

Midterm Progress Report

Team Name: zenscape 🐼

Team Members: Bryce Olivier, Harrison Juneau, Madelyn Zambiasi, Preston Schnell, Sadie Forbes, Zavien Kellum

Project Goal:

"Train users to improve task management skills in environments filled with sensory distractions."

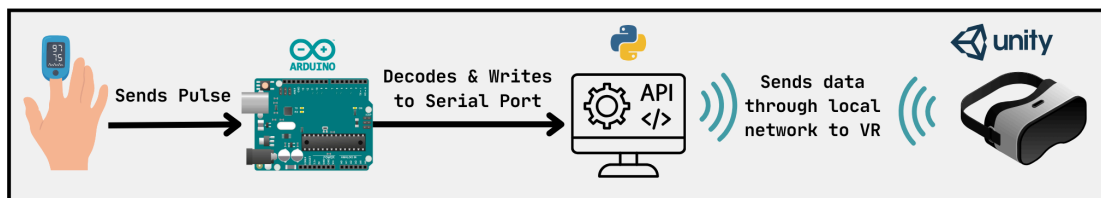
Implementation Vehicle:

Our implementation vehicles are Virtual Reality and Physical Computing.

We believe VR provides a highly immersive experience, making users feel present in the simulated environment. We chose Unity as our engine because it allows for the easy creation of realistic 3D environments. Users can interact with objects and navigate the VR environment as if they were physically there.

Next, we chose to include physical computing in our project in order to provide biometric data about our users. To develop the physical computing aspect of the project, we are using Arduino with a [Pulse Sensor](#). Higher levels of stress and cognitive load are directly related to an elevated heart rate, which is why we are gathering this data. To connect the Pulse Sensor with the VR Game, we are creating a simple Application Programming Interface (API) that sends the Pulse Sensor's data. The API, which will be implemented with Flask, will read real-time pulse sensor data from an Arduino connected to a laptop. The Unity VR game will make periodic requests to an API endpoint, receiving and logging the live pulse data for in-game use.

Combining all of these vehicles, we hope to make an experience that combines our team's multi-disciplinary skill sets, combining our design, engineering, and software skills.



Graphic of Data Flow and Vehicle Architecture

MVP:

ZenScape is an experience that will help users train to improve their task management in a virtual reality office space. This experience is unique because it is affected by the user's heart rate, which is monitored by an Arduino pulse sensor. The choice to include a pulse sensor to monitor heart rate is intentional, as we found that heart rate is a good indication of cognitive load; and cognitive load directly affects one's ability to manage tasks. We also thought that the setting of an office space was a fitting choice since an office is a place where people are expected to exercise their task management abilities. We hope to play off the preconceived notion that an office is a place to be productive, which is what we want our users to be.

Tasks:

For our tasks, we plan to have a minimum of three for the MVP, with five tasks being our stretch goal. Our tasks will consist of small memory challenges, including those inspired by tasks popular in cognitive load experiments, as well as sorting and organizing tasks. Below, we elaborate on our three confirmed tasks.

Our first task that we plan on implementing is a sorting task. Inspired by the Stroop test, the task involves a challenging file sorting scenario designed to test cognitive abilities by testing their information processing speed. Users are presented with a stack of files, each with a specific color and a name that reads a different color. The challenge is to sort these files into the correctly colored folder based on the name correspondence while ignoring the color of the file.

For our next task, we will implement a timed challenge where the user has to fill up their coffee mug. Once this mug is full, it will be too hot for the user to drink and will be penalized if they drink the coffee while it's still too hot. If the coffee is too cold when they drink from the mug, they will also be penalized and have to pour the coffee out and remake a cup. The goal is for the user to find the optimal amount of time to wait for their coffee to be the correct temperature to drink. This task will work well as a time management building task due to the user having to keep the thought of when to drink their coffee in the back of their head while completing other tasks.

Our third task revolves around answering phone calls. Users will receive various calls that need to be redirected to the correct department. Identifying and ending "spam" calls in time is crucial to avoid penalties. For important phone calls, users will use memorized keypad extensions to redirect them promptly. Department extensions may be available on a sticky note in the desk drawer, encouraging users to memorize them for quicker response times.

The implementation of more than three tasks is contingent upon whether we have extra time for development and the opportunity to expand upon our ideas following the completion of our Minimum Viable Product (MVP).

Distractions:

The distractions portion of our project have yet to be identified and detailed in our past reports. We have discussed how these distractions will be implemented, as well as list some of the distractions we have decided to implement in the game.

We plan on tying in the distractions with the heart monitor. There will be three tiers of distractions: easy, medium, and hard. If a user's heart rate is low, then we will pull distractions from the hard category in order to increase the game difficulty. On the contrary, if the user's heart rate is high, we will use distractions from the easy category to lower the difficulty. Each of the categories will have a set number of distractions. As of now, we plan on adding three distractions per category for a total of nine. When we call a distraction, we will get the tier level based on the heart rate. Then we will randomly select one of the three distractions within that tier. This will ensure that every playthrough is unique.

Distractions will be visual or auditory. An example of some visual tasks will be flickering lights, weather changes, and people walking outside the office door. Some auditory distractions would be things such as mosquitoes buzzing, crowd chatter from elsewhere in the office, and a fire alarm. Some distractions will be a combination of visuals and audio. For example, the flickering lights can have an annoying buzzing sound to add to the level of distraction.

Team Member Responsibilities:

- Bryce Olivier - Game Design and Development
- Harrison Juneau - Physical Computing Specialist
- Madelyn Zambiasi - Storyboard and Asset Designer
- Preston Schnell - Lead Art and Asset Designer
- Sadie Forbes - Game Design and Development
- Zavien Kellum - Art and Game Design

Midterm Progress Overview:

We have made progress in several different areas of our project, both artistically and technically. First, we have made progress on developing our Physical Computing components. Our Physical Computing Developer has successfully configured and tested the Pulse Sensor with an Arduino Uno, and we have created a basic yet functional demo showcasing the Pulse Sensor's interaction with the Arduino Uno. This is a prerequisite to integrating with both the API and then Unity, which will create the connection between physical and virtual sides of ZenScape.

Next, we have also made some progress in creating the Unity VR experience. Our team has tested and finalized the Extended Reality (XR) Rig, a component that allows users to interact with and navigate the VR environment. Additionally, key elements such as the Character Controller and Input Actions have been implemented, which allows for basic interaction within the VR environment. We have also developed locomotion and rotation mechanics to create realistic, immersive, and fluid user movement, bringing us closer to our goal. The player can now navigate the office space with accurate gravity and object collision.

Lastly, our team has also made good progress on the art and design of ZenScape. The 3D model of the office environment, created in Maya, has undergone some improvements. These include additional styling, refined lighting techniques, and added materials, contributing to making our environment more realistic and visually appealing. We have also imported and deployed a basic version of the office environment into our Unity project, combining our artistic design and technical development progress.

We believe that our progress places us on track to successfully complete our MVP, and we are excited about future iterations of the project. We plan to implement our task logic and game state flow before the next report, as well as finalizing our office layout and design to maximize its utility for our goal.

(A demo of the basic Unity VR Environment and our Main Theme can be found [here](#).)