

Newbie at CUHKSZ: A Voxel Art Puzzle Game for Campus Orientation

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Abstract—Due to the COVID-19 epidemic prevention policy, many university freshmen are unable to visit their schools in person. As a remote campus orientation tool, we propose *Newbie at CUHKSZ*, a voxel art puzzle game, for the incoming students to explore The Chinese University of Hong Kong, Shenzhen (CUHKSZ) in an interactive way. We crowd-sourced the digital model of the CUHKSZ campus and created Non-Player Characters (NPCs) as digital twins of our staffs in the virtual campus. Furthermore, we designed school traditions related puzzle tasks to lead an interactive campus tour and deliver humanistic values. The design of *Newbie at CUHKSZ* sheds light on a new way to engage the incoming students in a remote campus orientation event.

Index Terms—Puzzle Game, Serious Game, Campus Guide, Voxel Art

I. INTRODUCTION

A large number of incoming university students could not attend the campus orientation events because of COVID-19. Therefore, those students missed the opportunity to get a comprehensive understanding of their university and build friendship with their cohorts earlier. In order to help the group of students get out of this predicament, many universities have developed virtual campus guide systems that provide essential information about their universities [1] (e.g., the location of dormitories, the history of schools). Even some researchers have developed a complete version of the metaverse campuses based on their college (including the infrastructure, interaction, and ecosystem) [2]. The existing virtual campus guide systems can be classified into four categories from the perspective of visual representation: (1) 2D maps (e.g., McMaster University¹ and Huron University²), (2) guided panoramic photos (e.g., Emory University³ and Galveston College⁴), (3) introductory videos and slides (e.g., Henderson State University⁵ and St. Lawrence University⁶), and (4) 3D campus models (e.g., Hiroshima Institute of Technology [3], Communication University of China [4], and The Chinese University of Hong Kong, Shenzhen (CUHKSZ) [2].

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¹<https://discover.mcmaster.ca/map/>

²<https://huronatwestern.ca/contact/huron-campus-map/>

³<https://oxford.emory.edu/>

⁴<https://gc.edu/virtualtour/>

⁵<https://tour.hsu.edu/>

⁶<https://tour.stlawu.edu/>

However, these works mainly suffer from two problems: **P1: Lack of Interactive Experience**. The existing works usually guide the students in a monotonous way, since the students only have limited space and patterns for movement and exploration; **P2: Lack of Cultivation of Humanistic Values**. The state-of-the-art works barely focus on students' cultivation of the sense of humanistic value and only complete the basic navigation function.

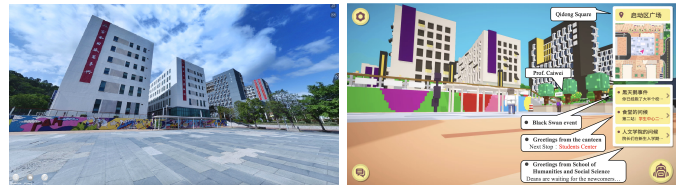


Photo of Campus Scene

Virtual Campus Scene

Fig. 1. Campus Scene and Corresponding Model

To solve these issues, we proposed *Newbie at CUHKSZ* which is a voxel art puzzle game for virtual campus orientation of CUHKSZ. In this game, students are able to explore the university without physical limitations, be familiar with the university's culture through communication with NPCs, and cultivate sense of social good by playing puzzle games based on real events on campus. In the following sections, we will first introduce the implementation details of *Newbie at CUHKSZ* in Section II, and then explain our solution in Section III and Section IV regarding to the aforementioned problems from two aspects: interaction experience and cultivation of humanistic value.

II. CROWD-SOURCING DIGITAL MODELS

During the development of *Newbie at CUHKSZ*, a big challenge was to construct a large number digital models of our campus environment, which was a heavy workload, especially in a remote mode under the threat of the COVID-19. To solve this issue, we adopt voxel style (Using MagicaVoxel⁷) to lower the threshold for 3D modeling and invite more than 10 students to participate in the construction with an online crowdsourcing method. The Fig.1 illustrates a comparison between the real campus and the constructed digital copies.

⁷<https://www.voxelmade.com/magicavoxel/>

III. INTERACTIVE EXPERIENCE

To address **P1** mentioned in Section I, *Newbie at CUHKSZ* sets puzzle games to lead the incoming students to visit their campus. **S1: Interactive Experience through Puzzle Games.** Our designed puzzle games can interactively guide the incoming students to travel the virtual campus. Significantly, *Newbie at CUHKSZ* does not provide teleportation, which is regularly used in other games. Therefore, the students can only walk around the campus step by step, which provides them more time and opportunities to explore and be familiar with the surroundings with a more realistic experience.

However, the utilized interactive modality introduced a new sub-problem **P1.1: Lack of Bird's-eye View Experience.** The students are only allowed to observe the campus from a regular pedestrian's perspective, while the bird's-eye view is a better approach for perceiving the entire environment. Therefore, we proposed a solution **S1.1: Parkour and Photo Shooting Task** to help the students overlook the landscape. The parkour games (shown in Fig.2) can generate virtual stairs in the air to help the students reach the rooftop. We also set traps, obstacles, and mazes on the stairs to enhance the entertainment experience of this task. When reaching the destination, the students will be asked to take photos of the virtual campus to complete the photo-shooting challenges



Fig. 2. Parkour Game

IV. CULTIVATION OF HUMANISTIC VALUES

The *Newbie at CUHKSZ* can also address **P2** from two perspectives: (1) Helping the students establish career plans before school selection; (2) Cultivating the students' sense of social good.

S2.1: School Selection. In CUHKSZ, the freshmen would not be assigned majors and departments during their enrollment. A puzzle game was built as the main storyline to help them discover their career interests and find their best-matching majors and departments. At first, the students need to search for and then chat with the deans to obtain information about the corresponding schools, as shown in Fig.3. After that, the students can preliminarily select the school they are interested in and answer the school-related qualification questions. For example, when the students choose the School

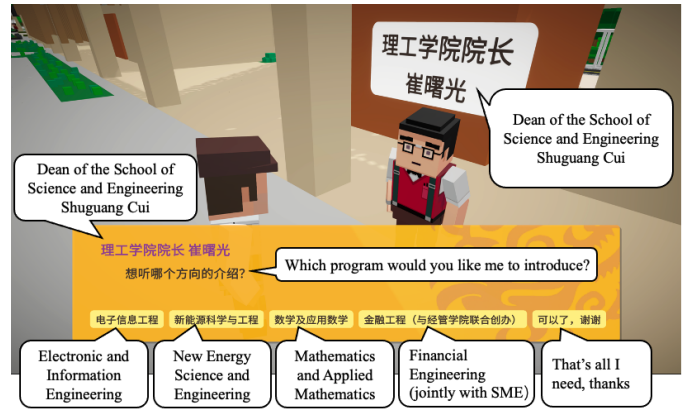


Fig. 3. Dialog with School Deans

of Science and Engineering, they will be asked questions about computer science and physics, while the students will be asked biology-related questions when they select the School of Life and Health Sciences. If the students correctly answer all questions, they are recommended to join the target school.

S2.2: The Sense of Social Good. In *Newbie at CUHKSZ*, we designed puzzle games based on real campus stories and tales to cultivate the students' sense of social good. For example, we collaborated with the university animal welfare organization to compose a love story between two stray cats. This narrative requires the students to help a cat take care of its wife, on the purpose of promoting wild animal protection in an engaging way. Additionally, we collaborated with the university security department on a story regarding computer theft to arouse social responsibility. The task requires the students to seek out their schoolmate's stolen computer by completing corresponding puzzles.

V. CONCLUSION

Newbie at CUHKSZ is a voxel art puzzle game for campus orientation. By introducing novel designs, we believe this work can effectively help the incoming students to be familiar with the campus and cultivate their humanistic values.

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REFERENCES

- [1] P. Song, G. Sun, and X. Liu, "Research on 3d campus integrated management based on arcgis pro and cityengine," in *Proceedings of the 2021 5th International Conference on Electronic Information Technology and Computer Engineering*, 2021, pp. 355–360.
- [2] H. Duan, J. Li, S. Fan, Z. Lin, X. Wu, and W. Cai, "Metaverse for social good: A university campus prototype," in *Proceedings of the 29th ACM International Conference on Multimedia*, 2021, pp. 153–161.
- [3] T. Tateyama, A. Kigami, Nishikawa *et al.*, "Construction of virtual campus guide system using mobile phone," in *2018 7th International Congress on Advanced Applied Informatics (IIAI-AAI)*. IEEE, 2018, pp. 765–768.
- [4] L. Ling, G. Juntao, and D. Xi, "The design and implementation of the 3d virtual campus models," in *2017 4th International Conference on Systems and Informatics (ICSAI)*. IEEE, 2017, pp. 1747–1751.