The Current Generation of AR (Part 1)

Thr, July 30 (Week 6.5)

Imagine you want to build a spatial memo app.

Rationale:

It will let people leverage spatial memory, which is one of the gifts we have.

Task: 10 Super Bowl champions from 1967 to 1976

Result: 96% recall accuracy even after a week (35% with a list on paper)





Target Hardware:









For a spatial memo app, spatial recognition (i.e., a minor version of 3D reconstruction) is required. But, since pixel access is blocked for security reasons, we need to rely on functionalities of provided software libraries.









What you can do with Anchors:

- Provide information of the location you want to claim as an anchor to a database for anchors.
- Then, your application connected to the database can now know where those anchors are.

(Microsoft calls them spatial anchors; Apple calls them location anchors.)

What your users will be able to do with this state-of-art AR application:

Placing memos at the specific locations registered in the database.

Things not possible yet:

- Showing the memo for peripheral view via AR headsets. (lack of field of view)
- Telling which floor of the building it is at or which room it is at if there are many similar rooms. (lack of accuracy)
- Expecting this app to semantically understand space.
 - Example 1: Placing a memo on one of your desks (e.g., by voice control saying it's the one at home) without manually pointing where is your desk.
 - Example 2: Sitting in your room and say "show me all the memos I added while shopping shoes yesterday."

Current Version:

Placing memos at specific locations by opening the app, pointing the place, and speaking the whole sentence you want to write down. They are visible only when you rotate your head towards the specific locations, or through a web interface for looking at them, which would look like a smartphone memo app.

Ideal Version:

You can tell your device to add a memo through natural language as if you are asking someone to put a sticky note somewhere. They show up when you are in a situation you need them, and you can give the app feedbacks based on its behavior to demand the best experience, instead of opening the settings window.

Headsets

Largest Problems to solve:

Field of View: at least 60 degrees diagonally

Weight: should aim the weight of normal eyeglasses (< 50 grams)

Battery Life: at least more than 8 hours

Focal Length: hard to solve now, but should support all lengths

Note: should not solve the problems by making other things (e.g., resolution) worse...

Maybe During in a Few Years?

HoloLens 3 could launch in 4 years with infinite field of view, says Alex Kipman

Kareem Anderson 🖾 Email 🎽 @MindHead1 Mar 5th, 2019 in News

APPLE \ TECH \ AUGMENTED REALITY

Apple reportedly plans 2022 release for first AR headset, followed by AR glasses in 2023

Apple managers say AR glasses could supplant the iPhone in a decade

TECH \ FACEBOOK \ VIRTUAL REALITY \

Facebook says it will build AR glasses and map the world

An Example of a Facebook Scientist's Patent List

A lot of useful things happening...

Wide-Field Holographic Pattern Generation for Head-Mounted Display (HMD) Eye Tracking G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 16/22,099		2020
Holographic Pattern Generation for Head-Mounted Display (HMD) Eye Tracking Using a Diffractive Optical Element G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 10/223,030		2020
Holographic Pattern Generation for Head-Mounted Display (HMD) Eye Tracking Using an Array of Parabolic Mirrors G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 19/223.026		2020
Holographic Pattern Generation for Head-Mounted Display (HMD) Eye Tracking Using a Fiber Exposure G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 18/223,033		2020
Holographic Pattern Generation for Head-Mounted Display (HMD) Eye Tracking Using a Lens Array G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 10/222,997		2020
Holographic In-Field Illuminator G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 16/222,990		2020
Holographic Pattern Generation for Head-Mounted Display (HMD) Eye Tracking Using a Prism Array G Kim, A Maimone, AJ Fix, RD Cavin, HY Lee, MCR Leibovici, US Patent App. 10/223.023		2020
Waveguide with coherent interference mitigation A Maimone, A Ouderklirk, HY Lee, N Huang, M Parsons, SC McEldowney, US Patent App. 16/224,837		2020
Scanner-illuminated LCOS projector for head mounted display RA Wall, JO Miller, T Vallius, A Maimone, JS Kollin US Patent 10,842,045	1	2020
Apparatus, systems, and methods for display devices including local dimming JS Sears, A Moheghi, O Yaroshchuk, DR Lanman, A Maimone, K Ratnam, US Patent App. 16/503,439		2020
Apparatus, systems, and methods for display devices including local dimming JS Sears, A Moheghi, O Yaroshchuk, DR Lanman, A Maimone, K Ratnam, US Patent App. 16/503,440		2020
Polarization-sensitive components in optical systems for large pupil acceptance angles A Jamali, L Lu, A Maimone, A Moheghi, WST Lam, SC McEldowney, US Patent App. 16/273,021		2020

Weight/Battery





Possible Implementations





Possible Implementations

An example of an AR headset from a startup company and their demo video.







https://youtu.be/9qobNZWtg2U

Possible Implementations

Unclear aspects from the demo video:

- Unclear whether the render machine is the one they are selling or a real PC in this demo. Not sure how much computation is required in the rendering pipeline.
- Shows Hololens in front of the sun, but theirs on the floor.

Problem for all AR/VR video: AR/VR quality cannot be delivered via a video...







During Time 1



During Time 2



Time 1 + Time 2

