Virtual reality interview simulator: To enhance professional skills

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Abstract. Traditional job interview practice methods are severely deficient in focusing on performance anxiety and realistic non-verbal communication skill development owing to an absence of intrinsic environmental and psychological immersion This paper outlines the architecture, design, and development of a new Virtual Reality (VR) Interview Simulator using Unity 3D and powered by the Neocortex AI Platform. The underlying intention of the simulator is to provide a safe, standardized, and a realistic simulation environment that repeatedly exposes job applicants to the whole sensory and psychological stress of a professional interview. The technology applies a premium six-step conversational cycle, merging Speech-to-Text (STT), Natural Language Understanding (NLU), and Text-to-Speech (TTS) to facilitate dynamic, AI-powered conversations with a personalized interviewer avatar. This research validates the effectiveness of conversational AI deployment in a high-fidelity immersive VR environment for soft-skills training of the utmost quality and presents a scalable framework to enable future content development, aiming to democratize access to high-quality interview practice.

1. Introduction

Job interviews are an essential part of everybody's lives; People often face difficulties in facing a real-life interview as it could be a strenuous process. Normal ways to get ready, like practicing with friends or reading tips, just don't feel like the real thing, so they don't always work. Because of this, really good candidates might mess up because they're too anxious or don't present themselves well. This could possibly be a loss to the company as they might lose actually talented candidates.

But over time AI analysis and the interview process has improved a lot, it is finally good enough and still improving its ability to analyse human behaviour and conversational skills. It is also highly soaring in the fields of medicine and tech. The combination of AI + VR makes the user feel like they are literally there in place rather than a regular AI training platform that supports only basic conversations. The main goal of this application is to support the users to develop their conversational ability and confidence, by familiarising them with the atmosphere of an interview. This allows the user to practise as much as they want as, it does not have a time limit. The user then finally gets a detailed analysis report of how they have performed and where they should improve in order to improve their speaking skills.

2. Related Work and Literature Context

The following shows how Virtual Reality has impacted the everyday life of users.

2.1. Education and Training with VR

VR is now used in several fields such as teaching. Al-Ansi et al. (2023) found that AR and VR integration with the educational field will highly impact and supplement students with hands-on experience as the students get to witness and feel the environment. Alhalabi and Khan (2023) showed how the same can be implemented in colleges to improve communication skills.

In the job market analysis Lin, Zhang, and Li (2023) understood that practicing interview simulation helped the candidates to reduce nervousness and get ready for real time interviews. This is similar to the findings of Luo et al. (2024), who studied how different people were when they attended VR based interviews. They understood that this made people self-aware of their strengths and made them become self-aware.

Patel et al. (2023) similarly built a system that monitored users on how they acted during VR training sessions. Recently Bhurle et al. (2024) created a VR simulation tool for interviews that solely works on sensing emotions. It definitely is a leap through in developing artificial emotional intelligence. These studies support how learning blends with practice.

2.2. Augmented Reality in Management and Business

From the studies on Walentek and Ziora (2023) review on the subject of using AR in management and business, AR implementation in building interactive and engaging marketing solutions as customers can try these products virtually before purchasing at the comfort of their homes boosts the sales of the product. Similarly, these tools are also used in employee training and review systems at work space that boosts the productivity of the employees.

This Virtual Interview Simulation tool helps users experience an interview and also gives the user a detailed report on how they have performed, by rating them on a scale of 1 to 10. This highly supports training people for tech-based jobs as stated by Amune and Amilian (2023). Platforms like the Neocortex provide API features to develop AI characteristics and behavior. It also provides features such as Speech to Text (STT), Text to Speech (TTS), to process the data received from the user. Such a software definitely supports the end user going through rigorous training, as it does not have a time limit. The user can work on their skills for as long as they desire.

2.2.1 Sample Survey

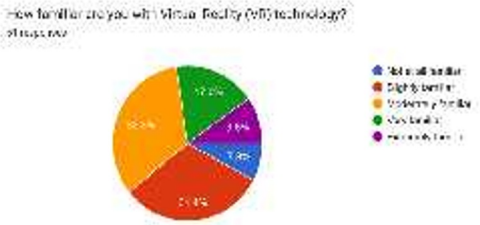

Fig.1. How familiar are you with VR?

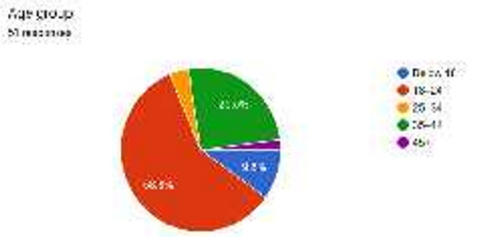

Fig.2. Age Groups

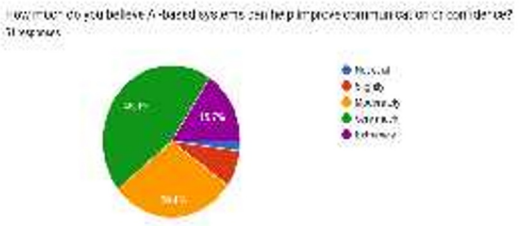

Fig.3. How much do you believe AI based Systems can improve communication or confidence?

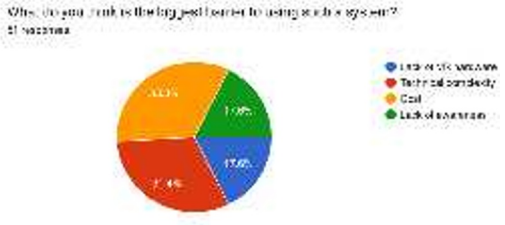

Fig.4. What do you thing is the biggest barrier to Using such a system?

2.3.1 Analysis and Findings of the Survey

We created a survey form to collect user opinions and responses on how aware they are on the current tech, such as AR and VR. Most of the people who attended the survey fell under the age group of 18 to 24, which shows us that it was the new graduates from college and final year students who were keen to use such an application. They seemed to strongly believe that this application could benefit them by providing conversational training.

A solid number of participants were working professionals as well, while some of them denied that such an application would be a substitute for traditional interviewing methods. Some of them really were interested in how this might work. Over half of the people had very good exposure to VR technologies, while the others didn't have much experience on VR and a few of them had never used such technology.

The main concerns that were raised were that such an application did not have proper reasoning abilities such as a complete body language scan and how the user reacted to specific questions, and how well aware the user was about certain situations. Though it was not a complete replacement for an actual interview process, this could be useful to familiarise the user with the interview environment.

Respondents commented on the positives of the VR Interview Simulator. Some of the merits include “The simulation of Real Interview”, “Ended with feedback” and also helps with Anxiety issues. The simulator’s realism and sharp feedback system that impressed the people’s likes and also as the feedback system can be improved on each turn.

The drawbacks pointed out by the respondents was the affordability of VR systems as in the current market the tech is not at an affordable rate or at people’s price and some individuals argue that the feedback system needs a human touch as the emotional aspect is not taken under consideration at the agent’s feedback.

Categorizing the survey feedback to help ease the process of betterment:

1) Involving human touch to better the quality and judgement.
2) Build VR systems that match the people’s price.

The survey summarizes the VR Interview Simulator is of good use for preparation and anxiety issues. To get more users on board, we need to make them cheaper, easier to get, and fair. The results show the VR Interview Simulator as a tool that helps in preparation and betterment for interviews.

3. Methodology and System Architecture

The VR Interview Simulator was conceptualized on the core implementation via integration of Unity 3D Engine and the Neocortex AI Platform. The project was finished and handed in ahead of the original deadline.

3.1 The Conversational Cycle

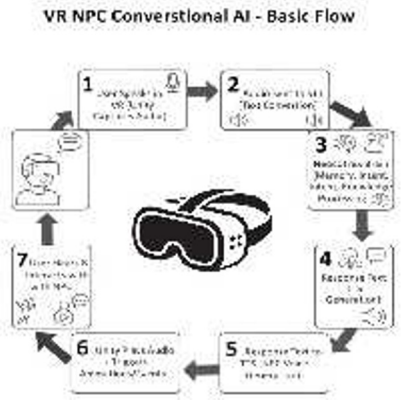

Fig.5. System Architecture

The conversational cycle depicts the sequential working by which the interaction process works:

1. **Audio Recording (Client-Side):** This step begins when the client starts to speak in the virtual environment. This recorded audio is sent to the engine.
2. **Speech-to-Text (STT):** Once the recorded audio reaches the engine the wave formed files are sent to the server, the conversion takes place.
3. **Core Intelligence Processing (AI/Cloud Processing):** The text is routed to the **Neocortex AI Platform**, serving as the central **conversational brain**. This core processing component executes three key functions:
   - **Memory Integration:** Maintaining conversational history and context.
   - **Intent Recognition:** Determining the semantic goal or purpose of the user.
   - **Knowledge Retrieval:** Accessing relevant domain-specific information to formulate an appropriate and contextually accurate response.
4. **Response Text Generation (AI/Cloud Processing):** Based on the context the bot generates a reply in the form of text.
5. **Text-to-Speech (TTS) Conversion (AI/Cloud Processing):** The response text is sent to a **Text-to-Speech (TTS)** service, generating an audio file in the desired NPC voice.
6. **Multimedia Output Trigger (Client-Side Action):** The NPC voice audio file and response text are transmitted back to the **Unity 3D engine**. Unity simultaneously initiates two actions:
   - **Audio Playback:** The NPC audio is played through the user's headset.
   - **Animation/Event Trigger:** Corresponding **animations** (e.g., lip-syncing, gestures) and relevant **in-game events** are triggered
7. **User Interaction (Client-Side Action):** The user receives the audio and visual in the user's point of view, and proceeds to answer the questions raised by the bot. Thus, leading to the next iteration cycle.

3.2. Development Tools and Requirements

The main software is the Unity 3D Editor, and all the logic has been coded in C#. The Neocortex Platform has been implemented for AI and the Ready Player Me platform for avatars.

Asset creation was performed on three main platforms:

Ready Player Me (RPM): To create the customized professional 3D avatar. The avatar, John, was customized with a professional grey crew-neck sweater.

Mixamo: A prefix removal script was used to get the avatar ready for native integration into Unity's animation platforms and the Neocortex SDK.

Neocortex Platform: The underlying AI service that delivers the conversational intelligence, which communicates with the Unity project through a Project ID and API Key.

3.3. Appendix: System Components and Technical Specifications

This part provides a step-by-step hardware and software decomposition of the elements utilized in developing and executing the VR Interview Simulator, including significant technical details.

Table1. Hardware Requirements

Component	Specification	Purpose
VR Headset	Oculus Quest 2 (or equivalent PC VR headset)	Primary user interface for immersive experience
Processor (PC)	Intel Core i7 (9th Gen) or AMD Ryzen 7 (3rd Gen) equivalent	Client-side Unity 3D processing and rendering
Graphics Card (PC)	NVIDIA GeForce RTX 2070 or AMD Radeon RX 5700 equivalent	High-fidelity graphics rendering for VR environment
RAM (PC)	16 GB DDR4	Smooth operation of Unity Editor and VR applications
Storage (PC)	500 GB SSD	Fast loading of assets and software
Internet Connection	Stable broadband (min. 50 Mbps download/upload)	Essential for cloud-based AI service communication (STT, NLU, TTS)

Table2. Software Stack

Component	Version/Platform	Role in System
Game Engine	Unity 3D (2021.3 LTS or newer)	Frontend development, VR environment rendering, user interaction logic
Scripting Language	C#	All client-side application logic and SDK integration
AI Platform	Neocortex AI Platform	Backend conversational AI, natural language processing, sentiment analysis
Speech-to-Text (STT)	Integrated within Neocortex Platform (or third-party API)	Converts user's spoken language to text for AI processing
Text-to-Speech (TTS)	Integrated within Neocortex Platform (or third-party API)	Generates audio responses from AI-processed text
Avatar Creation	Ready Player Me	Generation of customizable 3D interviewer avatars
Animation Integration	Mixamo (for retargeting and initial animations)	Applying motion data to avatars for realistic non-verbal communication
VR SDK	Oculus Integration for Unity (or OpenXR)	Interfacing with VR hardware for tracking and input
Operating System	Windows 10/11	Host operating system for PC-based VR development and execution

C. Data Flow and API Endpoints

- The Unity app and the Neocortex AI Platform in the cloud work nicely together.
- **Sound to Text:** When the end user speaks, the audio is recorded and sent to the Neocortex server in the form of text, for AI processing
- **Text Understanding:** The text that is sent, is then processed by the Neocortex server, this generates a response based on the received message. It grabs key details on what the user mentions, and asks counter questions.
- **Text to Speech:** The prepared text response is then converted into audio using the TTS (Text to Speech) this audio is then sent to the Unity project file through the Neocortex API
- **Speech to Unity:** This transmitted audio file is received and played to the user through the speakers; this enables animations assigned to the bot to be plates.

This setup keeps the VR headset running smoothly. It only has to worry about showing graphics and tracking movement. All the heavy AI lifting happens in the cloud. Security is maintained through things like API keys and encrypted data. These things help keep user data safe.

3.4. AI Interviewer Setup

The virtual interviewer, John, was configured in the Neocortex dashboard with the highest care so that there would be a uniform and credible persona.

Personality: Configured to Mid ENFJ, a personality type noted to be charismatic and inspirational (Fig.6.)

Agent Role: Designed as an interactive college fresher interviewer, coded to pose insightful questions and create dynamic, inquiring counter-questions according to user inputs. (Fig.7.) (Fig.8.) (Fig.9.)

Context: The World knowledge for the simulation is defaulted to "San Francisco, CA".

Constraints on Feedback: The system uses a "Short" Response Length and a "Strict" Context Mode to ensure that the resulting post-simulation performance report is accurate, brief, and actionable.

Project Files: The figure below shows the bot files and setup that has been implemented in the Unity Hub project file (Fig.10.), The Realtime development process of the project is displayed in the below figure (Fig.11.)

Fig.6. Neocortex Agent Map

Fig.7. User Point of View

Fig.8. Office View

Fig.9. Setup of Desk View

Fig.10. Hierarchy-Inspector-Project window

Fig.11. Project Development Process

4. Discussion and Conclusion

We have successfully created an application that can carry out conversation with the end user, enabling the user to communicate, question and learn the process of a formal interview. The public survey helped us collect information on how well aware are the public when it came to Virtual Reality, enabling us to analyse and understand the readiness and acceptance level.

4.1 Project Value

The VR Interview Simulator is meant to support new graduates as well as job seeking individuals to simulate the interview process. The VR system helps the user experience a realistic environment which is not provided by the traditional 2D software. The system is designed to provide the user a detailed personality analysis, stating the positives and the negatives the end user has to work on. This gives useful info about their performance. A big plus is that it works with the Neocortex platform, which allows for relevant follow-up questions using Natural Language Understanding (NLU). This would help the process feel more realistic rather than attending a scripted program. This would definitely help as a training tool for schools and businesses

4.2 What's Next?

The current version of the built application tracks the conversation between the end user and the bot. We are looking forward to developing response time, speech length, voice-based emotion prediction, eye movement and mood of the user during counter questions. Various scenarios can also be included such as a group discussion; Multiple board members type interview. To make it more user-friendly, we are planning to test it with our college students and faculty. We will gather their opinions on what could be improved, and how they felt using it, thus improving the overall quality of the product. We look forward to developing this as a final product and selling it to companies and universities to improve candidate confidence.

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