MICHIGAN STATE UNIVERSITY

Project Plan

IMAGINE: IMAGe INtake Experience

The Capstone Experience

Team Auto-Owners

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From Students…
…to Professionals

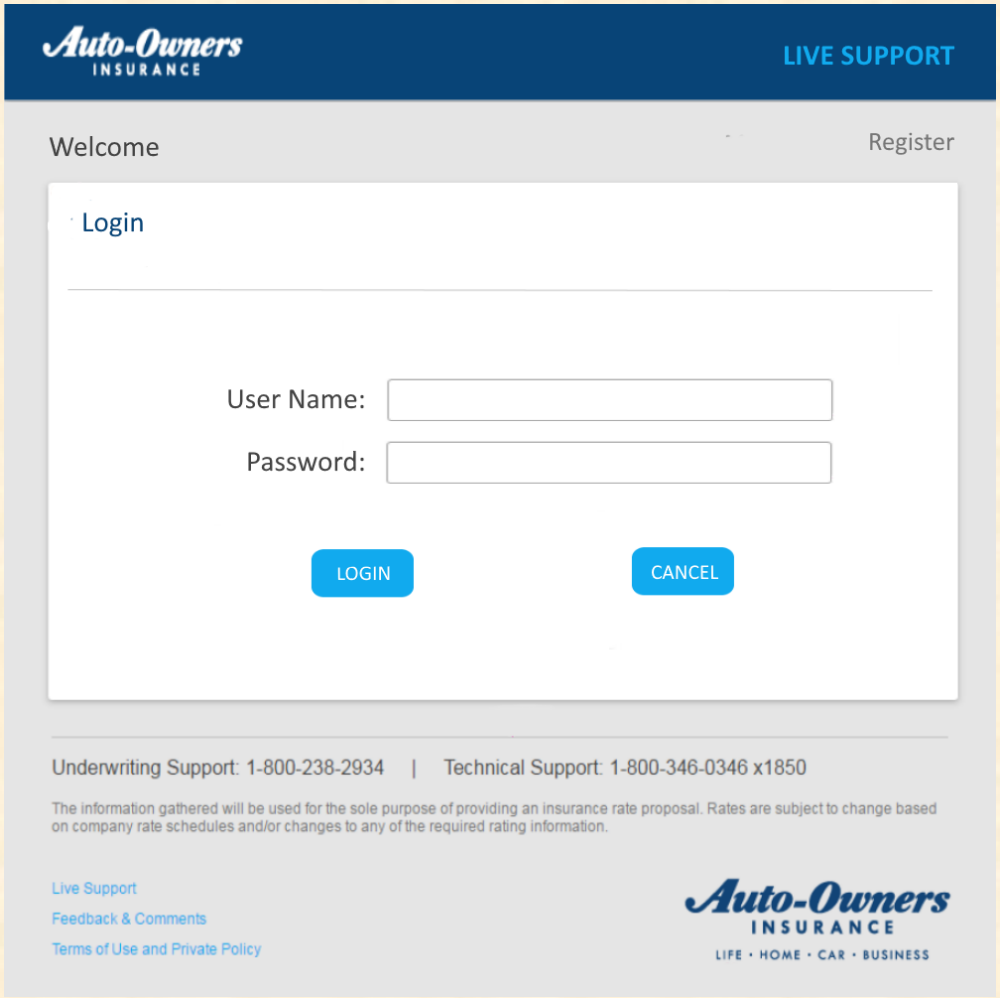
Functional Specifications

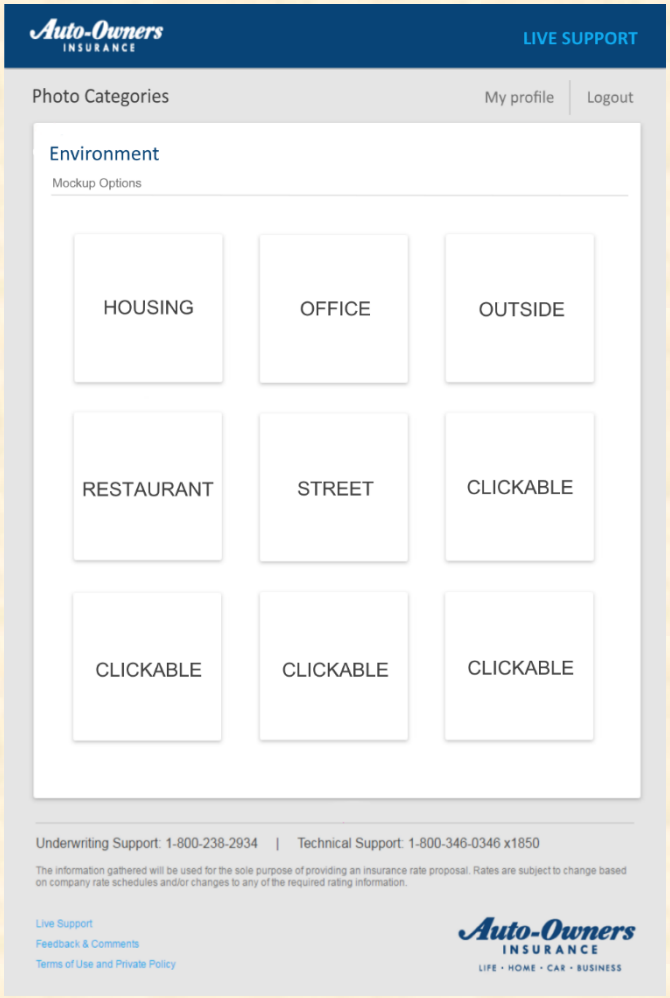
- Generating insurance quotes in a timely and highly accurate manner is difficult without an on-location assessment
- On-location assessments are time-consuming and costly
- By using panoramic images of locations in a virtual reality setting, adjusters can make remote assessments as if they were on site
- Object recognition can significantly reduce the time an assessment takes by automatically identifying objects of interest at a location to the adjuster

Design Specifications

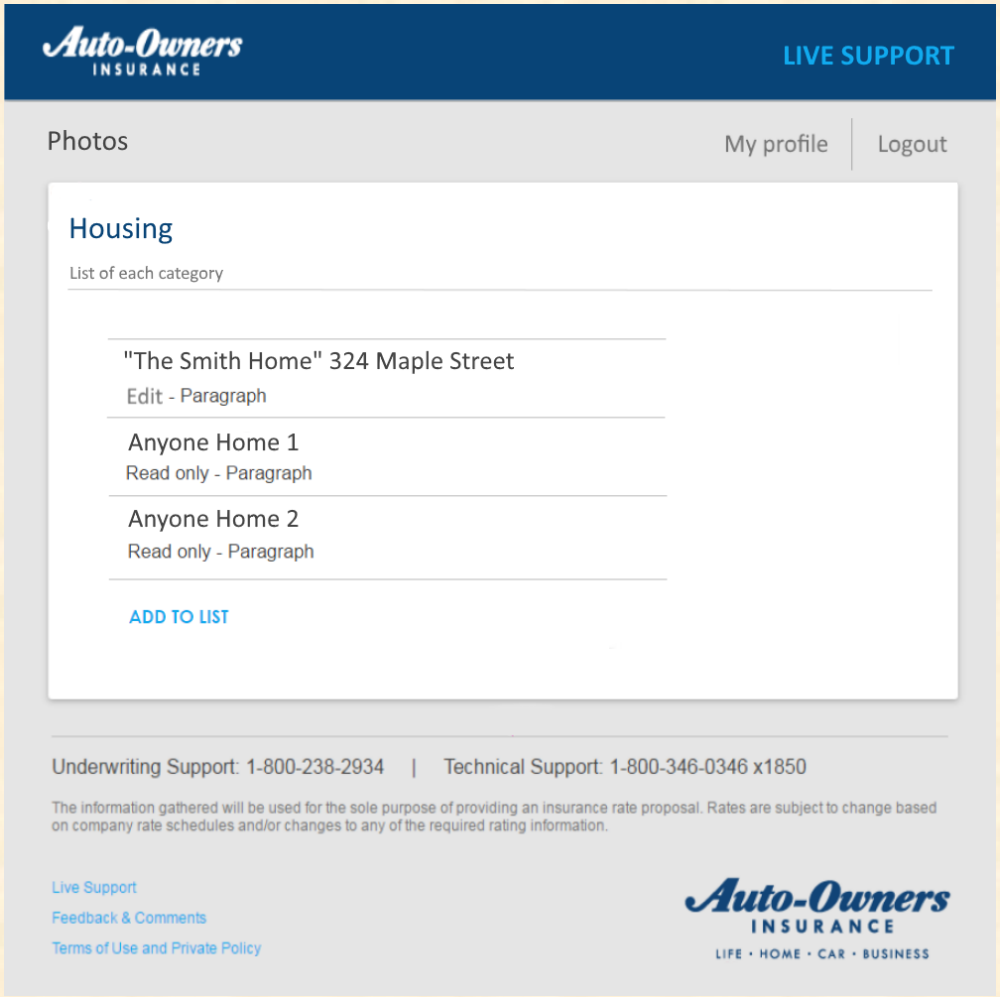
- Users should be able to upload images showing an environment and have the objects within identified, located, and labeled
- Users should be able to interface with an inventory of identified objects and make edits to their information through a web portal
- An image and its inventory should be viewable and annotated in a Unity VR application
- Image environment type should be classified by the objects within the image

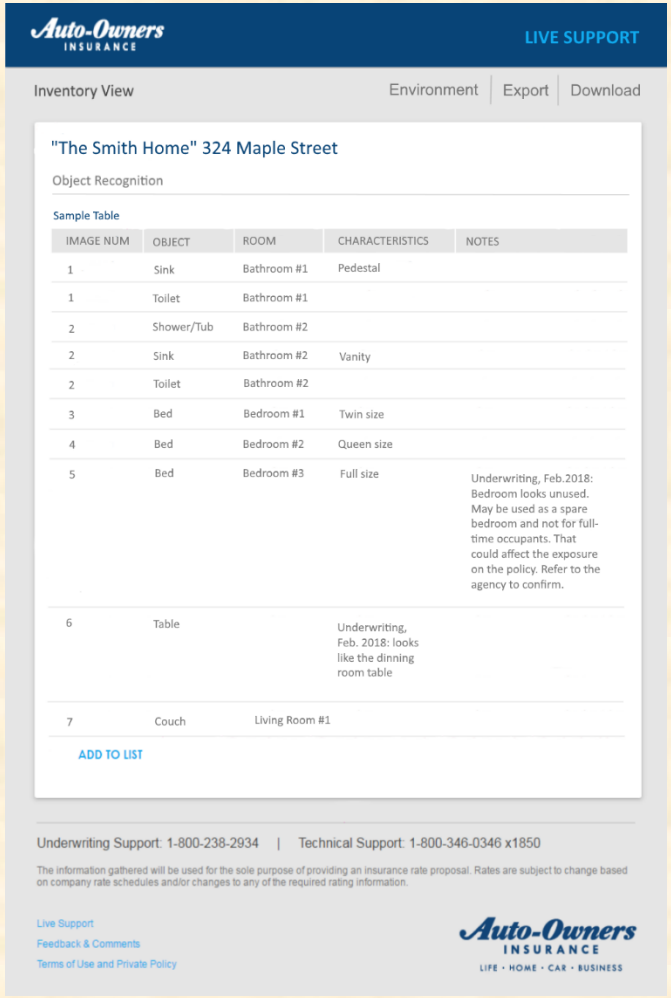
Screen Mockup: Web Application



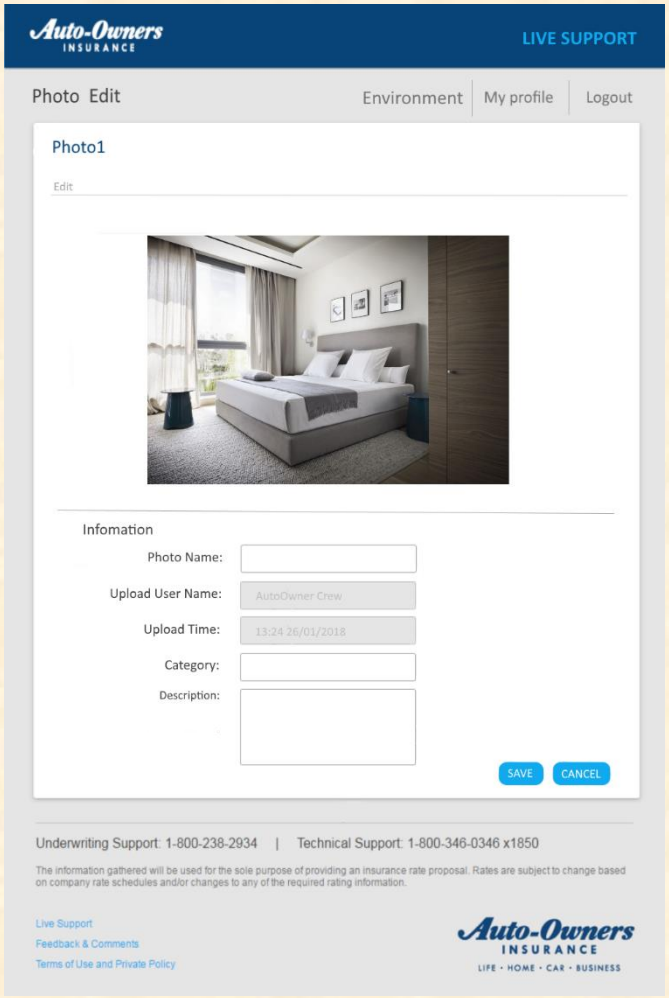


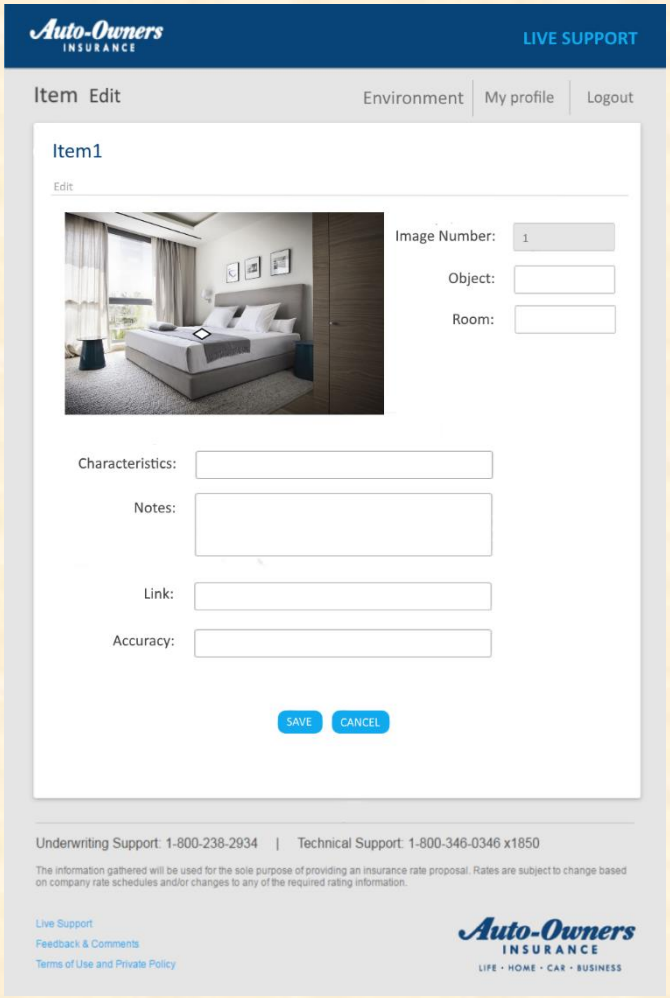
Screen Mockup: Web Application





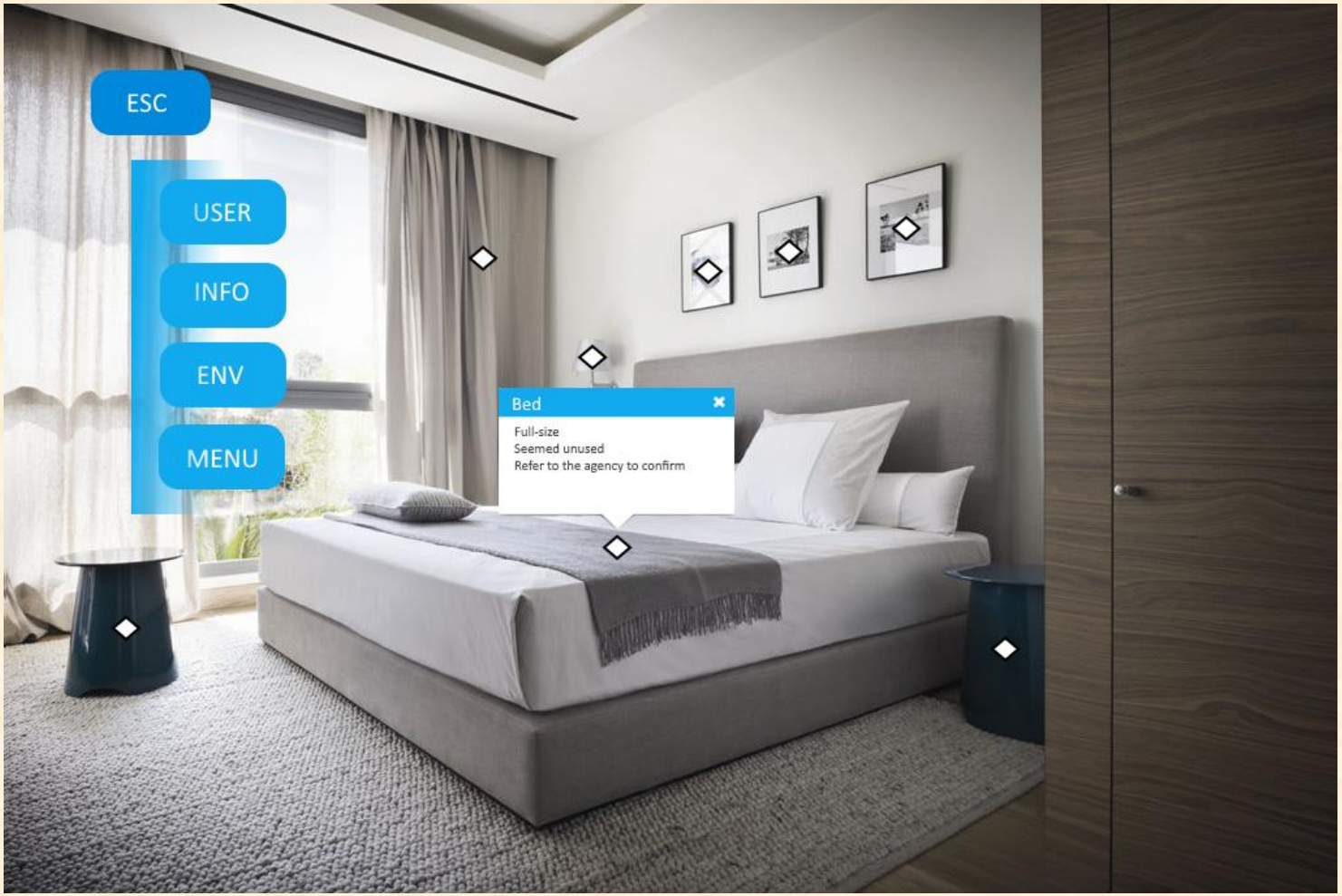
Screen Mockup: Web Application





Screen Mockup: VR Menu

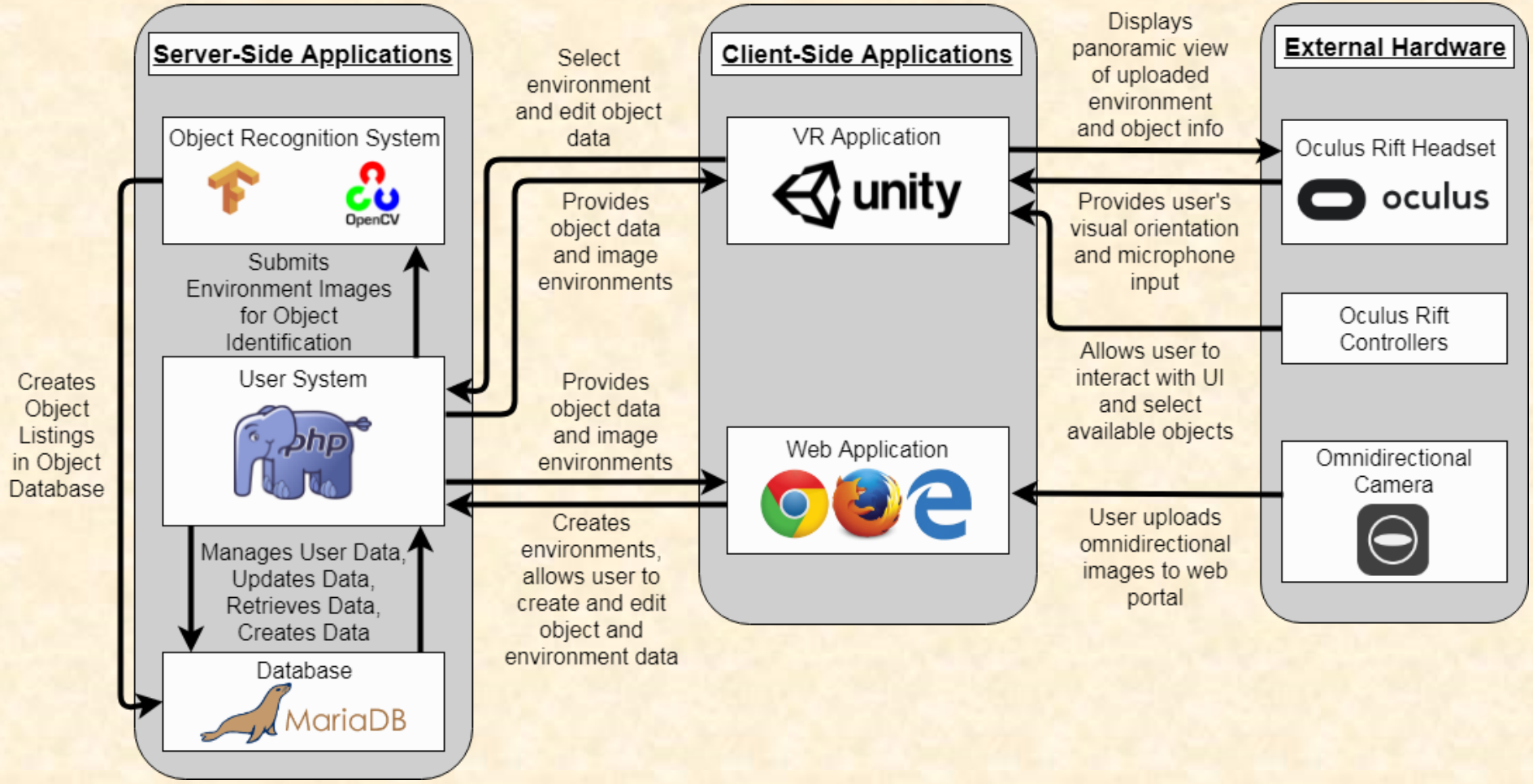
Screen Mockup: VR User Interface



Technical Specifications

- Panoramic photos are processed by the object recognition system (OpenCV/TensorFlow) to identify objects of interest and store their locations and information in a database (MariaDB)
- A VR Headset (Oculus Rift) can be used to view panoramic photos and annotated versions of the objects in them in an immersive manner
- The web application (PHP) can be used to see a manifest of the objects found in a photo, information about that photo's environment, as well as to edit the information of those objects and information about the photo's environment

System Architecture



System Components

- Hardware Platforms
  - Oculus Rift VR Headset
  - Oculus Rift Touch Controllers
  - Dell PowerEdge Server
  - CUDA Graphics Processing Unit
- Software Platforms / Technologies
  - Unity Game Development Studio
  - OpenCV
  - TensorFlow
  - GitLab
  - PHP
  - MariaDB
  - Ubuntu Server

Risks

- Inability to classify an environment
  - Environments should be classified based on types of objects found (i.e. bedroom, office, etc.)
  - Train negative classifiers to drop incompatible environments
- Multiple concurrent users
  - Multiple separate workflows will need to be able to be accessed by all users
  - Manage interactions with a user system using transactions to enforce ACID
- Object recognition in spherical images
  - 3D images have distorted pixel densities and will make classifying difficult
  - Normalize 3D images to 2D or include warped images when training our classifier
- Server Access Limited by MSU Firewall
  - MSU has firewall rules that prevent some external communications
  - Pipeline traffic through channels that are not restricted

Questions?