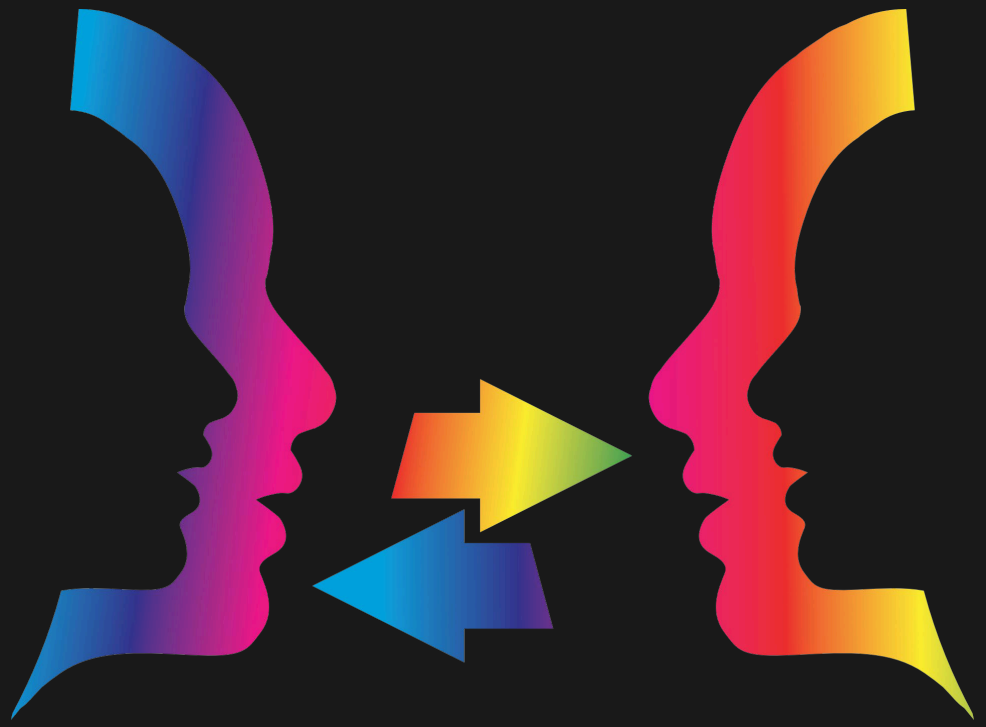

aiRRR – Interaction based Recognition, Rumination & Response using AI (Artificial Intelligence) and AR (Augmented Reality)

aiRRR is an AI and AR based system where an individual wearing an AR glass is able to identify another individual using face recognition upon a face-to-face interaction (in a meeting) and then retrieves the summary of recent digital conversations between them and finally suggest intelligent short responses within the context that aid in efficient communication

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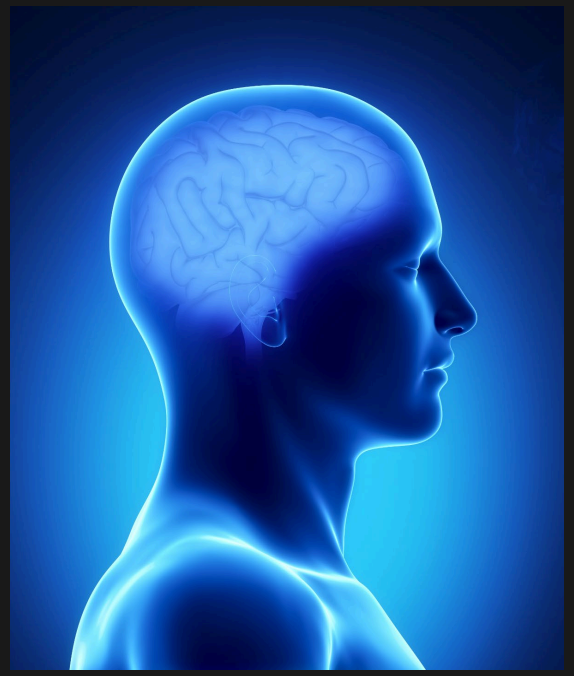
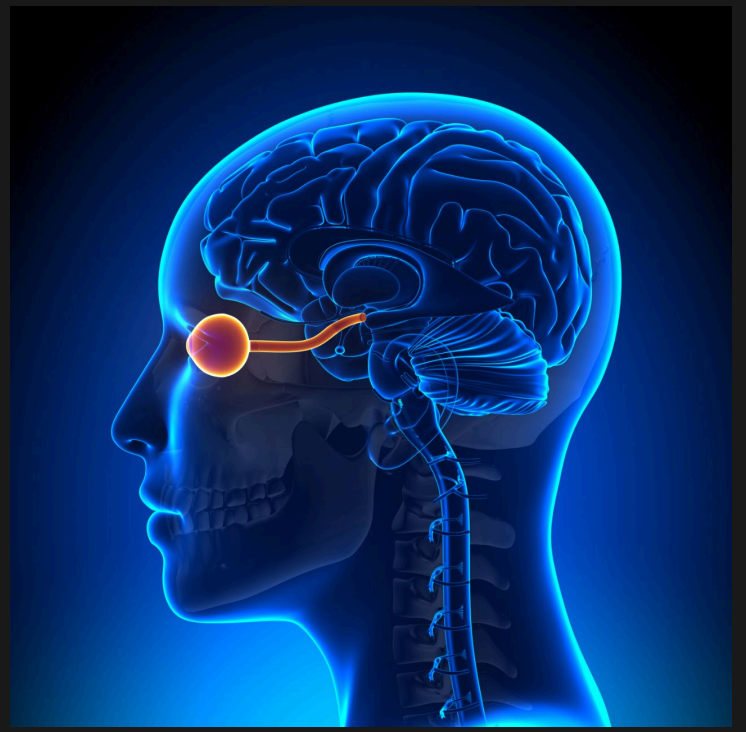
Facial Identity Recognition of humans through vision

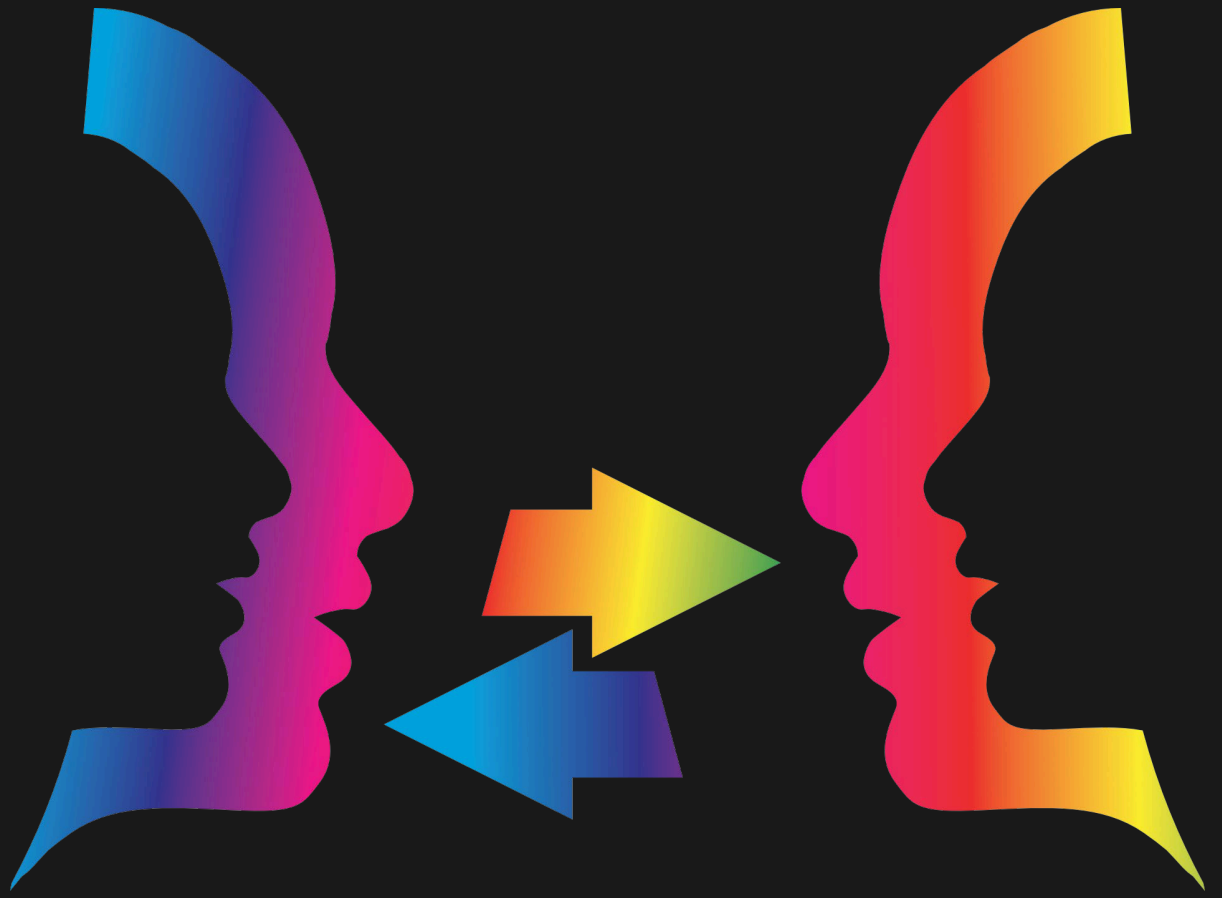
- One of the most important tasks that's accomplished everyday in human life is identification of other individuals primarily through faces (Kovács, 2020)
- Human vision is the most dominant sense perception and large portions of human brain is specialized for visual processing (Hutmacher, 2019)
- Recognition involves familiarity (vague feeling of knowing one has met the person before) and recollection (identifying details of a previous meeting) (Rugg & Yonelinas, 2003)





Remembering & responding to a conversation

- To effectively remember a conversation, humans need to recall the summary (by rumination) of what was said, by whom, and in what context (Brown-Schmidt & Benjamin, 2018)
- Early anticipation in a conversation results in a faster response (Magyari, Bastiaansen, de Ruiter, & Levinson, 2014)



RRR Explained

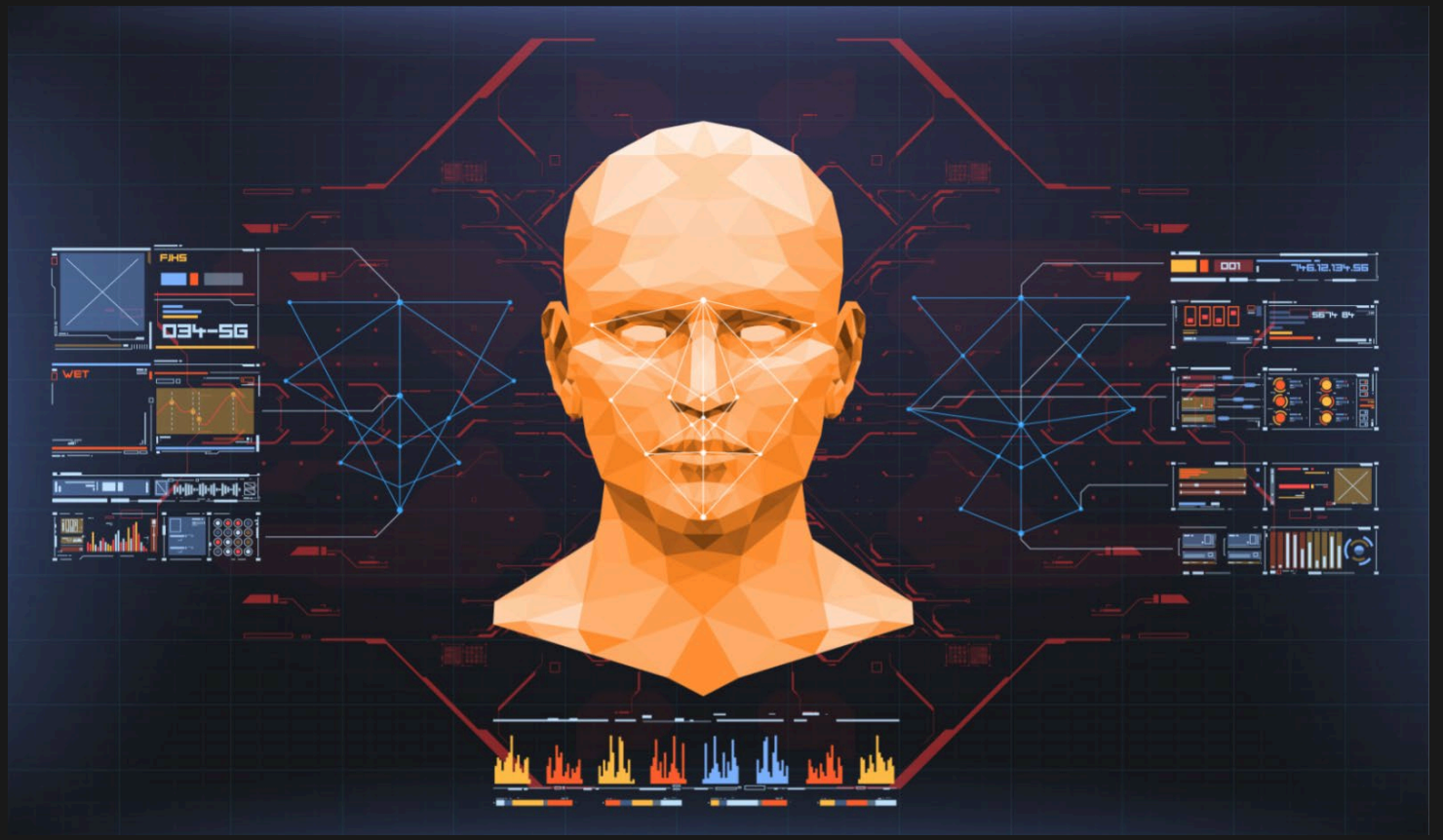
When a person P1 meets/interacts with another person P2, instinctively, P1 looks at P2's face for the identification/recognition of the P2. Once identified, P1 tries to recall the last interaction if memories of the interaction are available. The rumination typically happens in the background and provides the summary of the meeting. Once P1 gets a summary of the recent interactions with P2, P1 would like to respond to P2 within the context of the previous interactions.

Future of mobile computing – Right before our Eyes

- Future innovations in mobile computing with hardware companies making powerful chips in tandem with software companies with intelligent software will soon produce lightweight, standalone smart glasses suitable for all-day wear, which may replace the smartphone as we know it (Fried, 2021) (*The future of mobile computing is right before our eyes*, 2022)
- AR (Augmented reality) based glasses seem to be the best smartphone replacement (Tushar, 2022)

aiRRR – Explained

aiRRR is an AI & AR based system where an individual wearing an AR glass is able to identify another individual using face recognition upon a face-to-face interaction (in a meeting) and then retrieves the summary of recent digital conversations between them and finally suggest intelligent short responses within the context that aid in efficient communication



aiRRR in Action (Scenario in a software organization)

- In a software organization, a software development manager (SDM) wearing an AR glass organizes a bug resolution hybrid meeting (physical and virtual simultaneously) with the testing team. Utilizing AI-based microservices, the AR glass will do face recognition of members (depending on the direction of gaze by SDM) attending the meeting (physically/virtually) and retrieve their details (Name, Dept, Seating Location, Reporting Authority) and display it on the glass.

- If the SDM intends to interact with a Software Testing Lead (STL) regarding a critical bug, he would get a summary (text summarization) of the earlier interactions done with the STL on the company owned email/messaging/meeting platform regarding the bug.

- The SDM may want to provide an update on the bug during the meeting, so a short response may be drafted by advanced AI-based systems to assist the SDM in initiating a dialog/conversation regarding the bug.

aiRRR Implementation – Workflow

- aiRRR system runs the web app (bootstrap program) on catalyst microservice that triggers the camera and captures the user's face and send the image to an AI face recognition service. If there is a match in the facial database, the profile name is retrieved.
- The profile name is sent through REST API from catalyst service to Zoho Cliq so that extra profile information such as department, seating location and reporting person are fetched and displayed on the AR glass.
- The "Recent conversations" (if previous chat history available) are retrieved (with a threshold) using Zoho Cliq API for the selected user and then sent to a conversation summarization service. A summarized conversation is presented on the glass.
- A list of the bugs associated with the selected user is also retrieved using Zoho BugTracker API and displayed on the AR glass.

High-Level Architecture of aiRRR

Individual wearing an AR (Augmented Reality) Glass

Picture taken from AR Glass

Catalyst by ZOHO

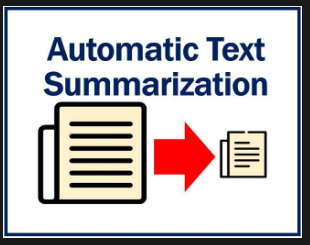
<u>Recognition of individual</u>
1) AI Face recognition service recognizes the face and retrieves the user profile name

<u>Retrieval of Profile Info</u>
2) Fetch department, seating location and reporting person using Zoho Cliq API

Cliq

<u>Rumination (Summarization)</u>
3) Text summarization of Cliq conversation using AI service

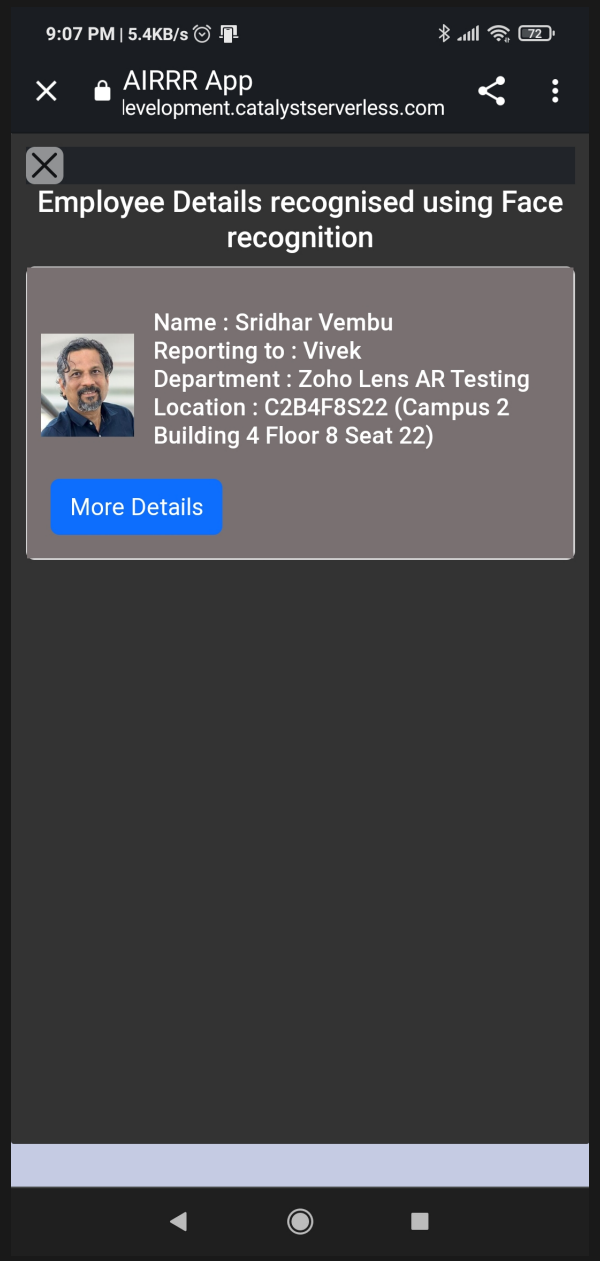
Cliq

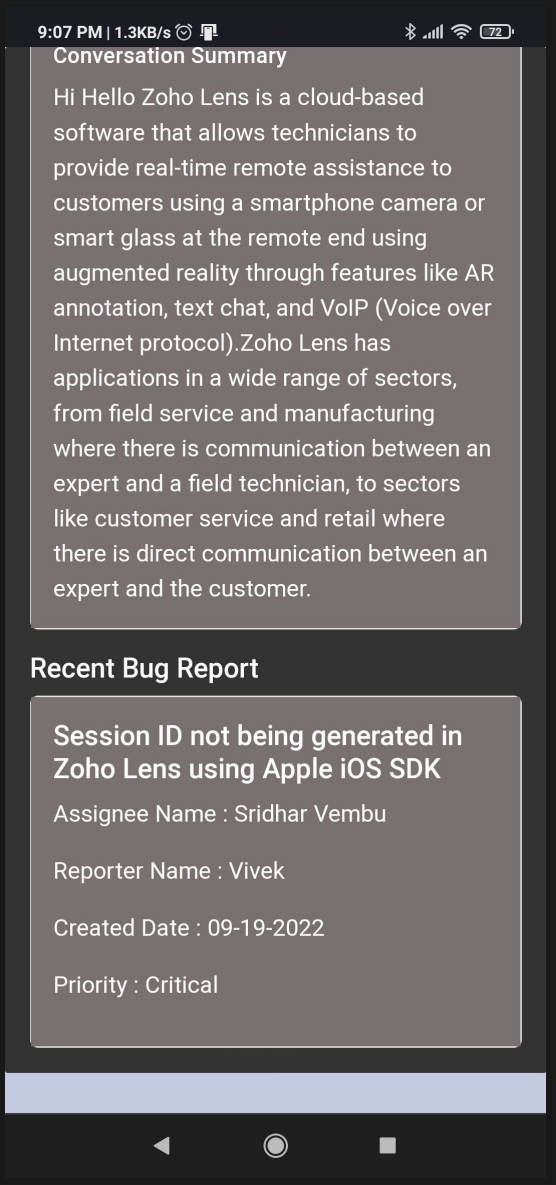


<u>Rumination (Summarization with more context)</u>
4) The details of the bug discussed in the conversation is listed

Zoho BugTracker

aiRRR – UX Look & Feel (on Mobile)





aiRRR - Steps to test

1. Click the link https://irrr-787344998.development.catalystserverless.com/app/ from Mobile browser
2. Focus the face of the person placed inside the rectangle (please use Zoho CEO Sridhar Vembu photos only – in the real-world implementation all the employees' photos within an organization will be trained using machine learning algorithm)
3. Press the Recognize button once and wait
4. Employee Details will be displayed with More Details button
5. Press More Details to get the latest conversation summary and bug details

https://www.google.com/search?q=sridhar+vembu+photos&sxsrf=ALiCzsYh7whMZH92xbiyBeW7ruZCpVDwag:1664121211677&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjRjb3NprD6AhX_4DgGHTD4Bu8Q_AUoAnoECAEQBA&biw=1707&bih=809&dpr=2.25

aiRRR – Future Improvements to Catalyst

The aiRRR can be better implemented if catalyst can support the following features in the future:

- Support for Python required so that AI services that are already developed in python could be implemented
- AI services such as Face detection, text summarization need to be included in catalyst
- Support for GPT-3 based AI services would be helpful to implement short intelligent responses for conversations

References

1) Kovács, G. (2020). Getting to Know Someone: Familiarity, Person Recognition, and Identification in the Human Brain. *Journal of Cognitive Neuroscience, 32*(12), 2205-2225.
2) Hutmacher, F. (2019). Why Is There So Much More Research on Vision Than on Any Other Sensory Modality? *Frontiers in Psychology, 10*.
3) Rugg, M. D., & Yonelinas, A. P. (2003). Human recognition memory: a cognitive neuroscience perspective. *Trends in Cognitive Sciences, 7*(7), 313-319.
4) Brown-Schmidt, S., & Benjamin, A. S. (2018). How We Remember Conversation: Implications in Legal Settings. *Policy Insights from the Behavioral and Brain Sciences, 5*(2), 187-194.
5) Magyari, L., Bastiaansen, M. C. M., de Ruiter, J. P., & Levinson, S. C. (2014). Early Anticipation Lies behind the Speed of Response in Conversation. *Journal of Cognitive Neuroscience, 26*(11), 2530-2539.
6) Fried, I. (2021, 2021-02-10). *AR glasses are what comes after the smartphone*, from https://www.axios.com/2021/02/10/ar-glasses-what-comes-after-smartphone
7) *The future of mobile computing is right before our eyes*. (2022). from https://www.qualcomm.com/products/application/xr-vr-ar/ar
8) Tushar, M. (2022, 2022-06-30). *How AR glasses are going from niche gadget to smartphone replacement*, from https://www.digitaltrends.com/mobile/ar-glasses-replace-smartphones-future-how/