

**MICHIGAN STATE**  

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**U N I V E R S I T Y**

# Project Plan Presentation

## 3D Scene Reconstruction of Vehicle Accidents

### The Capstone Experience

#### Team CSAA Insurance Innovation

Owen D'Aprile

Lisa Lipin

Varsha Narmat

Kaan Salt

Angelo Savich

Wendy Wu

Department of Computer Science and Engineering

Michigan State University

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*From Students...  
...to Professionals*

# Functional Specifications

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- Reduces the amount of time and work required to analyze any damages on the car
- Helps customers understand and visualize how the analysts reached their conclusions
- Helps client and customers decide next steps
- Reinforces company's primary objective: improving road and traffic safety



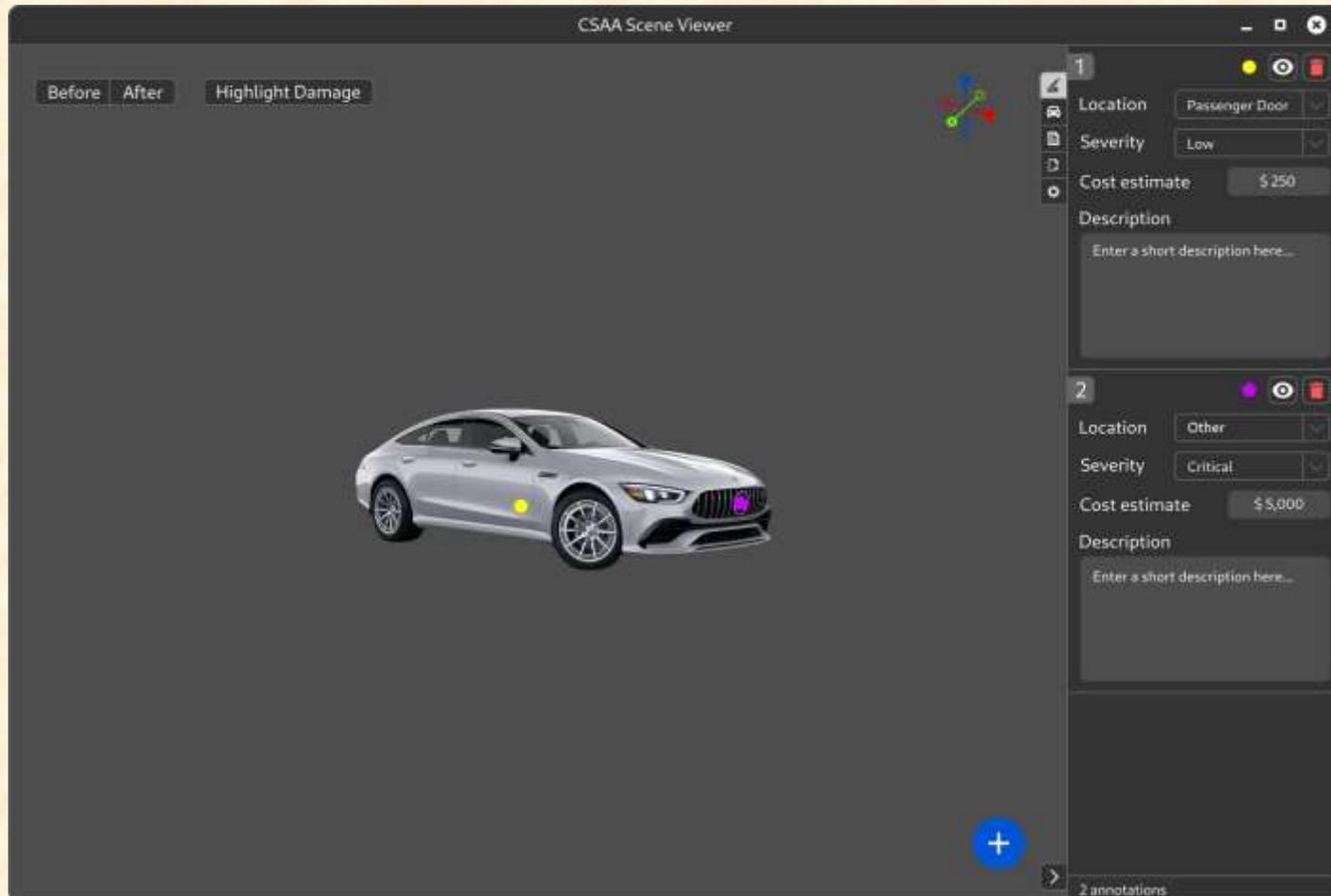
# Design Specifications

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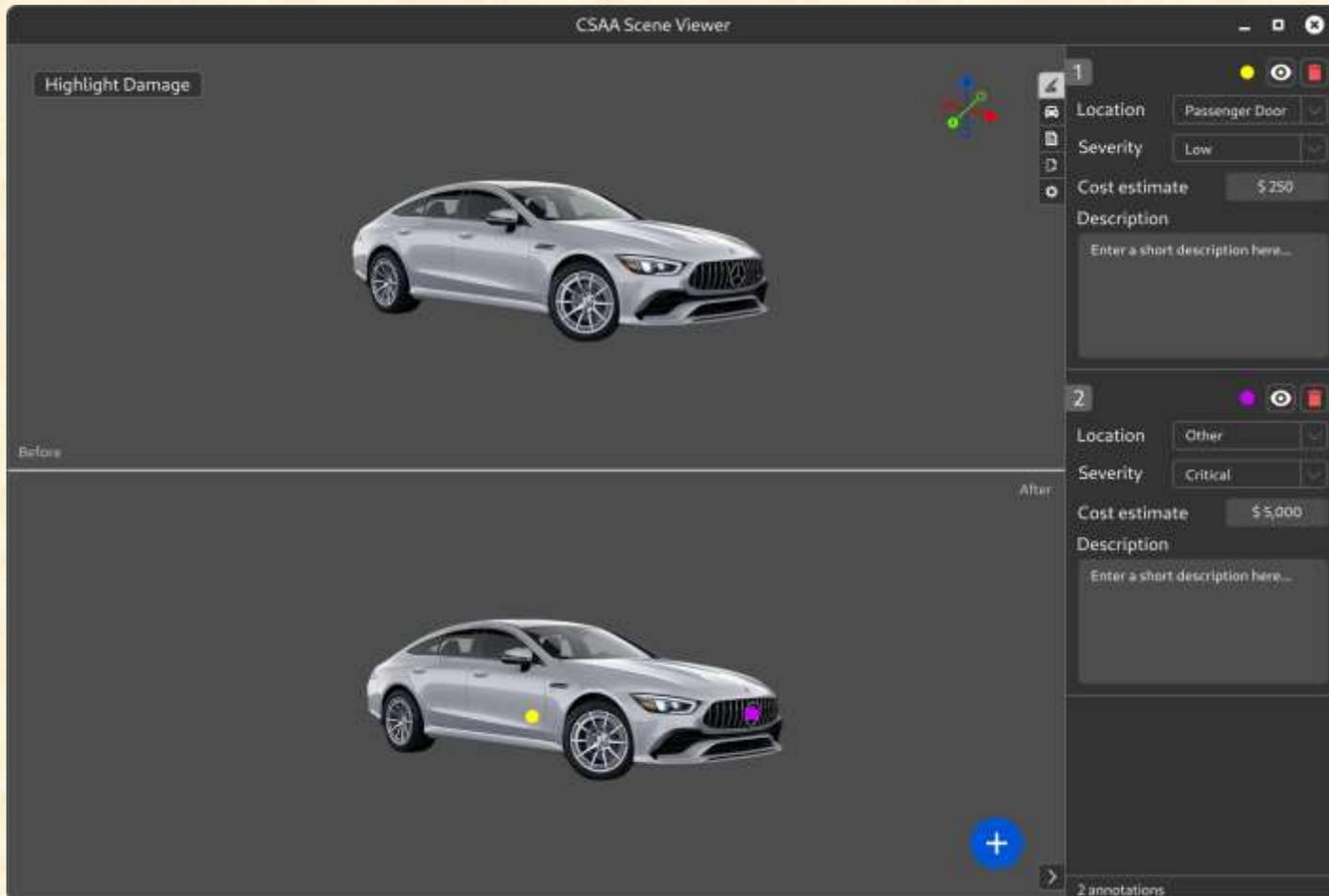
- Provide a method for creating a 3D model of a crash scene from a video
- Aid adjusters in analyzing a crash scene
- Provide tools to annotate the scene
- Showcase potential ideas to client for a future deployment



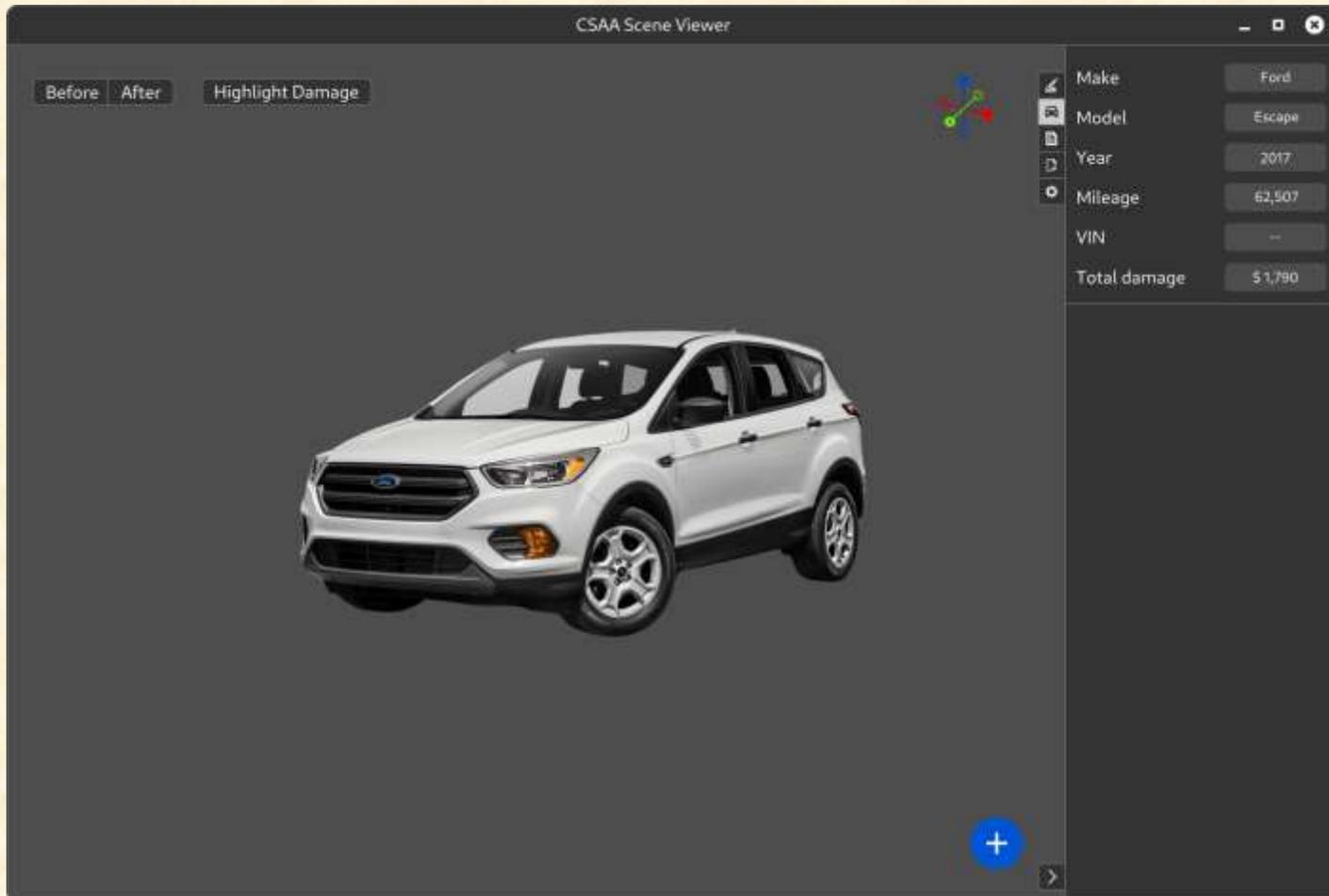
# Screen Mockup: Before/After View



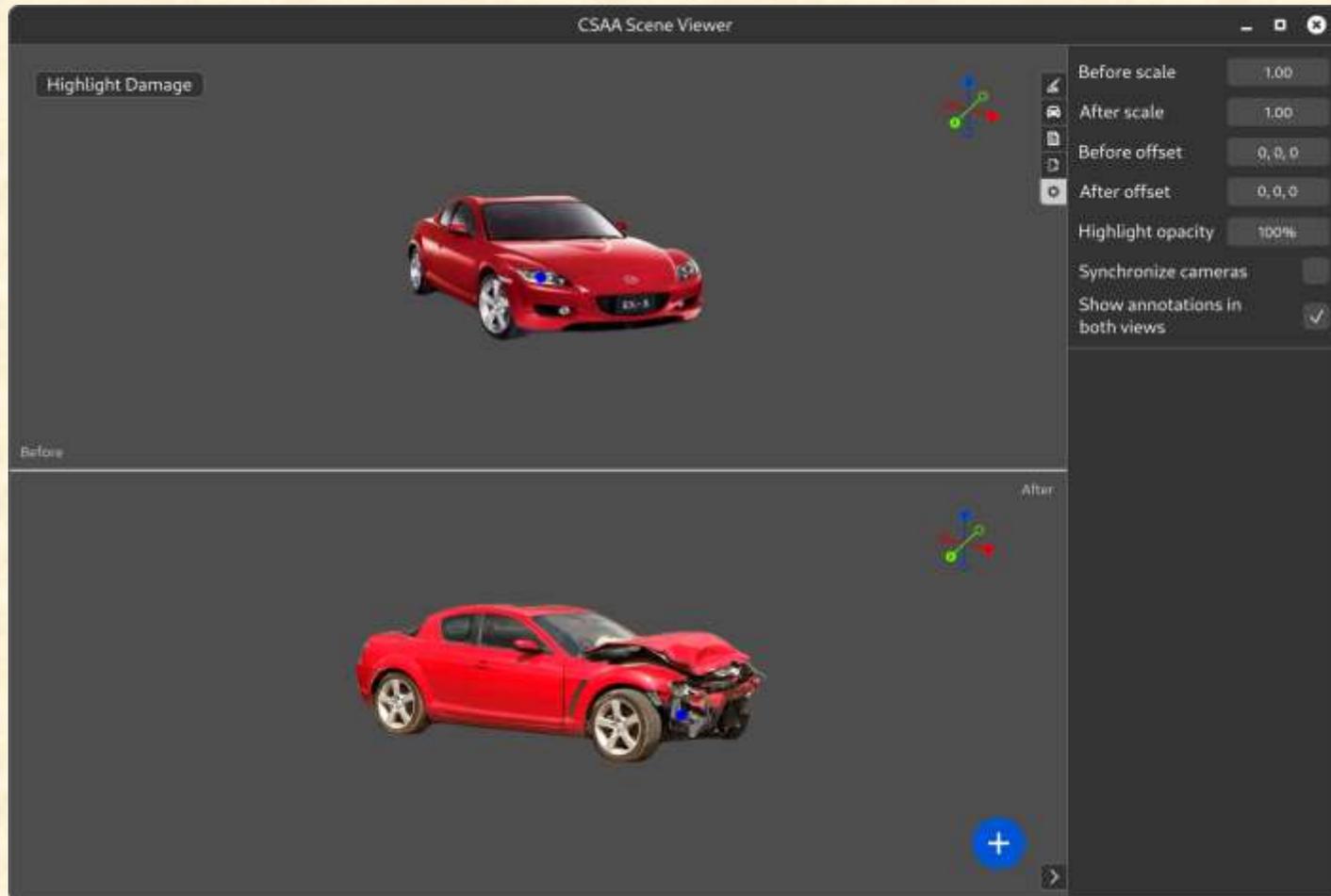
# Screen Mockup: Stacked View



# Screen Mockup: Vehicle Sidebar



# Screen Mockup: Properties Sidebar

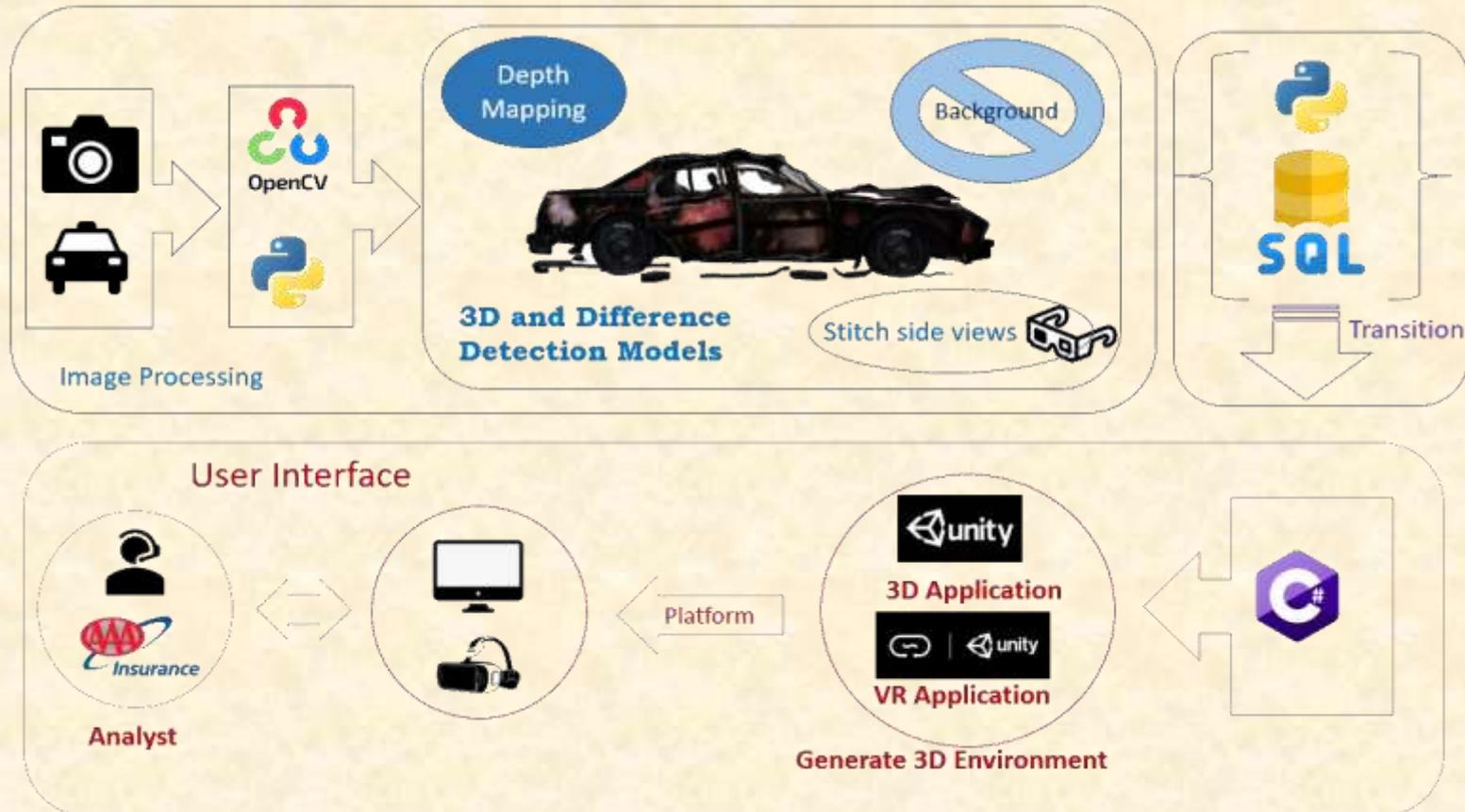


# Technical Specifications

- Development
  - Unity and C#
    - UI Bound to Model.
    - Server Requests
  - Python Server
    - Mp4 to CV to OBJ
  - SQL Server
- Production
  - Target: Windows; OS independent
  - Unity and C#
  - Python Server and SQL Server



# System Architecture



# System Components

- Hardware Platforms
  - Windows; OS Independent
- Software Platforms / Technologies
  - Unity and UI Toolkit
    - User Video Requirements
  - Python Server (Dockerized)
    - Machine Learning
      - ❖ Sci-Kit and OpenCV
    - DB Asset Access



# Risks

## **Combining frontend and backend**

Description: We need a smooth transition from our backend to our frontend so the program can work seamlessly.

Mitigation: We are testing a C# server that handles translation between requests and the Python machine learning model.

## **Refining the base model**

Description: The depth maps created by the model has some inaccuracies as we test out different input images to the model.

Mitigation: As we try out more data and input images we might discover new bugs and edge cases that will need to be refined and fixed.

## **Unity UI toolkit in pre-release**

Description: Our UI implementation uses Unity's UI Toolkit which currently is in pre-release.

Mitigation: If UI Toolkit does not work out for the project we will revert back to Unity UI.

## **Limited Model Accessibility for Feature Development and Testing**

Description: Finding vehicle 3D models can be challenging as there is no easy way to access such a 3D model for the comparison of any damaged vehicle.

Mitigation: Finding the most popular daily driver cars 3D models in the U.S. will give us a much better chance of ensuring that the damaged vehicle can be compared.



# Questions?

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