

FloatMind: AI-Driven Emotional Engagement for Gamified Meditation in Mixed Reality

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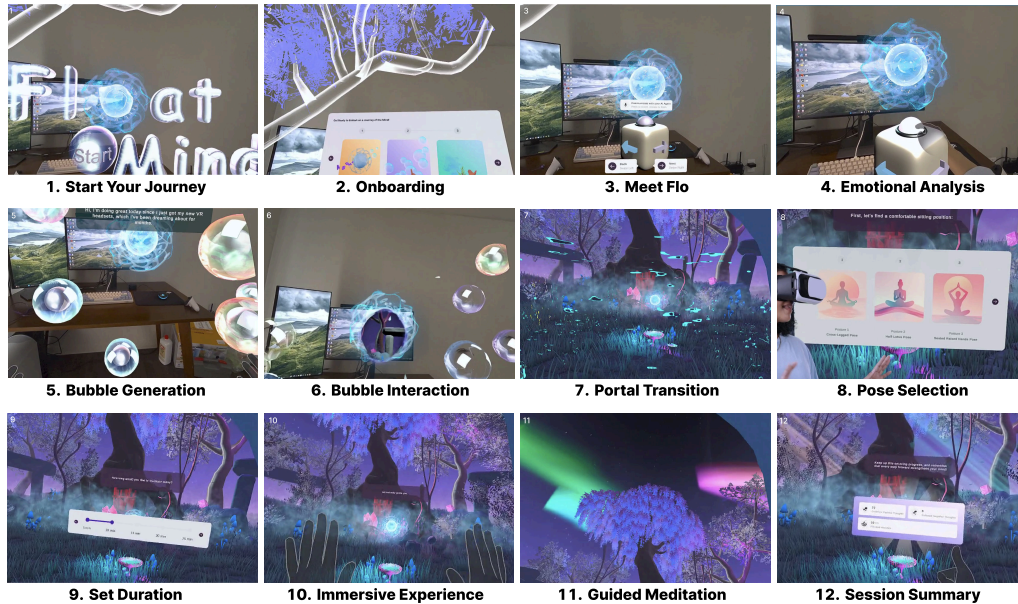


Figure 1: **FloatMind Experience Flow.** (1) Start your journey in MR. (2) Complete onboarding instructions. (3) Meet Flo, the LLM-powered avatar. (4) Share your mood for emotional analysis. (5) Emotion-driven bubbles appear in MR. (6) Interact with bubbles to trigger portals. (7) Transition seamlessly from MR to a serene VR forest. (8) Select a comfortable meditation posture. (9) Set session duration. (10) Engage with calming virtual elements through natural hand gestures. (11) Receive personalized meditation guidance from Flo. (12) Review your session summary and emotional reflection.

ABSTRACT

FloatMind is a mixed reality (MR) meditation experience that combines large language models (LLMs), gamification, and immersive environments to promote emotional well-being. The system features an empathetic AI avatar that initiates personalized conversations and generates emotion-driven floating bubbles. When interacted with, these bubbles open portals, seamlessly transitioning users from their physical surroundings into a serene virtual forest. Within this space, intuitive hand tracking enables natural interaction with calming elements—such as trees, auroras, and flowing particles—enhancing mindfulness and reducing stress. By blending AI-driven guidance, mixed reality, and interactive design, FloatMind reimagines meditation for modern lifestyles.

Index Terms: Mixed reality, hand tracking, meditation, human-computer interaction

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1 INTRODUCTION

In today's fast-paced world, stress and emotional disconnect are growing challenges. **FloatMind** addresses these issues by merging cutting-edge AR/VR technology, large language models (LLMs), and mindfulness practices to create an engaging meditation experience. The goal is to help users relax, reconnect emotionally, and reduce stress through an immersive, game-like journey.

The experience begins with **Flo**, an empathetic LLM-powered avatar that initiates interaction. Users share their mood, which Flo analyzes in real time to generate personalized emotional insights. Dynamic floating bubbles then appear in the user's physical space, forming gateways to a virtual meditation realm. Inside, a serene forest environment supports mindfulness activities using intuitive hand tracking for natural interaction.

Built for Meta Quest 3 using Unity, FloatMind combines AI-driven scene understanding, speech recognition, and real-time dialogue to deliver personalized guidance. By blending gamification and mixed reality, FloatMind redefines digital wellness and makes meditation interactive, enjoyable, and emotionally engaging.

2 RELATED WORK

Immersive technologies show strong potential for mindfulness and stress reduction.

VR Meditation. Applications like *Tripp* and *Guided Meditation VR* promote relaxation by enhancing focus through immersive envi-

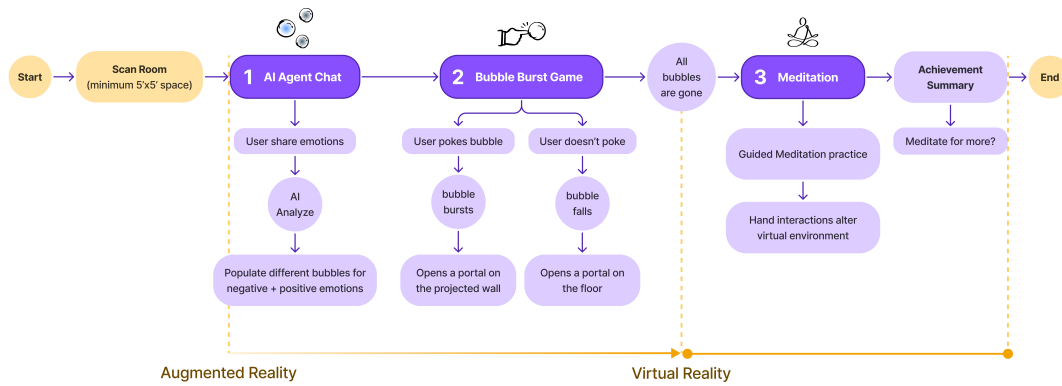


Figure 2: FloatMind Gameplay Flow: (1) Scan environment; AI generates emotion-based bubbles. (2) Bubble Burst: Poke for a wall portal (AR) or let fall for a floor portal (VR). (3) Meditation: Surfaces dissolve, mindfulness is practiced, and achievements are summarized.

ronments [1]. Research further shows VR can reduce distractions, guide breathing, and improve meditative experience [7, 2].

AI-Driven Emotional Support. LLM-based systems are being explored for empathetic and context-aware interactions, from social VR agents [8] to multimodal emotional support and persona-driven engagement [3].

Mixed Reality for Mindfulness. MR-based approaches improve presence and grounding by blending physical and virtual contexts [6].

FloatMind builds on these directions by combining LLM-driven emotional engagement with AR-to-VR transitions, creating a personalized and gamified meditation experience.

3 FLOATMIND OVERVIEW

FloatMind is an AI-powered meditation game designed for MR and VR environments, offering users a deeply immersive and interactive experience. Fig. 2 illustrates the core gameplay loop.

AI-Driven Avatar: Flo. A central feature is Flo, an avatar powered by GPT-4o mini [5]. Flo acts as a virtual psychotherapist—listening, detecting emotional cues, and offering context-aware responses. Built on an open-source Unity-OpenAI integration¹, the system uses real-time speech-to-text and text-to-speech for natural conversations, enhanced by voice-synced animations for a lifelike presence.

Bubble Burst Game. Leveraging the Meta Scene API [4], FloatMind scans the user's space and generates sentiment-driven bubbles based on emotional analysis of user input. Users interact by poking bubbles, triggering portals on walls or floors via raycasting. Unpoked bubbles fall, forming portals upon landing. This playful mechanic turns emotional engagement into an immersive transition to the meditation space.

Meditation Experience. In the virtual realm, users encounter a tranquil forest with breathing animations, narrative prompts, and gesture-based interactions. Custom Unity shaders animate environmental effects, while Figma-to-Unity UI integration² provides smooth narrative transitions. Guided activities foster mindfulness, with Flo offering supportive messages throughout the session.

4 EVALUATION RESULTS AND CONCLUSION

A user study with 18 participants ($M=26.6$ years) evaluated usability and immersion.

Usability. FloatMind achieved an average System Usability Scale (SUS) score of 79.1, indicating good to excellent usability. Participants found the system intuitive and easy to learn.

Immersion. The Igroup Presence Questionnaire (IPQ) scores (Fig. 3) show high *General Presence* (GP, $M=5.94$) and *Spatial*

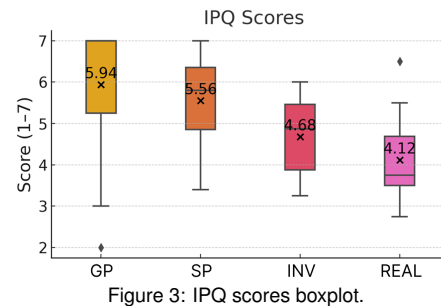


Figure 3: IPQ scores boxplot.

Presence (SP, $M=5.56$), moderate *Involvement* (INV, $M=4.68$), and lower *Experienced Realism* (REAL, $M=4.12$), suggesting strong immersion with room for visual fidelity improvements.

Conclusion. FloatMind demonstrates the feasibility of combining MR, LLM-driven engagement, and gamification for mindfulness, offering an interactive and emotionally personalized experience. Future work will explore adaptive personalization, multimodal input, and long-term effects on well-being.

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¹<https://github.com/srcnalt/OpenAI-Unity>

²<https://www.figma.com/community/plugin/1047282855279327962/unity-importer>