
Self-defense Training using Augmented Reality

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Goal

Kidnapping
cases

Mugging cases

Sexual Assaults

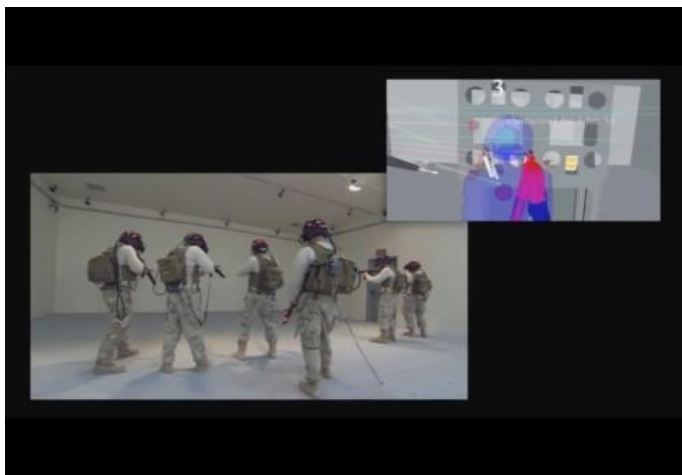
Limited trainers

Limited helpline
numbers



Train civilians in basic self-defense

Users interact with a virtual attacker via wristbands and headset and the product evaluates user actions to train them successfully.



Similar products : BARS, Sandia National Labs

Exist to train military
personnels in their drills and
rescue, evacuation process.

Novelty of STAR :

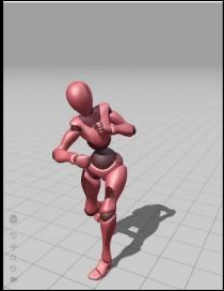
To train civilians mostly kids
and women in basic-defense.
Less rigorous training.

STAR does NOT do :

Receival of physical feedback
reaction from the product to
the user.

Keywords

Virtual Avatar

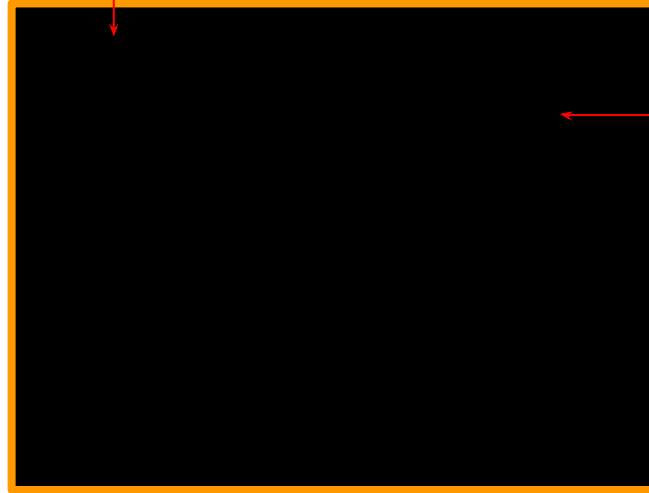


Headset



Health Meter

Instruction



Wristband



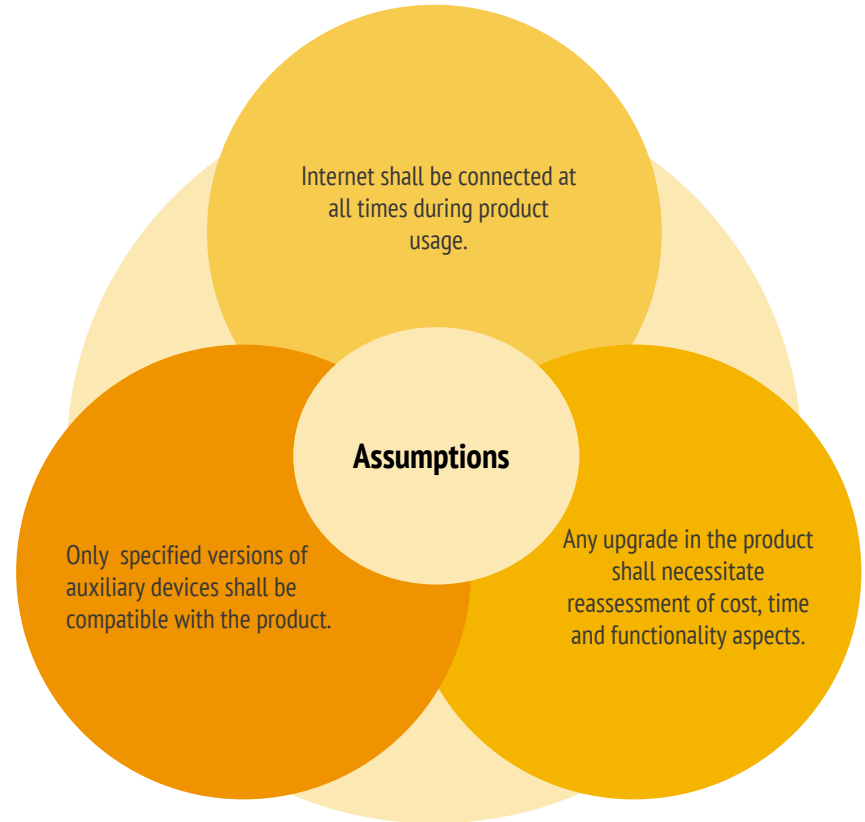
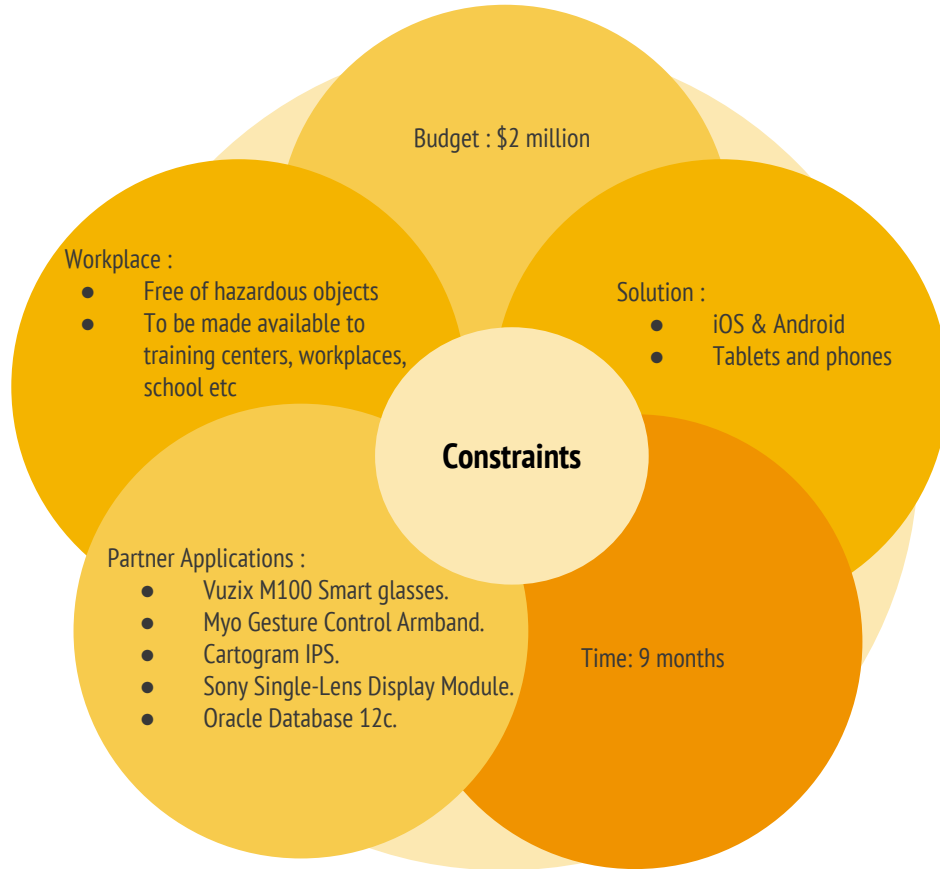
Map-Display



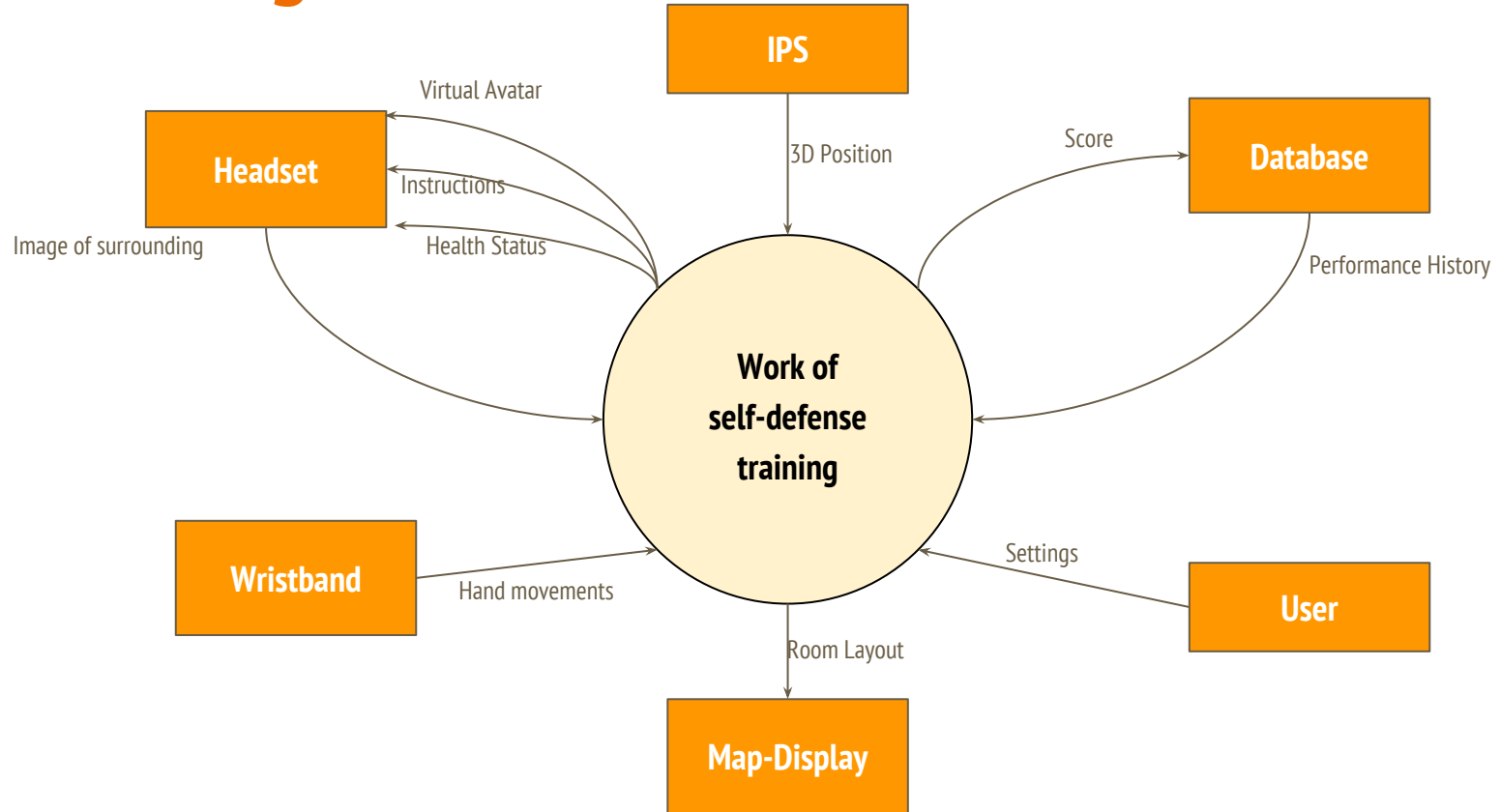
IPS : Indoor Positioning
System

Software similar to Global
Positioning System but
suitable for indoor
locations.

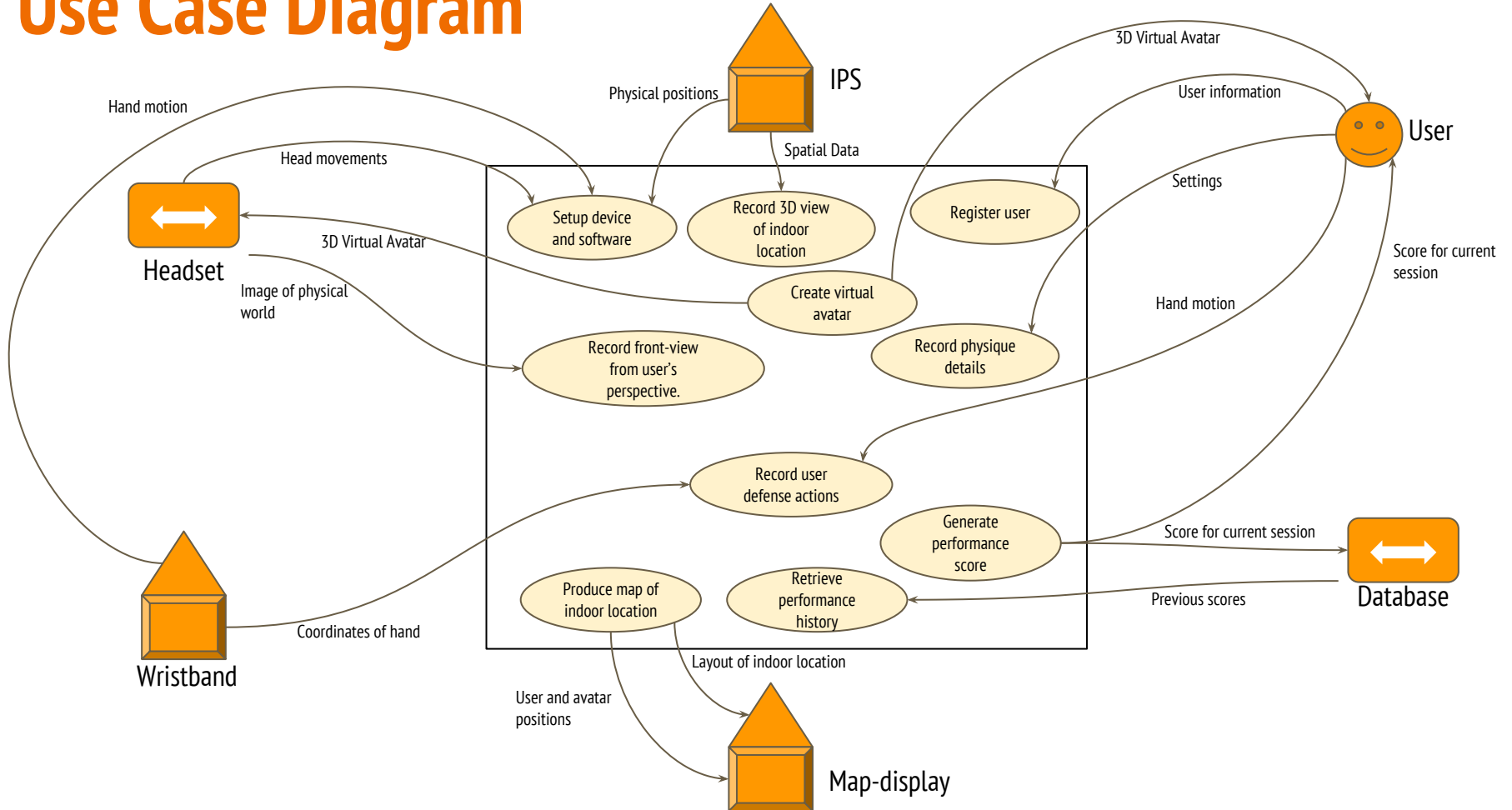
Constraints & Assumptions



Context Diagram



Use Case Diagram



Key Functional Requirements

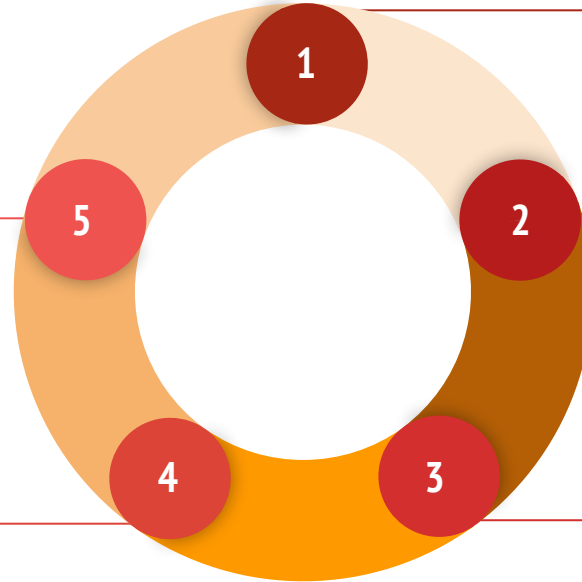


Update health meter

The product shall evaluate user actions and update health meter for assessment purpose.

Guide user reactions for avatar actions

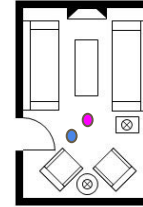
The product shall send instructions to user for training against avatar via headset and detect user actions via wristbands.



Record physique details and settings.

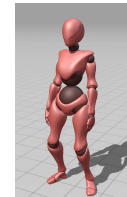
The product shall record custom or history-based settings for difficulty level of training.

Record room layout & 3D position



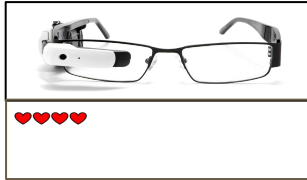
The product shall record real time position of user and avatar in the training room via IPS and map-display.

Create virtual avatar



The product shall assemble a 3D virtual avatar based on settings.

Functional Requirements Fit Criteria

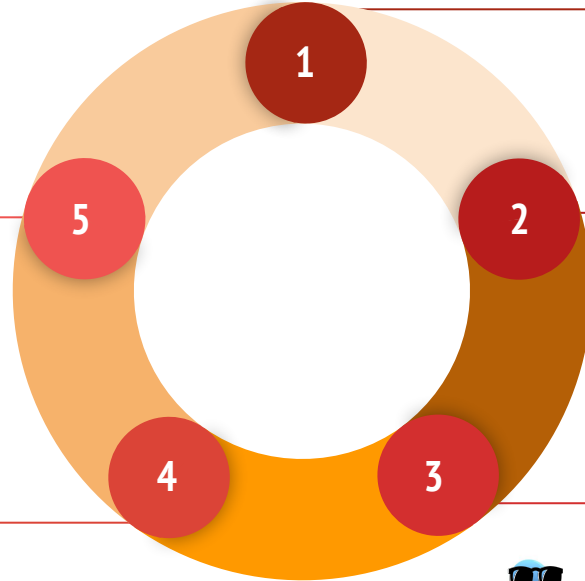


Update health meter

The user shall see its current health status based on his actions during training.

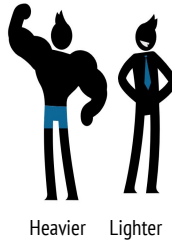
Guide user reactions for avatar actions

User shall see instructions on headset to guide through training.



Record physique details and settings.

Selection options for avatar physique types shall be available to the user.

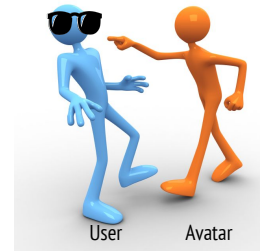


Record room layout & 3D position

The product shall process the information received by IPS and transfer to map-display.

Create virtual avatar

User shall be able to see the virtual avatar via headset or track its position via map-display.



Failure Scenarios



Failure in detection of one or more auxiliary device.



Failure in retrieval of performance history.



Incorrect evaluation of head or hand movements.



Failure in internet connection.

Key Non-Functional Requirements



Look & Feel

The product shall have easy-to-use interface for the age group of users.

Security

The product shall ensure protection of user information from unauthorized access.

Performance

The product shall create/update/move virtual avatar during a session promptly..

Capacity

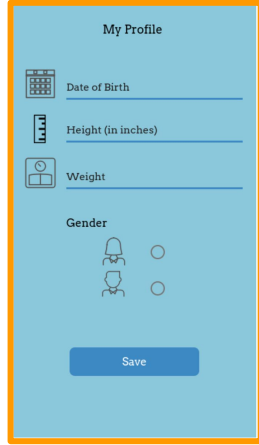
The product shall handle long training sessions.

Cultural

The product shall not discriminate against any community.



Non-functional Requirements Fit Criteria



A screenshot of a 'My Profile' form. It includes input fields for 'Date of Birth' (with a calendar icon), 'Height (in inches)' (with a ruler icon), and 'Weight' (with a scale icon). Below these is a 'Gender' section with two radio button options represented by person icons. A blue 'Save' button is at the bottom.

Look & Feel

Readable text size of 11pt and 1.5pt spacing shall be ensured. Relevant icons shall be used.

Security

User information shall be accessible with correct combination of username and password.

Performance

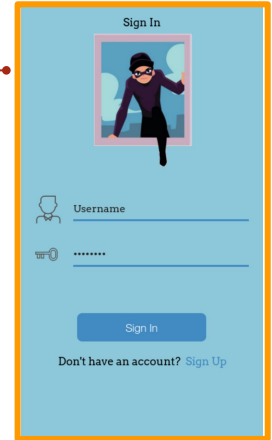
Any update/movement of virtual avatar shall take at most 0.15 seconds after user input.

Capacity

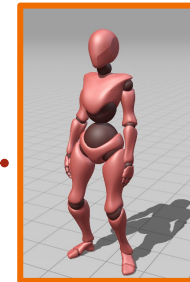
5 hours of continuous training session shall be possible on the product

Cultural

The virtual avatar shall be a human framework not representing any specific community

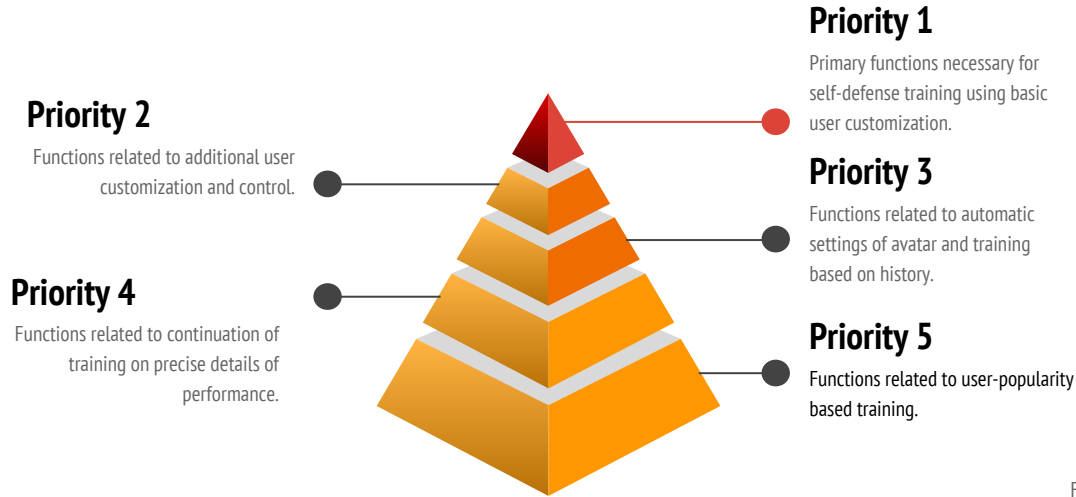


A screenshot of a 'Sign In' form. It features a placeholder image of a person in a dark suit and mask. Below is a 'Username' field with a person icon and a password field with a key icon and masked characters. A blue 'Sign In' button is at the bottom, followed by a link: 'Don't have an account? Sign Up'.

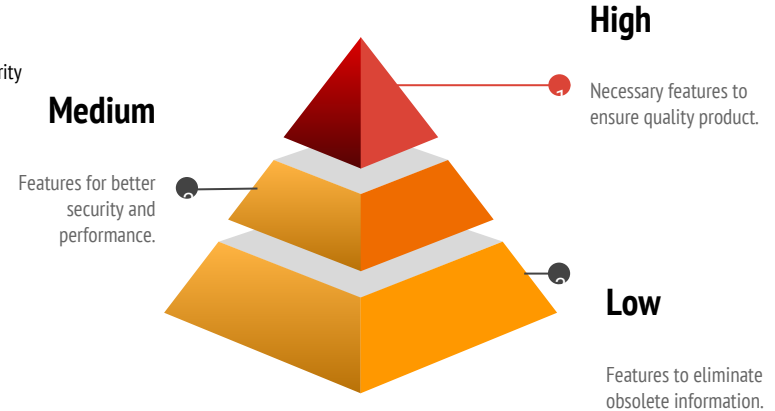


Prioritization of Requirements

Functional Requirements



Non-functional Requirements



Soft Goals



The product motivates user to tackle dangerous situations with agility.



The product addresses users' feeling of unsafety.



The product teaches users how to use self-defense efficiently.

While the above items are STAR goals, they are difficult to measure pertaining to the diversity of users, locations and various different attack scenarios.

Software Architecture of Prototype

Set Details on Interface

Create Virtual Avatar

Interact with Virtual Avatar

The image displays a user interface mockup for a web application, likely created using Proto.io. It features three overlapping panels. The top-left panel is a 'Sign In' screen with a header, a placeholder image of a person, and fields for 'Username' and 'Password' (masked with dots). Below these fields is a 'Sign In' button and a link for 'Don't have an account? Sign Up'. The middle panel is a 'My Profile' form with fields for 'Date of Birth', 'Height (in inches)', 'Weight', and 'Gender' (with radio button options). It includes a 'Save' button at the bottom. The bottom-right panel is a 'Physique Selection' screen with a 'Selection' label and a series of radio buttons for choosing body types. A 'Start Training' button is visible at the bottom of this panel.

Proto.io

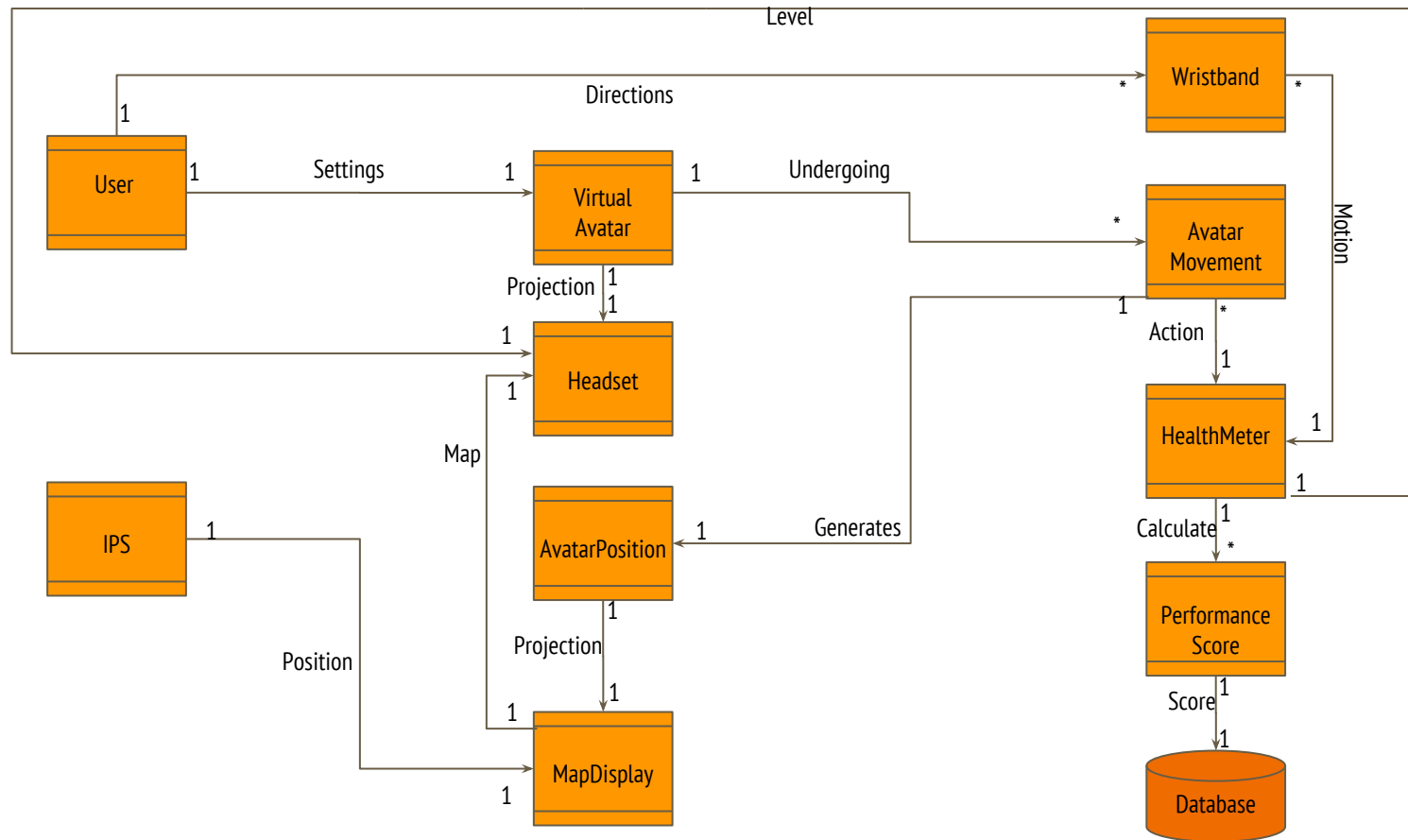


PowToon

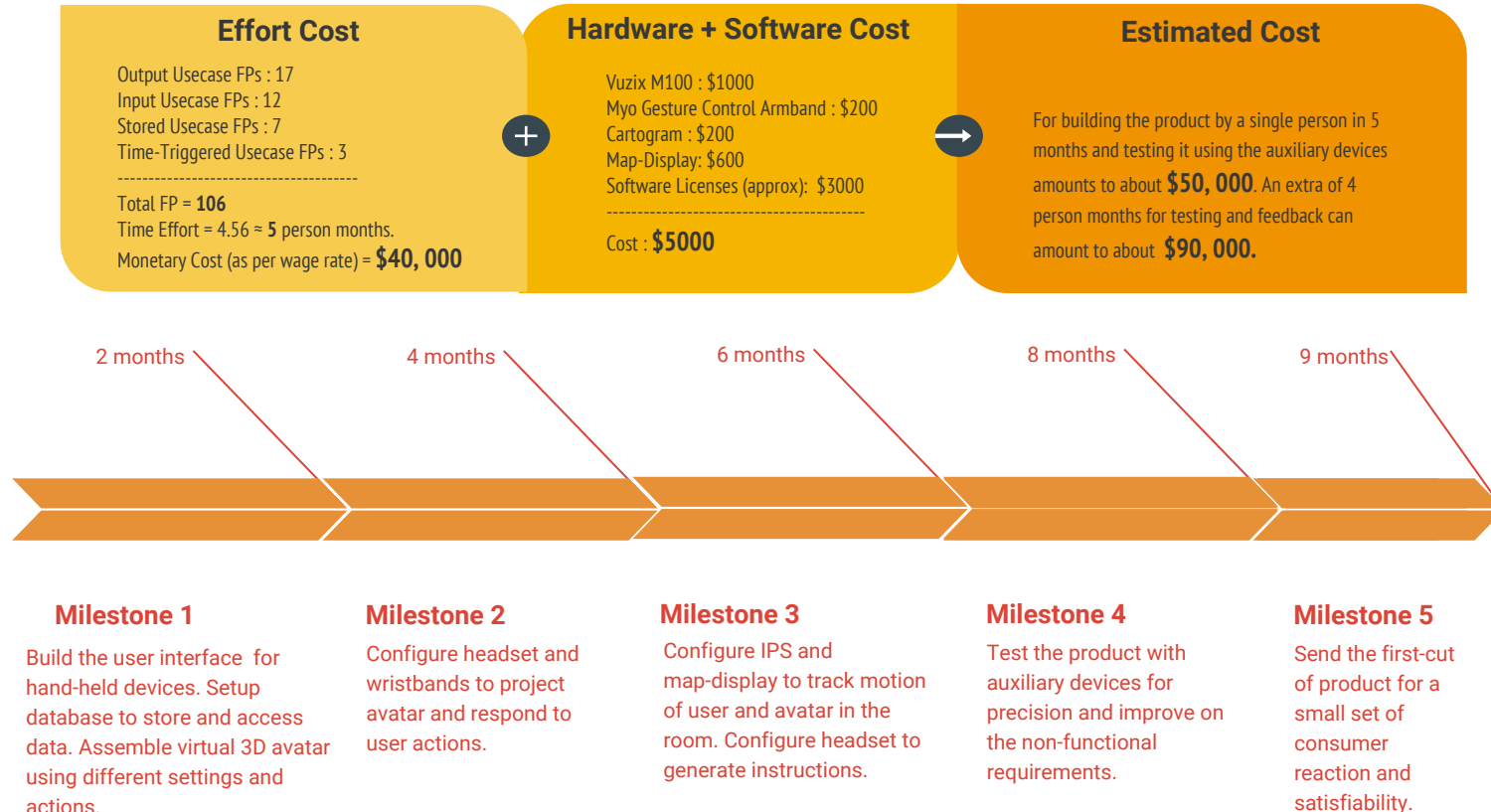


RaptMedia

Data Requirements



Cost & Schedule



Open Issues



Ability to detect unspecified user action like kicking is not available.
Requires additional sensor bands for legs.



Auto-identification of updated version of auxiliary device is unavailable.



Ability to detect multiple user sessions for security purpose is unavailable.