Avatar Fusion Karaoke: Research and development on multi-user music play VR experience in the metaverse

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  - Reflection on LookDev and character design
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- AI assisted music play
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- Conclusion / Future Evaluations

Alexandre BERTHAULT / Takuma Kato / Akihiko SHIRAI
REALITY Metaverse Laboratory
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Members of the Laboratory

Mr.Nakano
Fourth year student in the Department of Advanced Media Science at Meiji University's School of Comprehensive Mathematics and Science.
Joined the lab in December 2020, and has worked as an assistant director throughout the UXDev series, taking care of a wide range of tasks from storyline design to Unity engineering. Belongs to an a cappella circle. Loves movies.

Mr.Yahagi
Second year student in the Department of Digital Content at the College of Digital Communication at Digital Hollywood University, he is in charge of Unity engineering and various scripting for the UxDev series.
A genuine resident of the Metaverse who has been in and out of the lab since high school, Plays a lot of Valorant

Mr. Horibe
First-year master's student in the Department of Advanced Media Science, Graduate School of Advanced Mathematical Sciences, Meiji University.
Started working at GREE VR Studio Laboratory in October 2019 on voice analysis of users of the experimental voice changer service "Tensei Koe Uranai" and iOS implementation and acceleration of the voice changer. In the UXDev team, he is mainly responsible for voice and facial expressions.
Level 70+ at Pikmin Bloom

Members of the Laboratory

Mr. Alexandre Berthault
Graduated from ISART Digital, a French video game school, and became a research student at Tokyo University of Technology. Started working at GREE VR Studio Laboratory in June 2022, he is mainly responsible for UX prototyping and effect design in the UXDev series. Loves ramen. Doesn’t like Kanjis.

Mr.Yamaoka
Fourth-year student in the Department of Advanced Media Science, School of Integrated Mathematical Sciences at Meiji University, he joined the GREE VR Studio Laboratory in October 2022. He is researching technology that allows avatars to blend in with the real world without discomfort.
He is in charge of R&D related to avatars, making use of his production experience with Meta Quest, Hololens2, Web AR, etc. Recently, he has been working on HMD devices such as Quest to work on avatar benchmarking tools for Quest and other HMD devices.

Mr.Akihiko Shirai (Director)
Director of GREE VR Studio Laboratory. He has over 25 years of experience in R&D and education, visual arts, VR entertainment, and scientific communication. He brings diversity to the GREE Group's development culture through his diverse talents.
Outside of work, he writes for the GREE Technical Book Department and the book "Collaborate with AI to Become a Divine Artist".

「REALITY」User Scale

REALITY
XR cloud

Over 10 million downloads worldwide by the end of 2022
Continued growth expected in the future

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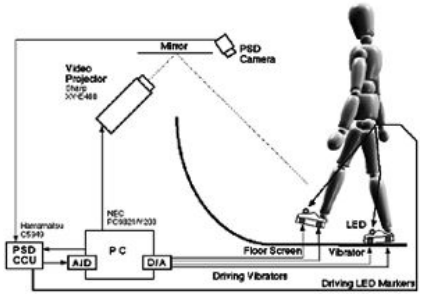

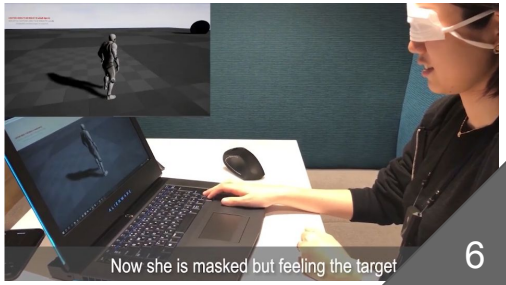

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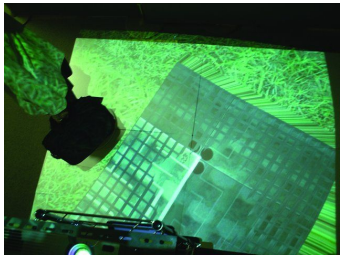

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1. Akihiko Shirai. 2019. REALITY: broadcast your virtual beings from everywhere. In ACM SIGGRAPH 2019 Appy Hour (SIGGRAPH '19). Association for Computing Machinery, New York, NY, USA, Article 5, 1–2. DOI:https://doi.org/10.1145/3305365.3329727

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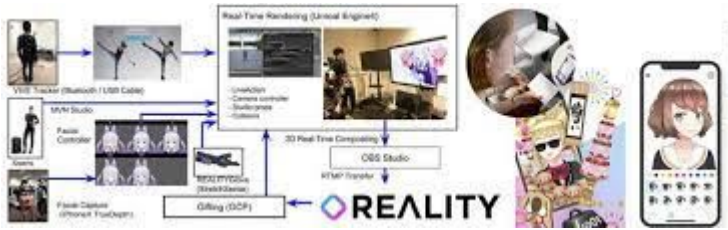


Latest work : Generative AI in the Metaverse

- Metaverse Mode Maker

Words to Textile using Stable Diffusion + Motion UGC
https://youtu.be/Lrd5i8EZxTI

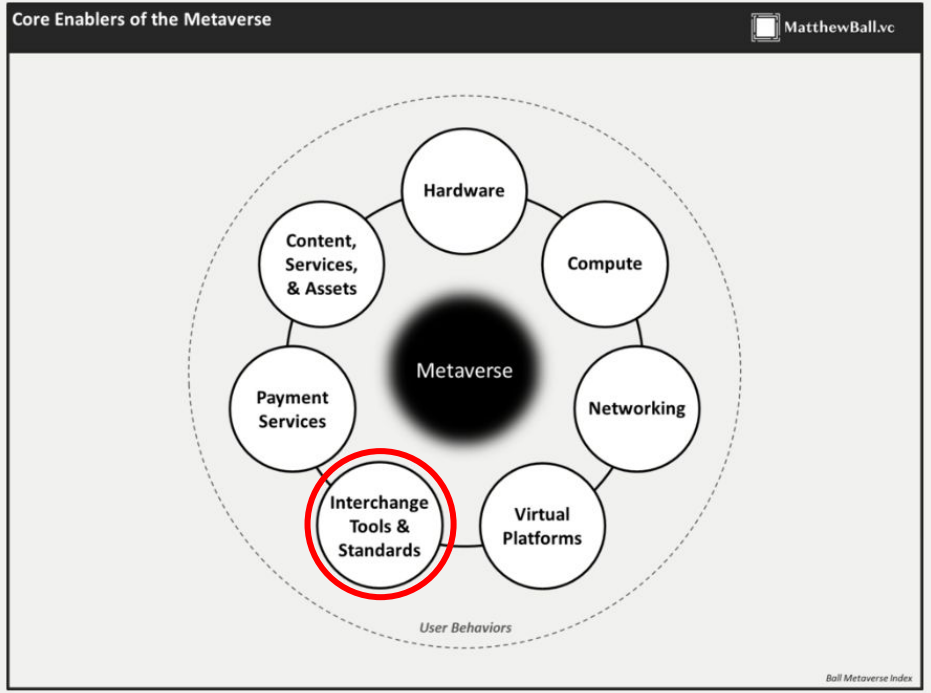
- AITuber #MetaChatNews

Multi-Agents chat play with voice and motion expressions
https://bit.ly/MCNKWS23

Introduction and background

https://www.matthewball.vc/all/forwardtothemetaverseprimer

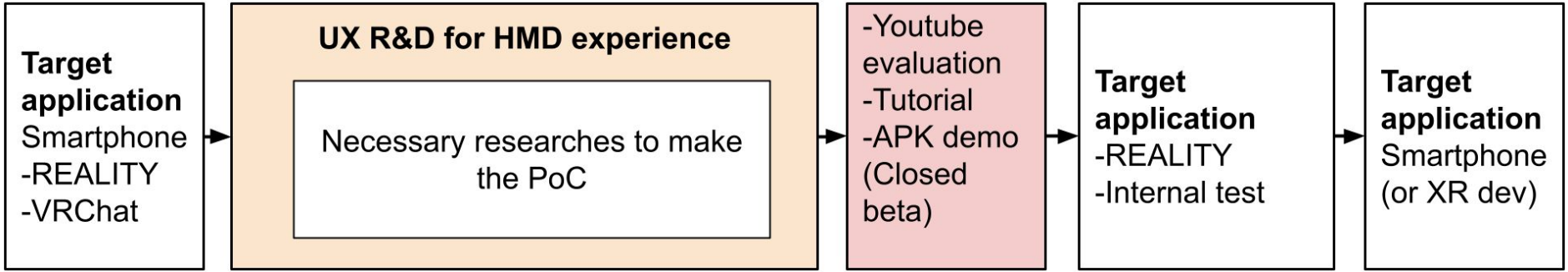
- No definite definition of the “Metaverse”
- Can be seen as an iteration of our internet system



Seven core enablers of the metaverse by Matthew Ball

Our focus

- Create Research and development protocol for new metaverse user experiences and use it to answer our hypothesis
- Conclude on the hypothesis that it should be possible to design the avatars with only the necessary functions and rendering costs.
- Objective : create a school life karaoke experience



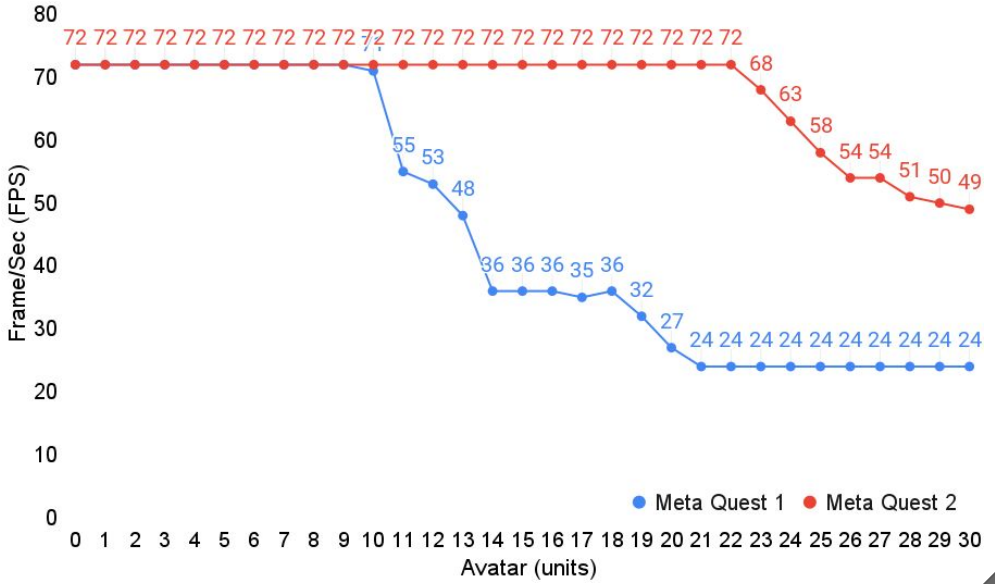
R&D procedure. This paper focuses on completing UX R&D for the HMD experience

Pre production research and tools

Performance benchmark

- VR Benchmarking is critical !
- Avatar average polygon count in REALITY : 30 000, Materials : 6-14

Benchmark application



Result graph

Pre production research and tools

Reflection on LookDev and character design

- Limitate change in visuals
- Optimization and compatibility
- Coherence between appearance and use

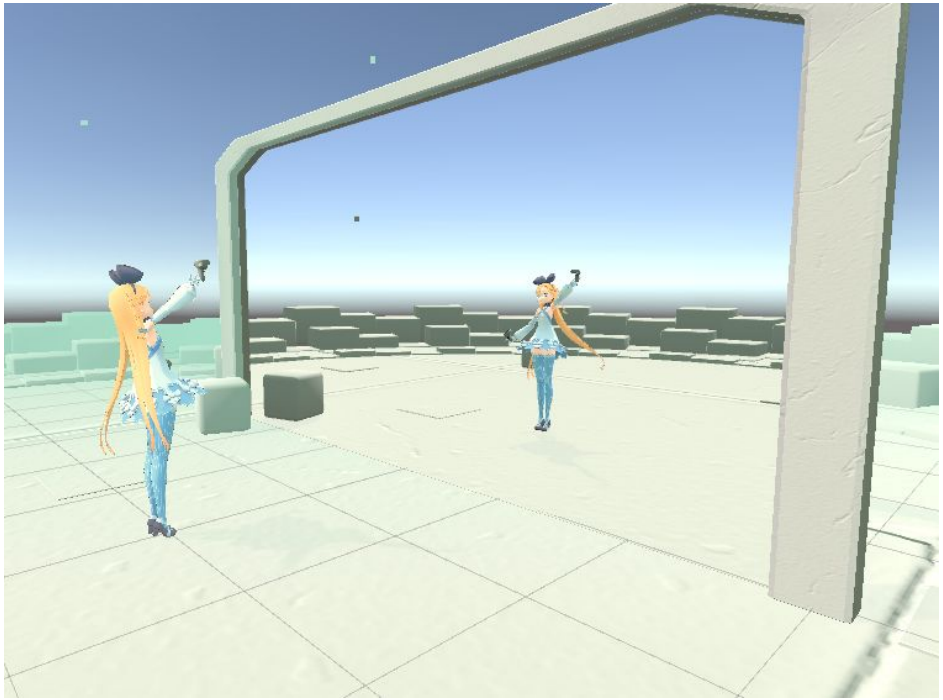
Example of different character models used in our application. The same character can wear a vast variety of clothes making the compatibility and look dev that more challenging.

Pre production research and tools

QueTra

- Motion capture system using Meta Quests
- Creates animations compatible with Unity
- Tested in a children’s workshop

Kids workshop
https://youtu.be/bXxnUdpaX8M

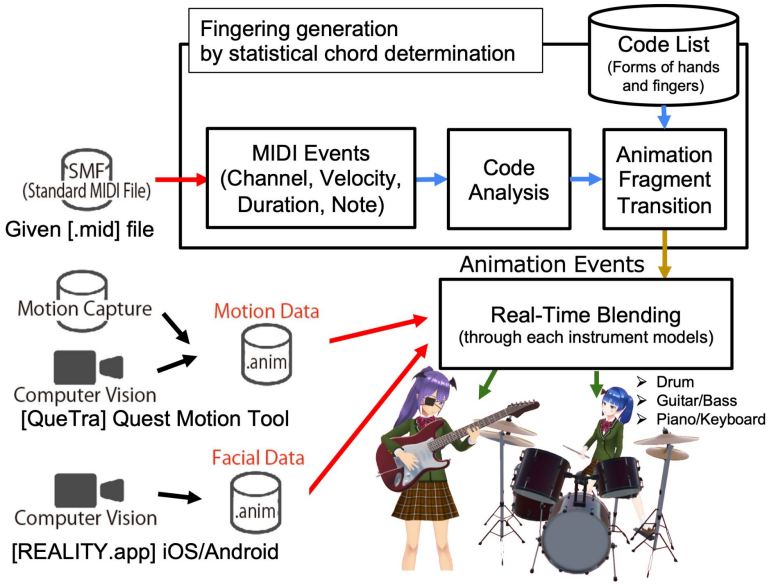


QueTra application

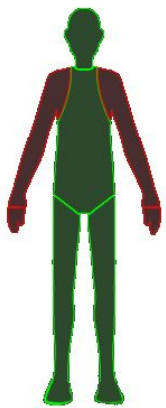
AI assisted music play

AI Fusion principle

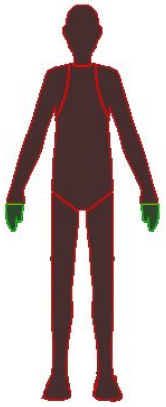
- Uses Standard MIDI files
- Algorithms transforms midi files into usable animations
- Layers allow for a mix of multiple animations



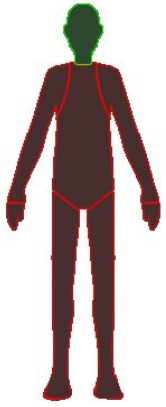
Example of Midi generated music play
https://youtu.be/LrB5aNikLvA



Motion Capture Animation Avatar Mask



Midi Generated Animation Avatar Mask

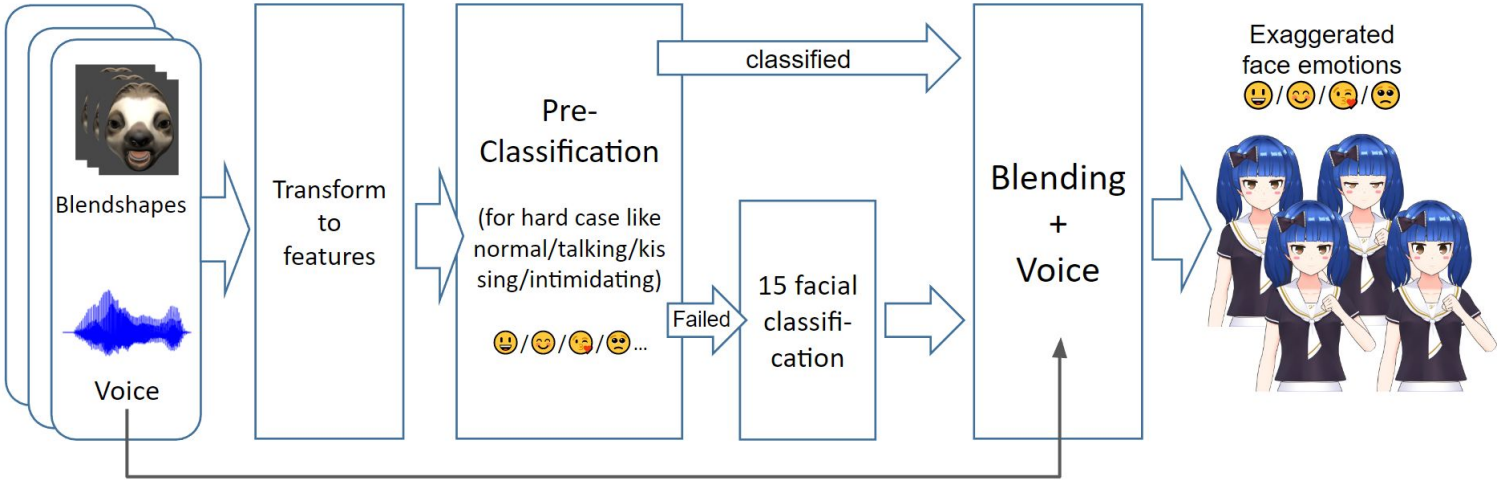


Facial Motion Capture Avatar Mask

AI assisted music play

Challenges

- Face tracking impossible with VR headsets
- Research on RandomForest
- Research on Audio2Face

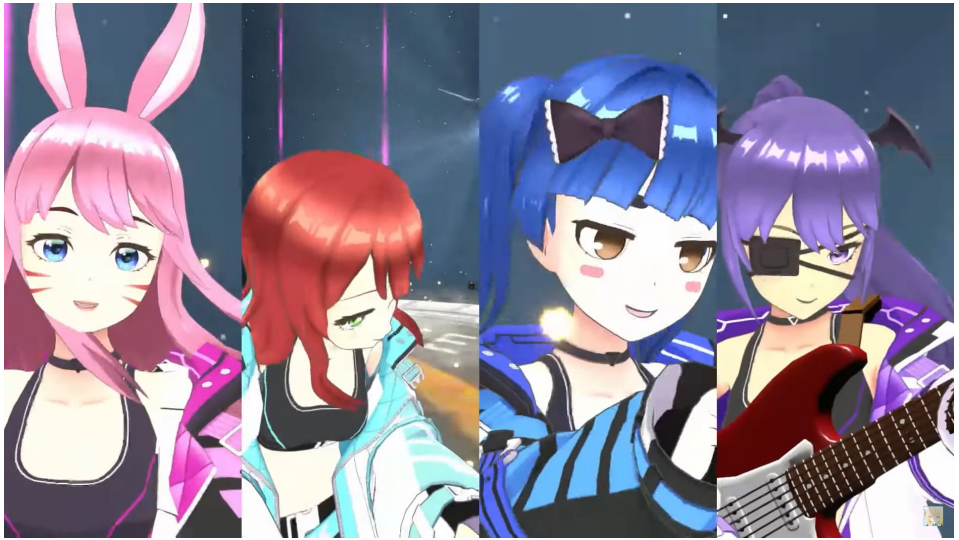


The process to generate exaggerated facial expressions with BlendShape + LipSync from real-time voice and depth-camera input.

AI assisted music play

Proof of concepts

- MetaDreamers objectives, limitations and future focus
- GV Band, a VR music play experience

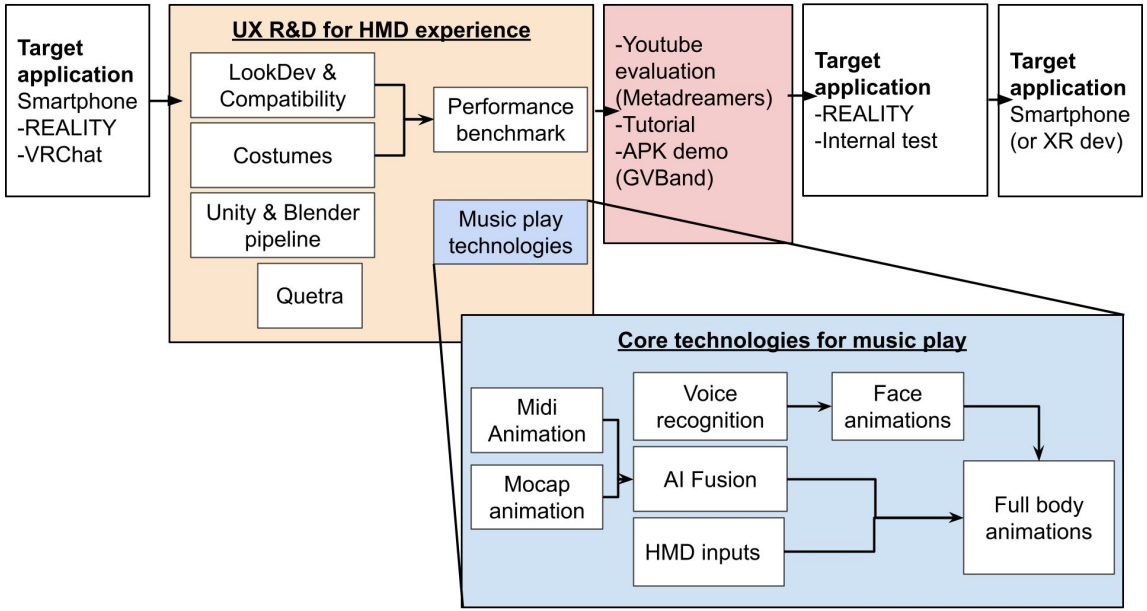


Meta Dreamers short film

GV Band VR application

Conclusion / Future Evaluations

- Results : two proofs of concepts which answer the initial hypothesis
- Created an atavistic experience which checks three type of validations :



1. Quality of communication based on hardware limitations
2. Identification of challenges in the user collaboration experience
3. Verify user motion representation and complementary technologies

We started with the objective of an avatar-driven music play. Through various R&D, we created an APK application (GVBand) and a short film (MetaDreamers), which can then be evaluated.

Thank you for your attention

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https://www.youtube.com/watch?v=mMrNWEe0IOs