

VRD: A multi-lingual translation and Ai-Assisted Navigation experience for VR Conference Application

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Figure 1: Participants virtually connected to the VR Conference Application

Abstract

This paper presents an AI-assisted VR conference application with multilingual translation and navigation agent capabilities. A pilot study with 18 participants (11 females, 7 males) was conducted to assess the system's usability. AI-assisted navigation worked smoothly, but the AI translation had issues that prevented the users from having a good experience, nonetheless, participants expressed positive attitudes toward the system, and future work will focus on achieving better user experience.

CCS Concepts

• Human-centered computing → Virtual reality; User studies.

Keywords

Virtual Reality, User Study, navigation, translation, AI

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1 Introduction

The shift toward virtual and hybrid conferences has expanded opportunities for global participation [1]. However, language barriers and navigational support remain a persistent challenge, often restricting engagement and overall better user experience. This exclusion can limit the diversity of perspectives and reduce the overall effectiveness of international collaboration. VRD was developed to address this challenge by combining virtual reality technologies with automated translation and AI-assisted navigation agent. The VR Conference case includes a virtual personal assistant providing instant translation in multiple languages, venue navigation assistance, and conference program advice, enabling seamless navigation and multilingual interactions. It also offered a virtual conference experience, emulating the features of a professional conference: venue lobby, trade show, social spaces, business meeting areas, and

Table 1: Results of the questionnaires for the two conditions.

		Agent		No agent	
		M	IQR	M	IQR
SUS [3]		65	25	60	9.38
Immersion [6]	Person-VE int.	5.67	1.5	3.33	2.5
	Immersion	4.5	1.75	3.5	3
Presence [8]	Presence	5	2.25	5	3
	Spatial presence	25	3.25	23	4.25
	Involvement	9	4	4	2.75
	Realism	13	6	11	4.5
SSQ (diff) [7]	Nausea	0	14.31	0	40.54
	Oculomotor dist.	7.58	20.84	22.74	54.95
	Disorientation	0	24.36	27.84	52.20
	Total	7.48	17.77	14.96	52.36
NASA TLX [5]	Mental demand	20	41.25	20	16.25
	Physical demand	5	16.25	20	27.50
	Temporal demand	55	20	20	51.25
	Performance	50	72.50	25	38.75
	Effort	50	47.5	20	58.75
	Frustration	25	51.25	30	30
Behavioural int. [4]	Machine trans.	4.5	1.67	3.67	0.83
	Voice assistance	2.67	2.92	3	1.5
	VR Conference	4	1	3.5	2.38
QoE		3	0.25	3	2

conference room. Unlike traditional video conferencing tools, VRD provides a spatially immersive environment where participants can interact naturally through avatars, while benefiting from real-time speech recognition, translation, and asking the AI-agent for navigation help. By embedding multilingual and navigational support into the social fabric of VR, VRD aims to enable more equitable participation in global events and foster richer, cross-cultural communication.

2 Pilot and Methodology

The pilot was designed to assess the impact of AI-assisted navigation and automatic speech translation on conference-goers. The objectives were to: (A) Evaluate participants' response to the navigation technology, and (B) Assess participants' reaction to the machine translation features. The criteria was (1) to include individuals who were not fluent in Dutch but were fluent in one of the languages offered by the interface (English, Spanish, Italian, German, Greek) to assess the effectiveness of the machine translation; (2) include general conference-goers to evaluate the overall usability and effectiveness of the VR navigation system. A general familiarity with XR technologies was a plus but not mandatory. Half participants had access to the Virtual Agent for navigation support, whereas half only relied on virtual map and visual navigation guide generated by the system in randomized order. All participants had access to multi-lingual translations. We followed a mixed-methods approach including quantitative (questionnaires) and qualitative (interviews after the VR experience) measures. We employed standardized questionnaires, (see Table 1). The interviews were analysed using Thematic Analysis by Braun and Clark [2].

3 Results

The pilot study involved 18 participants (11 females, 7 males) with an average age of 37 (range: 24-53). Participants were selected from diverse backgrounds and linguistic representations, including English (17), Greek (5), Dutch (13), German (8), Spanish (6), and Italian (5) speakers. Participants (11) expressed a generally positive sentiment towards the VR conference environment, highlighting its immersive and interactive nature; and noted the realistic feel and interactive potential, (P04 "I felt present. It felt real in a sense that I could interact with the other people."). Many participants (07) recognized the potential benefits of machine translation with the agent in enhancing their VR experience despite technical glitches (P03 "Agent assistance is very useful for navigation guidance in unfamiliar virtual spaces."). Several patterns emerge between the Agent and No Agent conditions. Participants reported notably lower physical demand and frustration when using the Agent, but they also experienced higher temporal demand, effort, and performance ratings. This suggests that while the Agent may have reduced strain and frustration, it simultaneously required participants to invest more effort. SUS were slightly higher with the Agent, and for presence and immersion, the person-virtual environment interaction and involvement were significantly better with the agent, indicating enhanced immersion and the authenticity of the experience. Importantly, SSQ was consistently lower with the Agent. Behavioural intention scores showed only modest differences, with small improvements for machine translation and VR conferencing but a slight decrease for voice assistance. Finally, the overall QoE remained unchanged across conditions. The results indicate that the Agent contributes positively to immersion, realism, usability, and comfort by reducing simulator sickness, but at the cost of increasing subjective workload.

4 Conclusion

The outcomes reflected the helpful aspects of the VR conference experience with AI-assisted navigation and multi-lingual translation modules. Participants also noted several areas for improvement, such as occasional technical glitches and a need for more language options. The results demonstrated positive outcomes included accepting the virtual agent, assistance in navigation and overall willingness for attending future virtual conference venues.

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