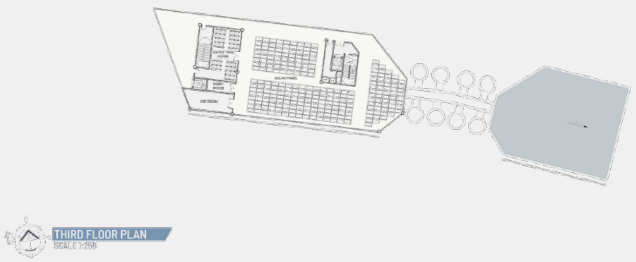

Figure 20: Third Floor Plan

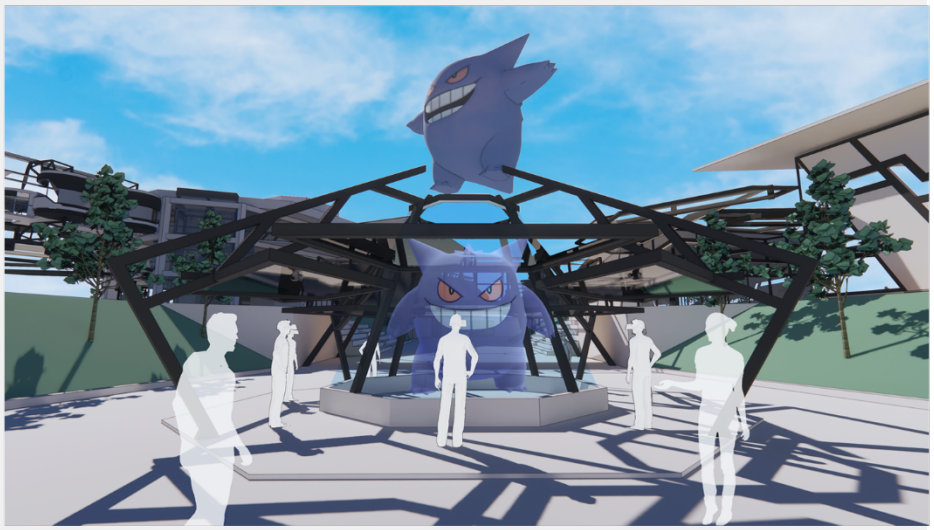

Figure 21:: AR+ Portal with the situation of in-game group battle (source: author)

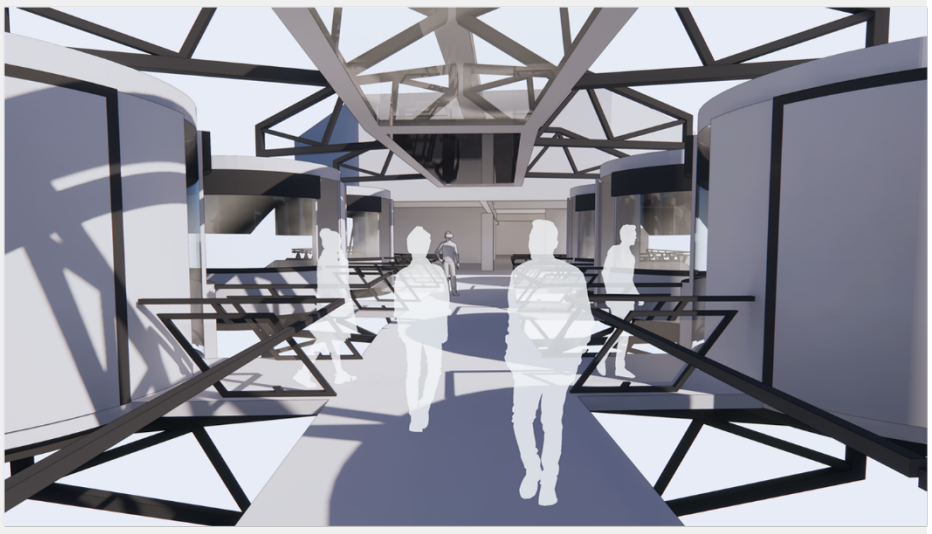

Figure 22: View to the Class-Pod using the bridge (source: author)

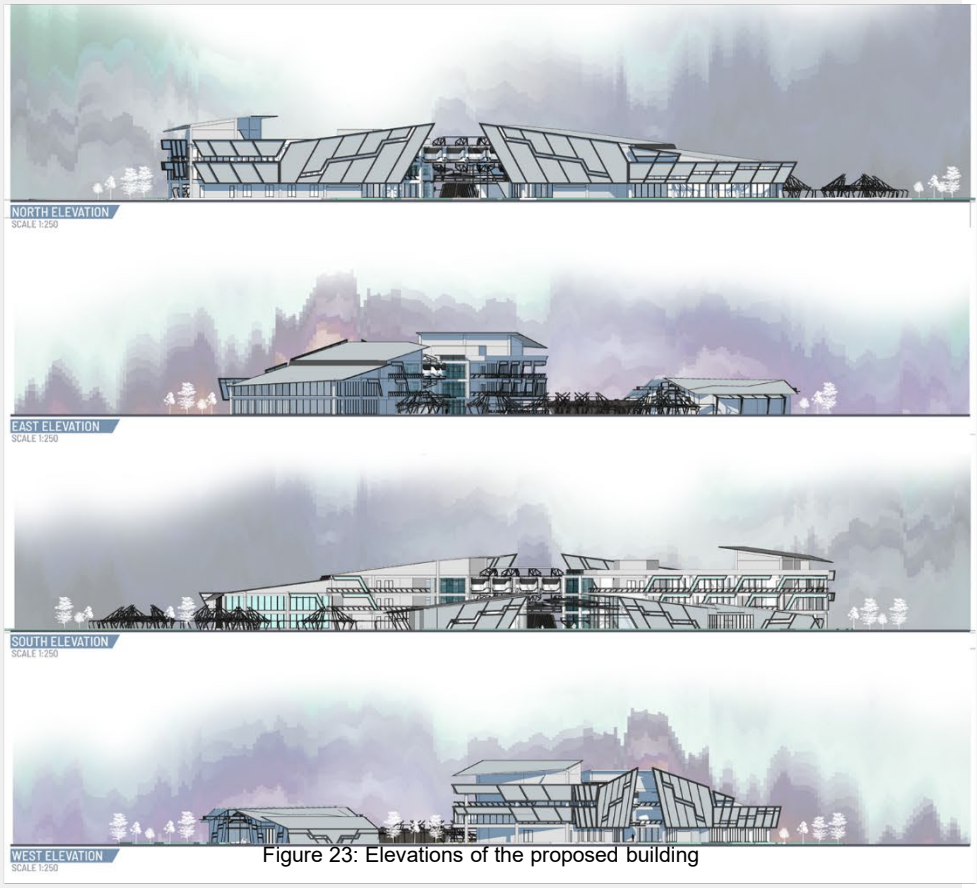

Figure 23: Elevations of the proposed building

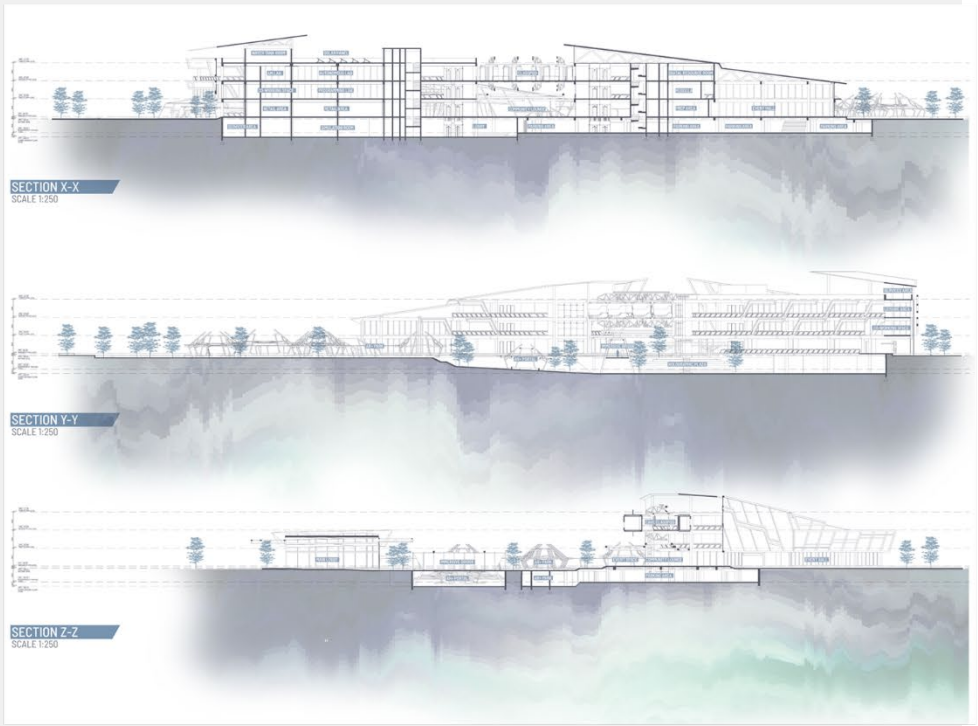

Figure 24: Sections of the proposed building

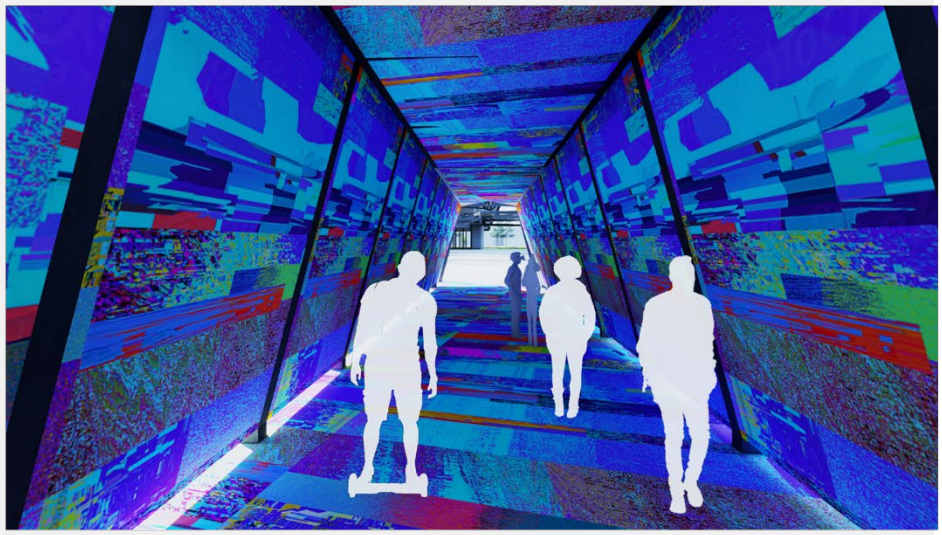

Figure 25: View inside the Immersive Bridge

Figure 26: View of Co-Working Space at First Floor

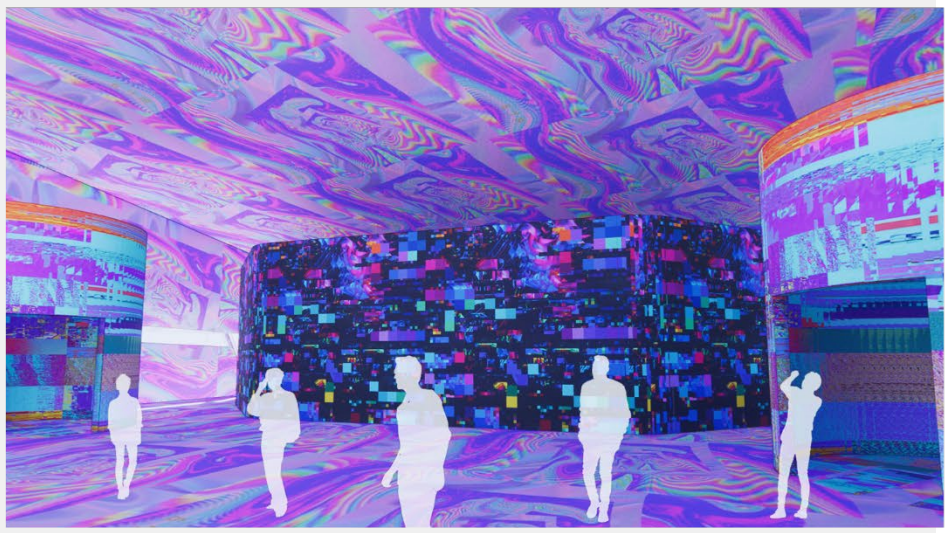

Figure 27: View of Immersive Gallery on the Ground Floor

Figure 28: Perspective View

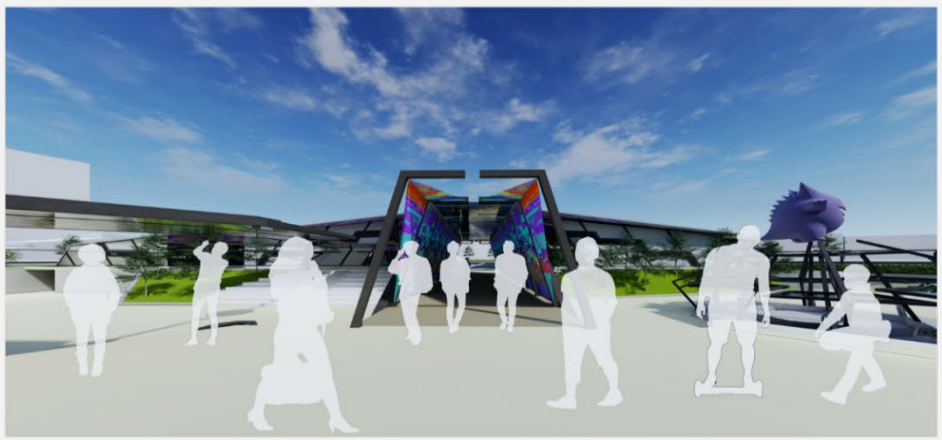

Figure 29: The Immersive Bridge

Figure 30: View of Sunken Plaza, facing the AR+ Portal

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Figure 31: View of Immersive Plaza on the Lower Ground Floor

Figure 32: Aerial View of AR+ Park

CONCLUSION

The design exploration of this research successfully produced an architectural design for a facility that could inspire the Malaysian government to develop a speculative immersive architectural realm not only for the digital community at Jalan Cochrane, Kuala Lumpur but also elsewhere throughout Malaysia, in the spirit of the 4th. Industrial Revolution (IR 4.0) to produce, upskill and reskill future talents among the youth community.

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