

Title : Exposing virtual reality's navigation aids with behaviour-based prediction model

Author(s) : 1. Pachara Chairungsi

Student ID : 640510669

Major : Computer Science

Advisor(s) : 1. Dr. Sutasinee Thovuttikul

Type of presentation* (choose 1) : Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)
 Poster (กรณี นำเสนอผลงานปัญหาพิเศษ/การค้นคว้าอิสระ)
 Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

Systems that involve exploration in large environments can cause users to experience anxiety and uncertainty due to disorientation. This issue is typically addressed in conventional screen-based systems by incorporating navigation aids in the user interface, such as displaying a mini-map or an arrow on the screen. However, implementing the same approach in Virtual Reality (VR) systems can decrease the user's sense of immersiveness, which is a main component of VR. This is because user interface elements can obstruct parts of the environment, preventing users from focusing on either the virtual world or the navigation aids. Therefore, the solution of permanently displaying a mini-map or an arrow is not suitable for VR applications.

This independent study investigates when users need navigation aids to display a mini-map or an arrow at desired moments. Based on a review of related research, it was found that vertical and horizontal head movements, as well as movement speed, can serve as datasets for a model to predict whether a user is disoriented. The methodology in this study consists of two steps. First, collect behavioral data from participants using a system developed in Unity, with an Oculus Quest 3 as the data collection device. Second, use the datasets to develop a Long Short-Term Memory (LSTM) model.

The model was trained using head movement and movement speed datasets from 22 participants to classify whether users experienced anxiety due to disorientation. The results showed an accuracy of 0.6337, precision of

*Type of presentation must be matched with an option you choosing on student upload system.

**The abstract can be more than one page and must be approved by project advisor before upload.

0.1317, recall of 0.6513, F1-score of 0.2191, root mean square error (RMSE) of 0.4422, mean absolute error (MAE) of 0.3806, mean absolute percentage error (MAPE) of 45.5860%, and R^2 of -1.6911. The number of misclassified data remained high due to inconsistencies in movement sequences among the 22 participants. This inconsistency arose because the behaviors intended for classification did not always align with the desired moments when data was labelled. To improve data consistency, future work should improve the data collection protocol and provide clearer instructions to participants.

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*

Title name guide.

ADVISOR title name / แปลไทย	
Professor Dr.	ศาสตราจารย์ ดร.
Professor	ศาสตราจารย์
Associate Professor Dr.	รองศาสตราจารย์ ดร.
Associate Professor	รองศาสตราจารย์
Assistant Professor Dr.	ผู้ช่วยศาสตราจารย์ ดร.
Assistant Professor	ผู้ช่วยศาสตราจารย์
Dr.	ดร.
Lecturer	อาจารย์
Mrs.	นาง
Ms.	นางสาว
Mr.	นาย

Major name guide.

SCIENCE MAJOR name / แปล	
Biology	ชีววิทยา
Microbiology	จุลชีววิทยา
Zoology	สัตววิทยา
Biochemistry and Biochemical Technology or Biochemistry and Biochemical Innovation	ชีวเคมีและชีวเคมีเทคโนโลยี หรือ ชีวเคมีและชีวเคมีนวัตกรรม
Chemistry	เคมี
Industrial Chemistry	เคมีอุตสาหกรรม
Materials Science	วัสดุศาสตร์
Physics	ฟิสิกส์
Computer Science	วิทยาการคอมพิวเตอร์
Data Science	วิทยาการข้อมูล
Mathematics	คณิตศาสตร์
Statistics	สถิติ

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*

Gemology	อัญมณีวิทยา
Geology	ธรณีวิทยา
Environmental Science	วิทยาศาสตร์สิ่งแวดล้อม

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*