Progress Report 1(9/25 ~ 10/11): VitalGaze

Abstract(Our idea):

VitalGaze is an integrated system consisting of a VR-based eye trainer game and a wearable glass device. Together, they offer a more immersive, engaging, and effective solution to screen-induced eye fatigue. The VR Eyetrainer uses gaze-based exercises in a game environment, while the wearable glasses track eye movements and provide real-time feedback using LED arrays. The entire system is designed for accessibility, portability, and self-management, making it easy to use in various environments.

Project Proposal Development

Background and Motivation:
- Help people perform eye exercises more effective and scientifical, and it can provide personalized feedback.
- Eye exercise, including eye rotation, can keep eye relaxed and refreshed

Existing Solutions and Limitation: (why existing solutions are not enough)
- The existing devices not that cost effective, they're expensive
- lack of personalized feedback

Our idea and rationale: (the general engineering methods)
- project aims to provide personalized eye training solutions by using smart glasses equipped with gaze tracking technology
- camera capture eye movement → processing data to hardware(sensors) analyze → data…

Execution Plan: (list the sub aims and who will be responsible)
- Can be simply divided into software, hardware, mechanical structure, algorithm(AI/ML/CV/DL-based software) parts.

Progress (9/25 ~ 10/11):

- Proposal Development: Get started with the proposal.
- Research: Investigated physical design aspects of the VitalGaze glasses, including materials and sensor placement.
- Discussion and Brainstorming:
  - Main functionality:
    i. 1. Wearable (Optional): Provides enhanced tracking but not essential for basic functions.
    ii. 2. VR effects
  - How can we effectively embed the microcontroller into the glasses for the gaze tracker?
  - What are the potential technical challenges related to tracking eye movement for different eye colors?

- How do we really show the importance of our project in tackling eye fatigue?

Action Plan (Next Week):
- Pick the feasible hardwares.
- Each member should formulate a Google Doc for the proposal and start populating it collaboratively.
- Each member should send their resume and course transcript to identify relevant skills.
- Each member should consider which part of the project they want to focus on and prepare to share their insights in the next meeting.

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…