AR/VR Blackjack Assistant

Remote Rendering Application

Team: ARAnnihilators

Membership: UCCS

Faculty Sponsor: Dr. Semiari

Faculty Sponsor: Bill Michael

04/29/2022

User Roles

- **Project Manager** - Amber Dolezal
- **Communications Manager** - Amy Mejia
- **Logistics Manager** - Austin Hobbs
- **Design Manager** - Stefano Signorelli
- **Math Technician** - Jack Brock

Overview

- Microsoft Hololens (1st generation)
- Wireless communication (WiFi 802.11AC)
- Blackjack “game” to test

Rough Overlay Expectation

Problem Background

Current Solutions

- Virtual Desktop for Oculus Quest
- Holographic Remoting Player
- Remote-rendering by gizemdal

Our Project Differences

- A standalone game not designed by MS
- Lower delay

Possible Out-Of-Scope

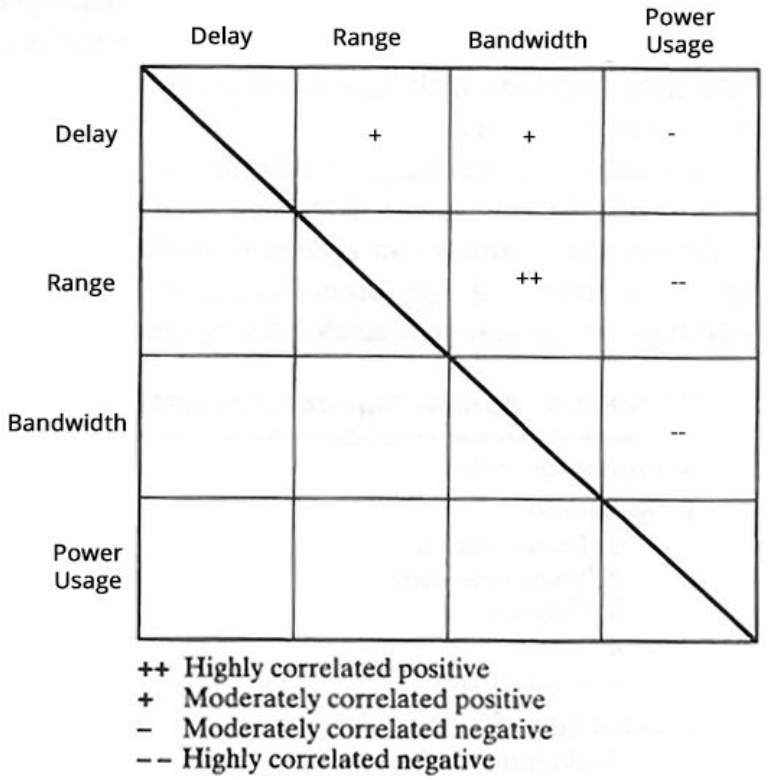
- Ray-tracing
- SDR

Standards Discussion

Processing Latency
Transmission Latency
Range
Accuracy
Ease of Use
Safe
Sustainability (Hydroelectric Powered?)

Constraints

- Transmission Delay < 2s
- Refresh Rate > 75Hz
- Range between Hololens & Router close enough for full bandwidth.
- Bandwidth of WiFi Connection
- Power Usage



Requirements Analysis

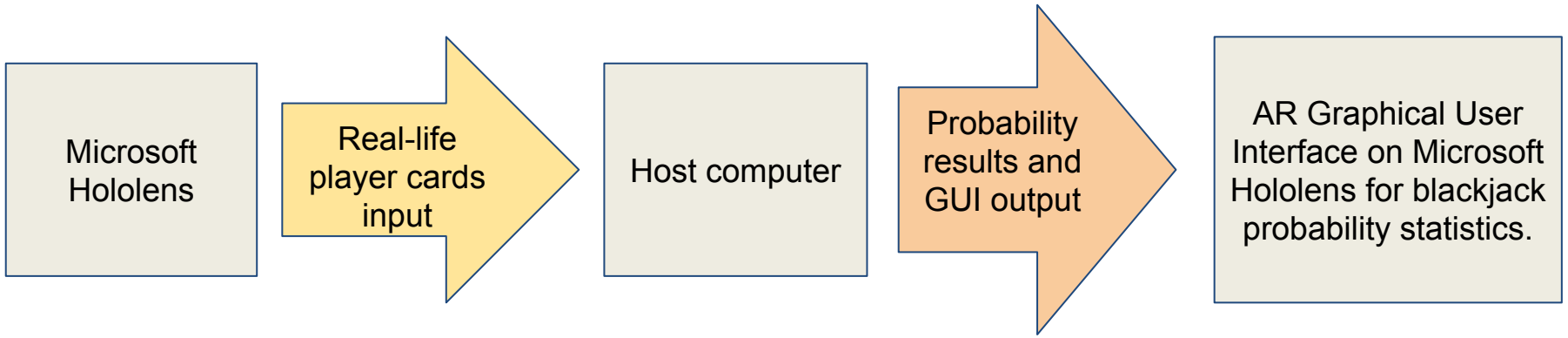
- Dr. Semiari is the customer.
- Host computer, AR, object-detection, and power efficiency.
- App requirements versus low system latency and power consumption.
- A Real-World consideration: object-detection and accuracy.

Requirements

- Accompany a set of documents specifying every piece of software and its functionality
- Allow the AR/VR device will connect to a wifi-router in order to communicate to the host computer
- Perform the app rendering and processing will be done on the host computer
- Improve runtime and battery life
- Allow the app rendering and processing will be done on the host computer
- Identify the playing cards that a person is holding
- Determine the value of the cards
- Display the statistics for next move that the player should perform
- Determine if the player should hit, split, or stand for their next move

Requirements Analysis

Input/Output Analysis:



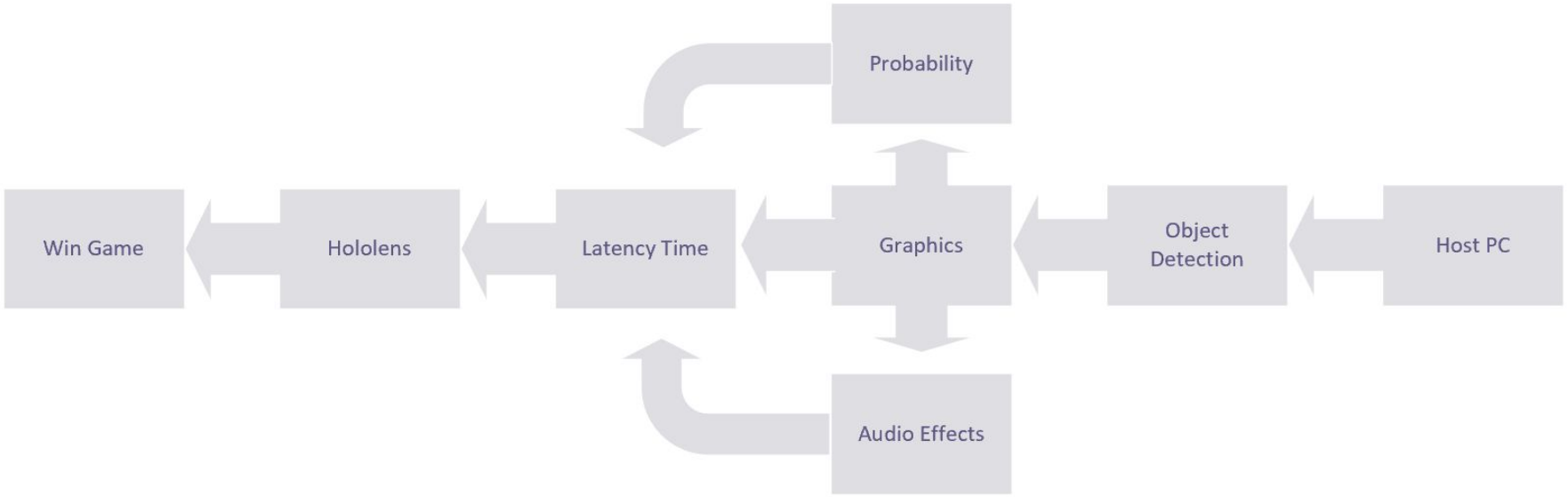
AR Graphical User Interface Example:

Chance of winning when:
Hit: 60%
Stand: 40%
Chance of getting a:
1: 0.08%
2: 0.08%
3: 0.08%
4: 0.12%
etc…

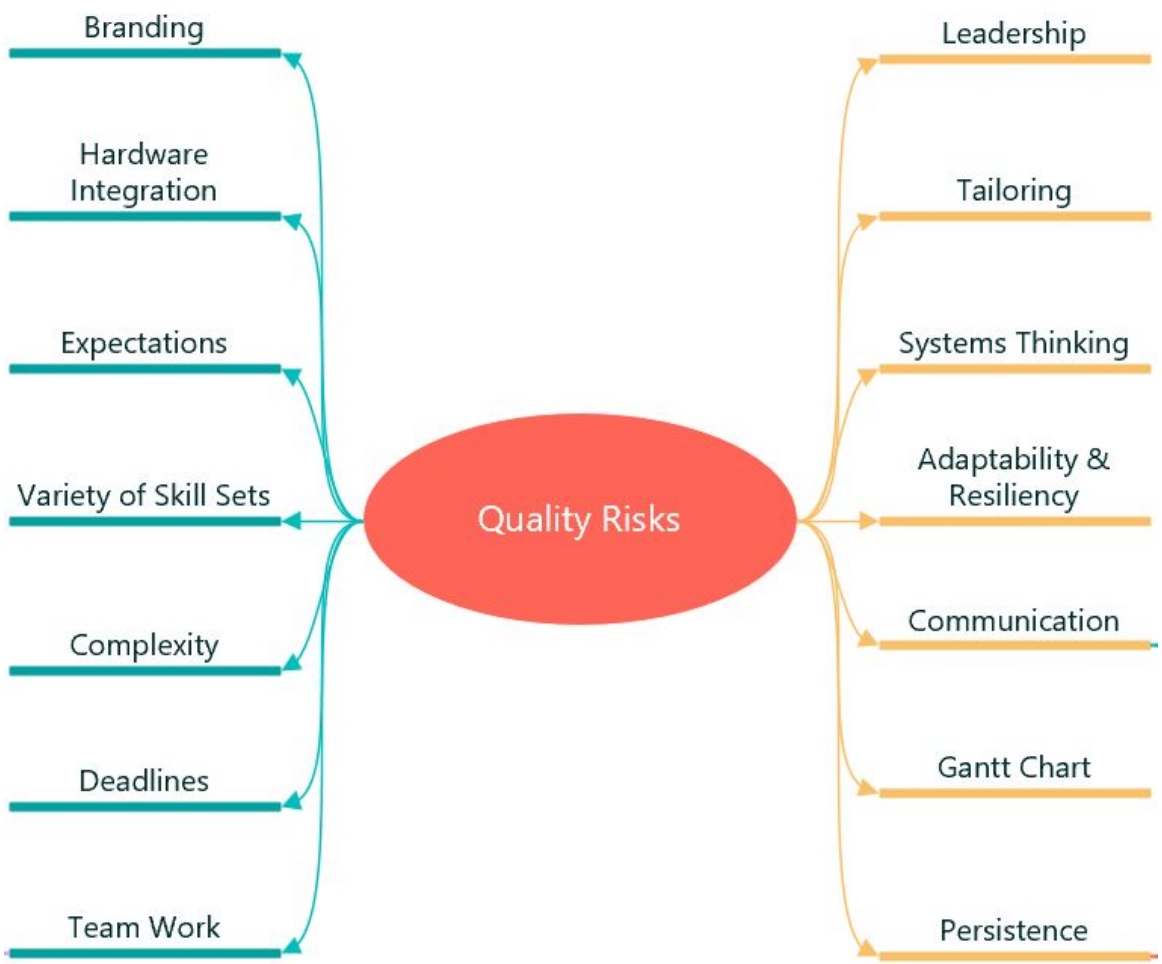
Requirements *Specifications*

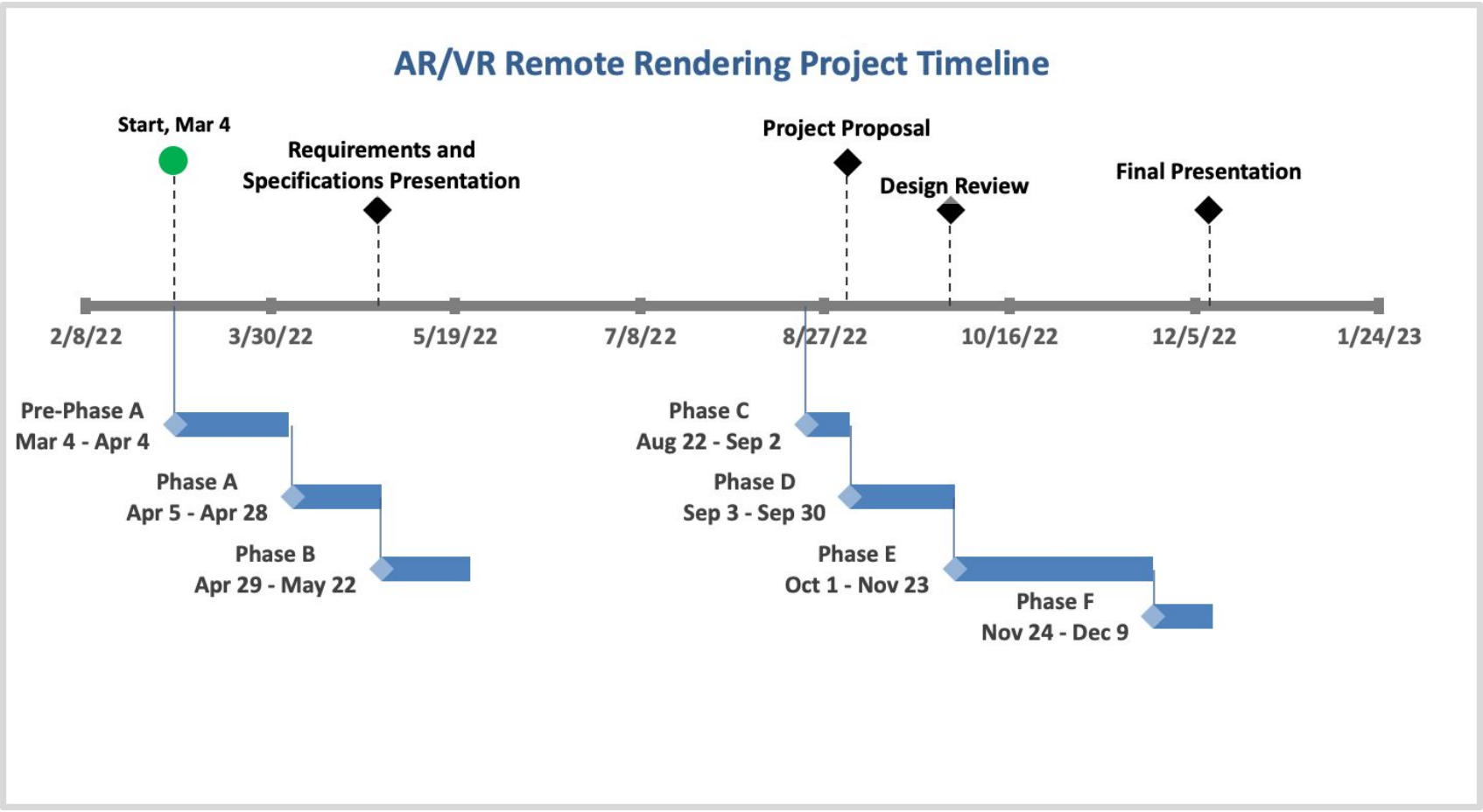
Requirement	Specification
Remote Rendering will be done utilizing an AR/VR Device	HoloLens
Remote Rendering and processing will be done on a host computer	The system latency will be under two seconds
Remote Rendering will improve runtime and battery life	Battery life will be improved by 5-15%
The application will display the statistics for the next move that the player should perform	The application will display the probability of success on the HoloLens for each move the player could perform
The application will determine the value of the cards that are on the table (player)	The application will display a graphic and play a sound on the HoloLens when player hits a card count of twenty-one
The application will determine the value of the cards that are on the table (dealer and player)	The application will play a sound when the player wins the game

System Design Expectations



Issues


Branding
Hardware Integration
Expectations
Variety of Skill Sets
Complexity
Deadlines
Team Work
Quality Risks
Leadership
Tailoring
Systems Thinking
Adaptability & Resiliency
Communication
Gantt Chart
Persistence


AR/VR Remote Rendering Project Timeline
Start, Mar 4
Requirements and Specifications Presentation
Project Proposal
Design Review
Final Presentation
2/8/22
3/30/22
5/19/22
7/8/22
8/27/22
10/16/22
12/5/22
1/24/23
Pre-Phase A
Mar 4 - Apr 4
Phase A
Apr 5 - Apr 28
Phase B
Apr 29 - May 22
Phase C
Aug 22 - Sep 2
Phase D
Sep 3 - Sep 30
Phase E
Oct 1 - Nov 23
Phase F
Nov 24 - Dec 9

Budget

- Microsoft Hololens (1st gen) ($810 new on Ebay plus $30 for shipping)
- WiFi 6 Netgear AX1800 Wireless Access Point ($40 new on Amazon)
- Playing Card with Chips ($7 new on Amazon)
- Total price for needed items is: $887
- Total budget is $1000 to cover tax when purchasing.

Societal Concerns

- **Ethical**
  - It is important that we not encourage or endorse gambling
  - The data retrieved from the AR headset should not be transmitted across unsecure networks
- **Sustainability**
  - Our AR headset is locally sourced, hydroelectric fed, free range and so on.

Conclusion

Remotely Rendering an AR/VR Program

Questions?

References

- Microsoft Hololens (gen 1) https://www.ebay.com/p/6010469621?iid=125260999825
- WiFi 6 AX1800 Dual Band Wireless Access Point https://www.amazon.com/NETGEAR-4-Stream-Dual-Band-Gigabit-Router/dp/B097HMLTQX/
- Playing Cards and Poker Chips https://www.amazon.com/Plastic-Playing-Waterproof-Gambling-Assortment/dp/B08CBV84LF/

References

- VR Virtual Desktop
  https://uploadvr.com/how-to-pc-vr-virtual-desktop-quest/
- AR Microsoft Remoting Program
  https://hololens.reality.news/news/hololens-can-now-wirelessly-use-pcs-cpu-gpu-for-faster-development-cycles-0173967/
- RTX Project
  https://github.com/gizemdal/remote-rendering/blob/main/README.md