

MICHIGAN STATE
UNIVERSITY

Project Plan

IMAGINE: IMAGE INTake Experience

The Capstone Experience

Team Auto-Owners

Sean Larabell

Zack Geizer

Xinyun Zhao

Nick Frederick

Reece Cole

Department of Computer Science and Engineering
Michigan State University

Spring 2018



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



LIVE SUPPORT

WelcomeRegister

Login

User Name:

Password:

LOGINCANCEL

Underwriting Support: 1-800-238-2934 | Technical Support: 1-800-346-0346 x1850

The information gathered will be used for the sole purpose of providing an insurance rate proposal. Rates are subject to change based on company rate schedules and/or changes to any of the required rating information.


Live Support

Feedback & Comments

Terms of Use and Private Policy



LIFE • HOME • CAR • BUSINESS



LIVE SUPPORT

Photo CategoriesMy profileLogout

Environment

Mockup Options

HOUSING

OFFICE

OUTSIDE

RESTAURANT

STREET

CLICKABLE

CLICKABLE

CLICKABLE

CLICKABLE


Underwriting Support: 1-800-238-2934 | Technical Support: 1-800-346-0346 x1850

The information gathered will be used for the sole purpose of providing an insurance rate proposal. Rates are subject to change based on company rate schedules and/or changes to any of the required rating information.

Live Support

Feedback & Comments

Terms of Use and Private Policy



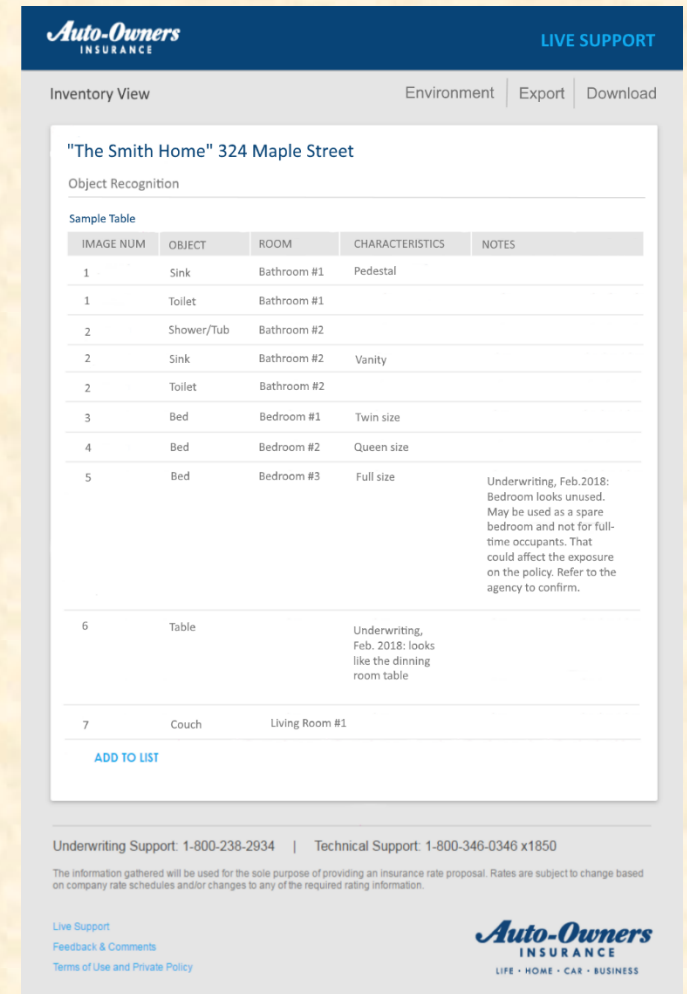
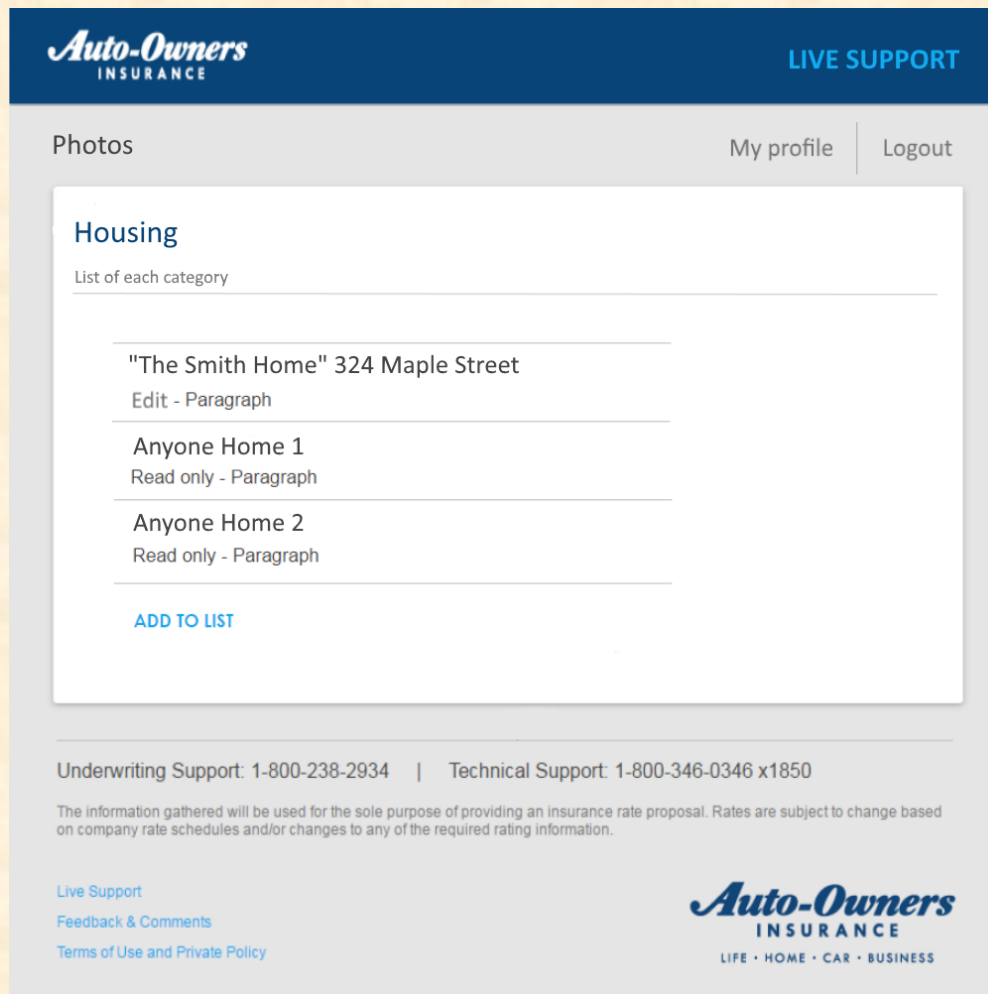
LIFE • HOME • CAR • BUSINESS

The Capstone Experience

Team Auto-Owners Project Plan Presentation

4

Screen Mockup: Web Application



Screen Mockup: Web Application

Auto-Owners
INSURANCE

LIVE SUPPORT

Photo Edit


Environment

My profile

Logout

Photo1

Edit



Information

Photo Name:

Upload User Name:

Upload Time:

Category:

Description:

SAVE

CANCEL

Underwriting Support: 1-800-238-2934 | Technical Support: 1-800-346-0346 x1850

The information gathered will be used for the sole purpose of providing an insurance rate proposal. Rates are subject to change based on company rate schedules and/or changes to any of the required rating information.

Live Support

Feedback & Comments

Terms of Use and Private Policy

Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS

Auto-Owners
INSURANCE

LIVE SUPPORT

Item Edit

Environment

My profile

Logout

Item1

Edit




Image Number:

Object:

Room:

Characteristics:

Notes:

Link:

Accuracy:

SAVE

CANCEL

Underwriting Support: 1-800-238-2934 | Technical Support: 1-800-346-0346 x1850

The information gathered will be used for the sole purpose of providing an insurance rate proposal. Rates are subject to change based on company rate schedules and/or changes to any of the required rating information.

Live Support

Feedback & Comments

Terms of Use and Private Policy

Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS



Screen Mockup: VR Menu

Auto-Owners **INSURANCE**

HOUSING

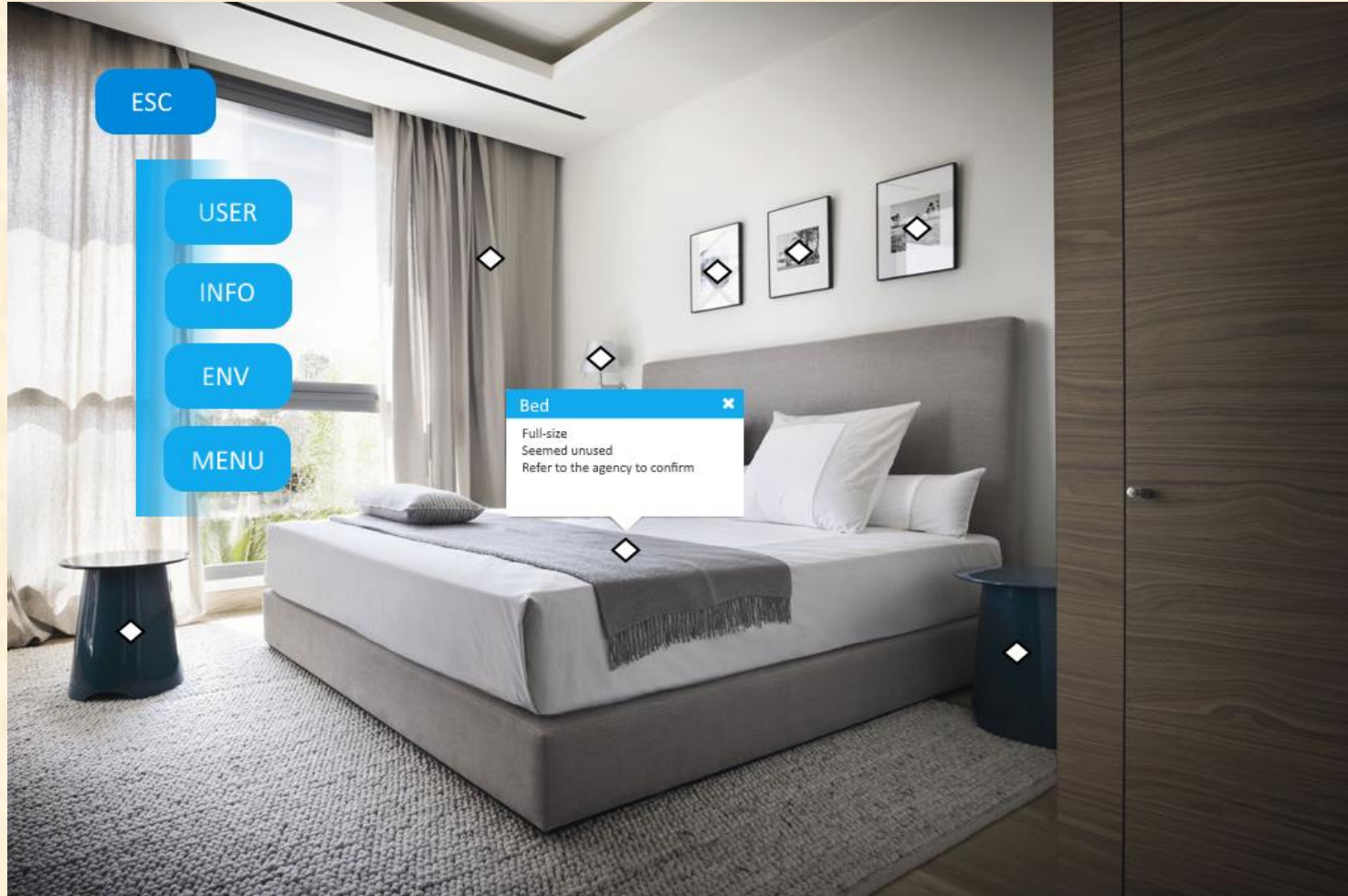
OFFICE

RESTUARANT

OTHERS



Screen Mockup: VR User Interface

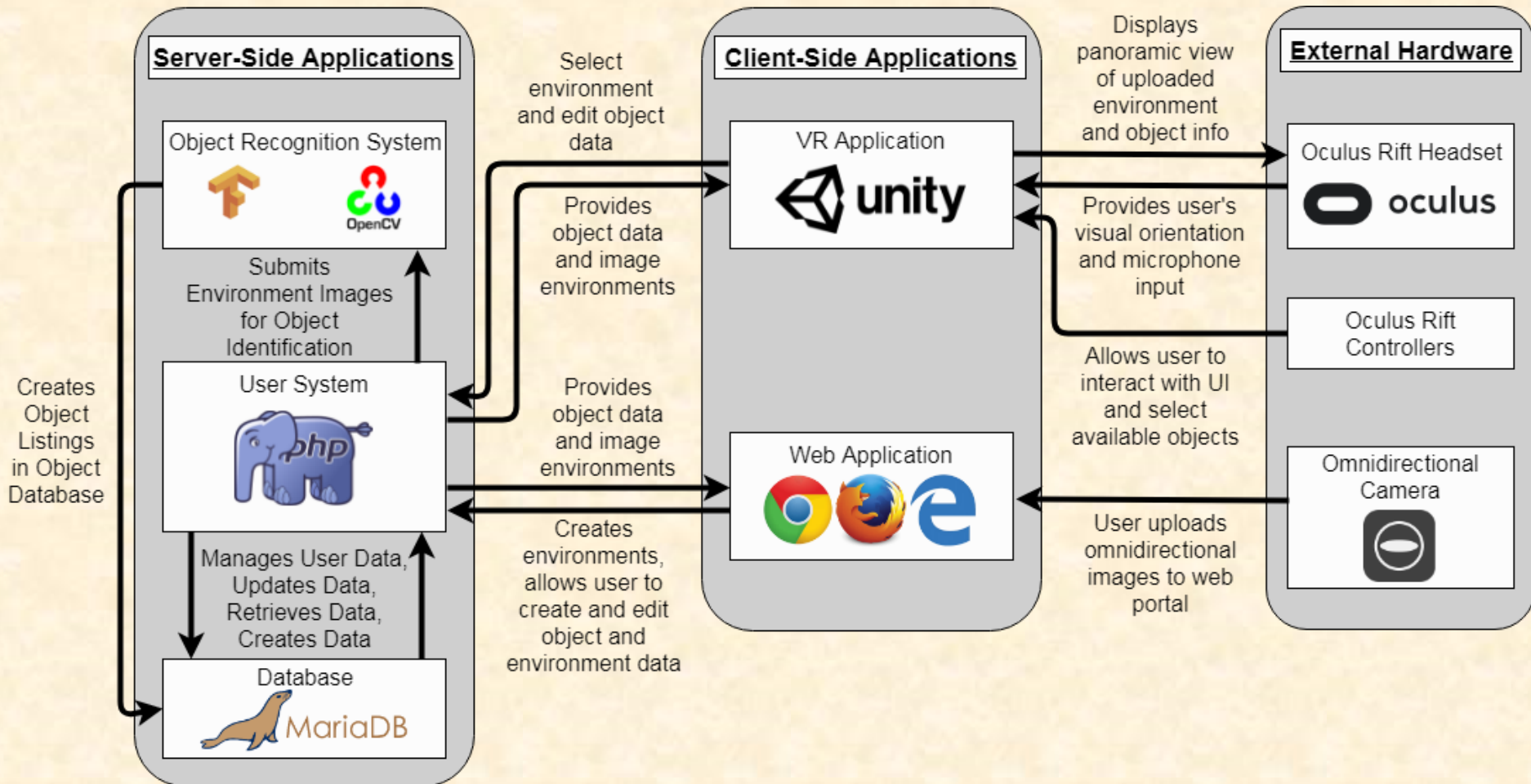


Technical Specifications

- 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?

?

?

?

?

?

?

?

?

?

