Progress Report 2: VitalGaze

Abstract:

VitalGaze is a VR and wearable-based system designed to combat digital eye strain by providing users with personalized, interactive eye exercises. The system combines VR eye tracking with wearable technology to offer real-time feedback, promoting eye health in an engaging, accessible manner.

Progress (Last Week):

- Proposal Development: Continued refining the proposal, detailing components of the wearable device and its integration with VR exercises.
- Research: Investigated physical design aspects of the VitalGaze glasses, including materials and sensor placement.
- Discussion and Brainstorming: Explored an architecture where the smartphone app acts as the core user interface, with cloud integration for data storage and app/web-based visualization. Decided on a hybrid model:
    - Main functionality:
        i. 1. Wearable (Optional): Provides enhanced tracking but not essential for basic functions.
        ii. 2. VR effects
    - Smartphone App (Primary): Used for login, scoring, and user engagement.
    - Cloud Service: Hosts user data and enables remote access to statistics and progress via an app/web interface.
- Cloud Connectivity: Discussed strategies for connecting the wearable and app to the cloud server to support seamless data exchange and secure storage.

Action Plan (Next Week):

Cloud Architecture Research: Deepen research on cloud service architecture to determine the best approach for data storage, access, and security.
Mock-Up Designs: Begin creating mock-ups for the wearable glasses and app interface on Figma.
Proposal Update: Incorporate recent findings and refinements into the proposal based on this week's discussions.
Hardware Protocol: Analyze the performance and selection of the MCU and consider the multi-MCU solution.

Current component choices:

[1] Microcontroller (ESP-32 S3, ESP 32 S3 with Cam) - contains a powerful dual-core processor and enhanced features like AI acceleration with the help of eye detectors.

[2] Raspberry Pi (3B, 4B, 5) - Given the demand for video and picture legend for glasses we may also consider needing a more performance microcontroller (Quad-core higher 1 Ghz).

[3] Camera(OV2640 Cam long version, OV3660 160 Degree YUV RGB version) - the macro sensor and high sensitivity enable a smaller glass size and reduced weight.

[4] Screen(E ink) - different from OLED and LCD monitors without strobe to deepen the digital eye, but slow fresh rate affects the game development. (We may need to customize the glasses screen according to the glasses made from 3D printing)

[5] Power supply(Power Bank Battery Charging Module, AC to DC Power Supply Single Output 5V 3Amp) -

[6] Glasses frame (Using 3D printing, we need to decide which material to use) - simple modeling of the frame and part and a better understanding of parts compatibility.

[7] Cloud (Wenyao xu server) - deploy the server like docker to allow users to access data remotely.

(to do)Additional function…