



TEAM 1 – VR TEXTING & DRIVING

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PROJECT OVERVIEW

- Sponsored by Erie Insurance
- Android app to show dangers of texting while driving
- Google Cardboard VR
 - Immersive experience



Cardboard VR device

Review of Requirements

Project Name: Virtual Reality---Texting While Driving			
User Requirements		System Requirements	
Req ID	Description	Req ID	Description
UF-A	The application should present various scenarios that display a distracted driver, and give the user the ability to overcome the potential negative outcome.	SF-A-01	The system should provide three possible solutions for every decision presented.
		SF-A-02	When the car passes a trigger, a scenario should be presented.
UF-B	The user should control a passenger in a vehicle driven by a person engaging in dangerous activities.	SF-B-01	The user should have a first person perspective during the experience, and can use motion inputs to position the camera.
		SF-B-02	The user will use the button on the cardboard headset to interact with objects in the environment, and select choices during scenarios
		SF-B-03	Double clicking the input button will re-center the camera to the front of the car
UF-C	The system should feature multiple outcomes that can occur due to the driver being distracted.	SF-C-01	The system should have four types of outcomes that can occur within the environment, including hitting an object, running off the road/lanes, speeding/slowing down, and missing traffic lights.
UF-D	The user should be able to interact with their environment between scenarios presented to them	SF-D-01	The user should be able to open/close glove box, interact with objects in the glove box, drink a drink in the cup holder, open/close the window, and adjust the radio.

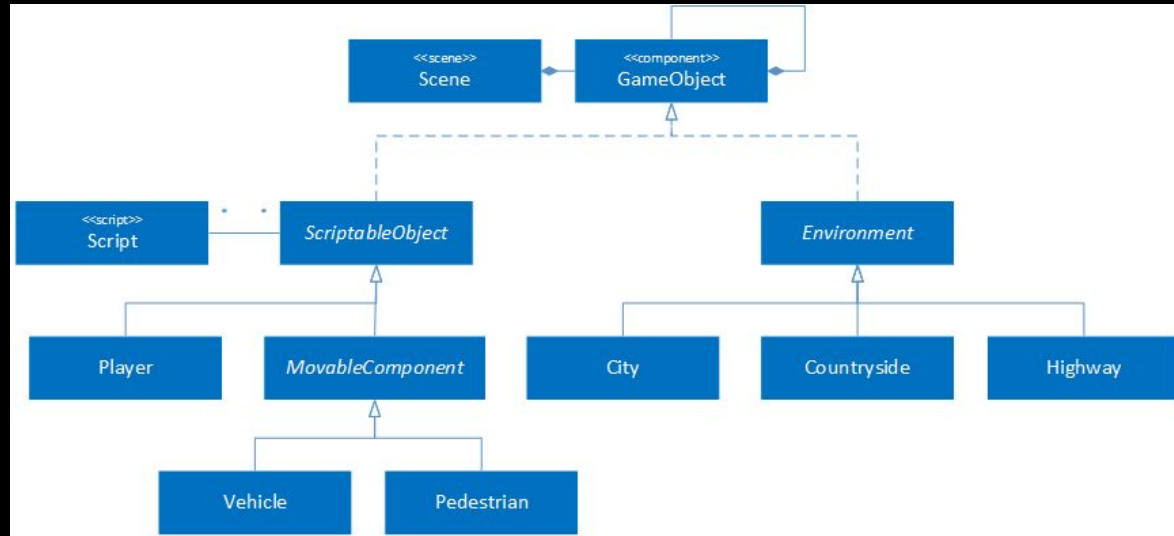
UF-E	User should be able to modify experience settings	SF-E-01	The system will provide options to the user including changing weather effects and time of day.
UF-F	The driver should be controlled by an AI and should engage in various tasks.	SF-F-01	The driver AI should drive, text, converse with user, and look out window.
UO-01	The application should be developed for modern Android devices.	SO-01-01	The system should be targeted for Android 5.1.1 "Lollipop" for phones with hardware specifications of the Samsung S5 and up
UO-02	The application should be developed for cardboard VR use.	SO-02-01	The system will utilize the Google VR SDK to display two images through the cardboard.
UO-03	The application must feature ERIE Insurance branded paraphernalia advertising the company throughout.	SO-03-01	Erie Insurance logos will be placed on buildings, billboards, bumper stickers, and air fresheners.

UP-01	The system should run at an acceptable frame rate suitable for virtual reality use.	SP-01-01	The application should run at a minimum of 30 frames per second.
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Exploratory Studies

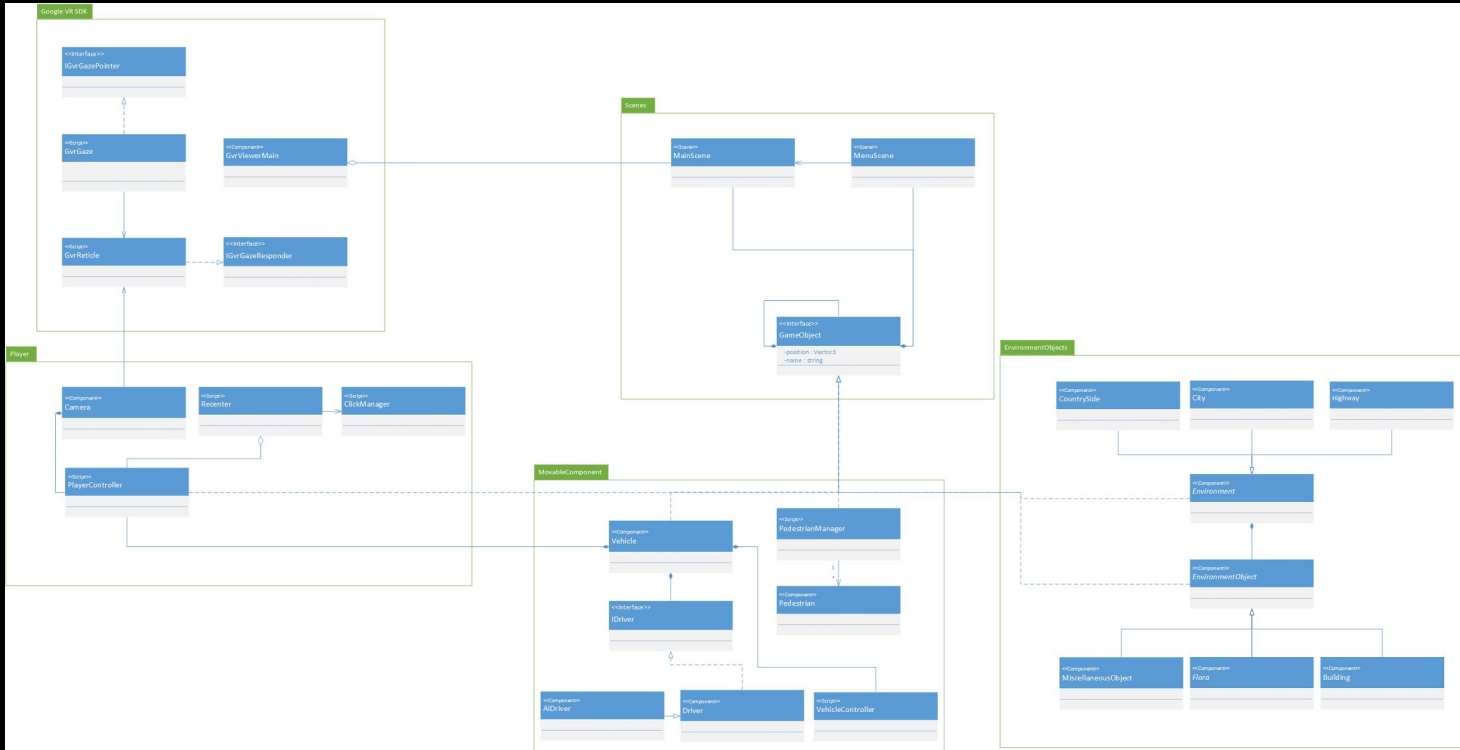
- Erie Insurance is allowing us to use Unity 3D
- Unity Test Tools will aid us in creating & executing tests
 - Unit testing
 - Integration testing
- The Unity Asset Store has been invaluable to us in aiding our rapid prototyping
- Explored new approach to architecture

Architecture Design Alternatives & Decision Rationale

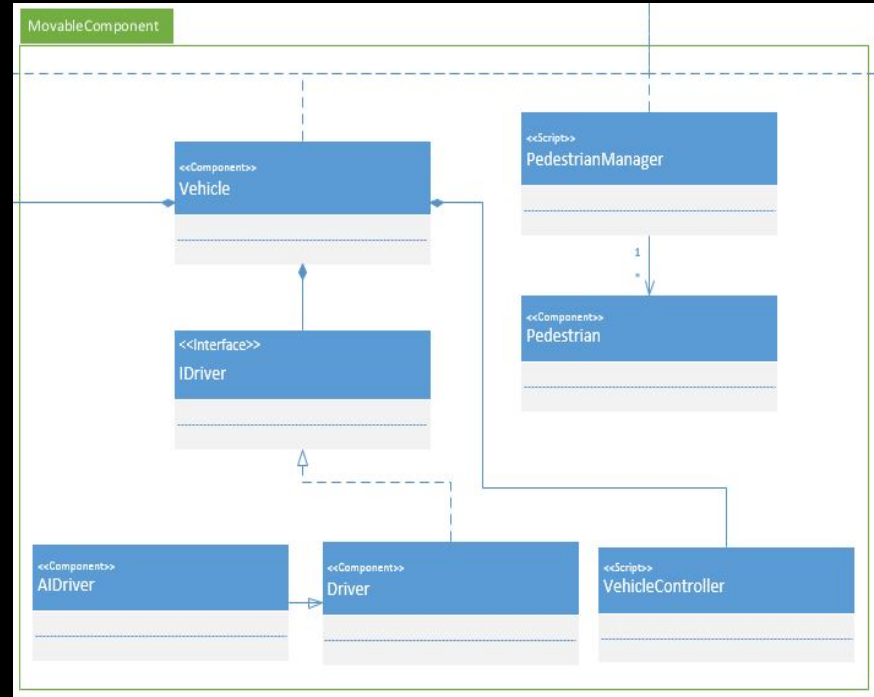
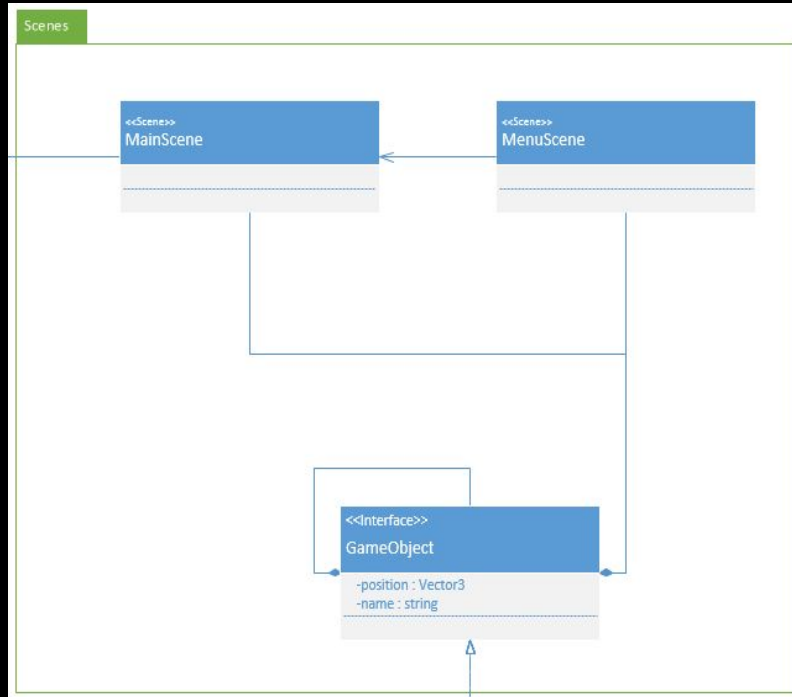


Component-based architecture

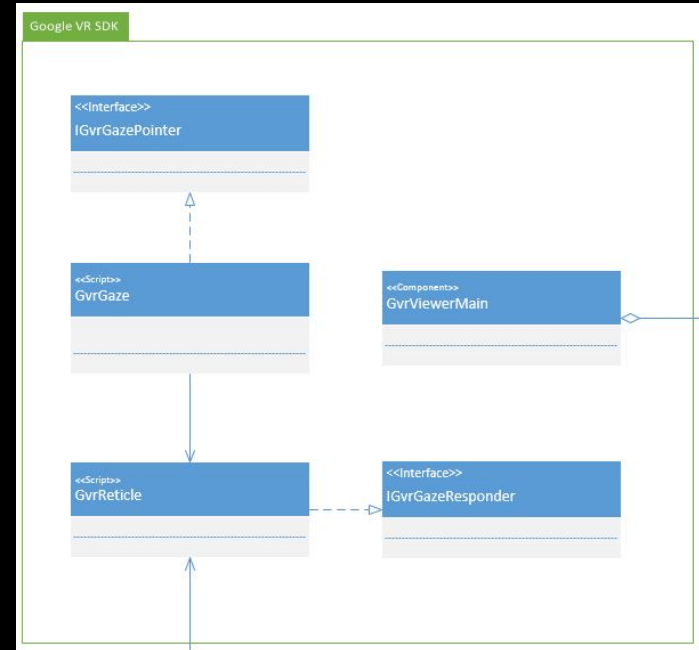
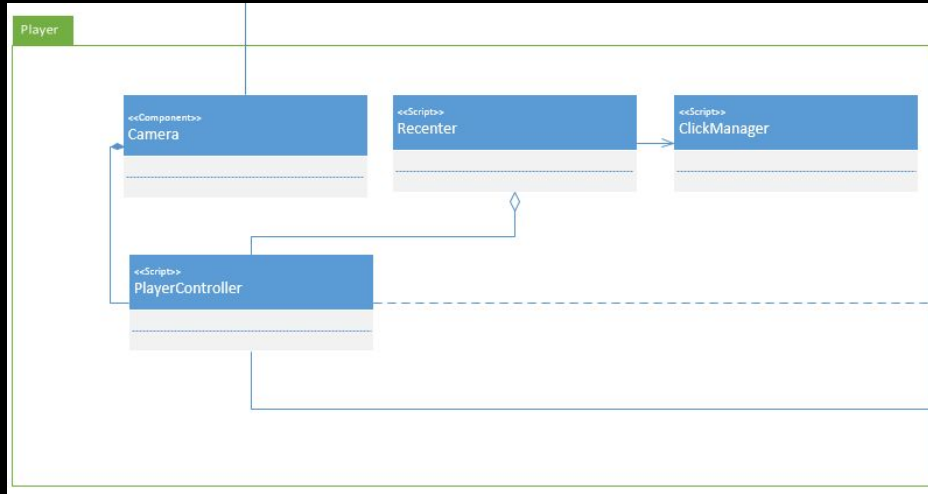
Structural Design



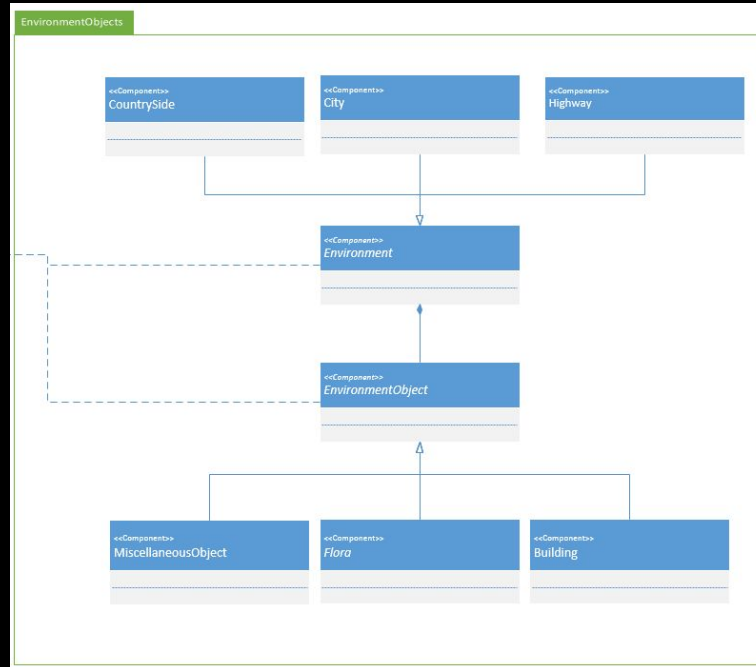
Structural Design



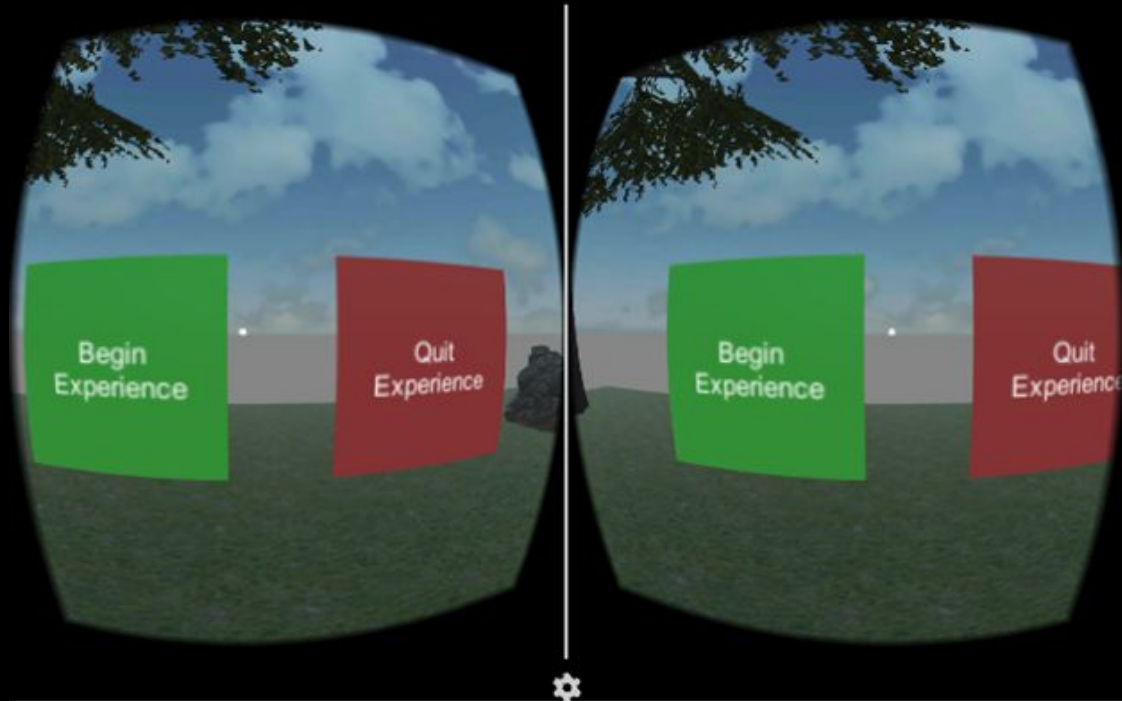
Structural Design



Structural Design



User Interface



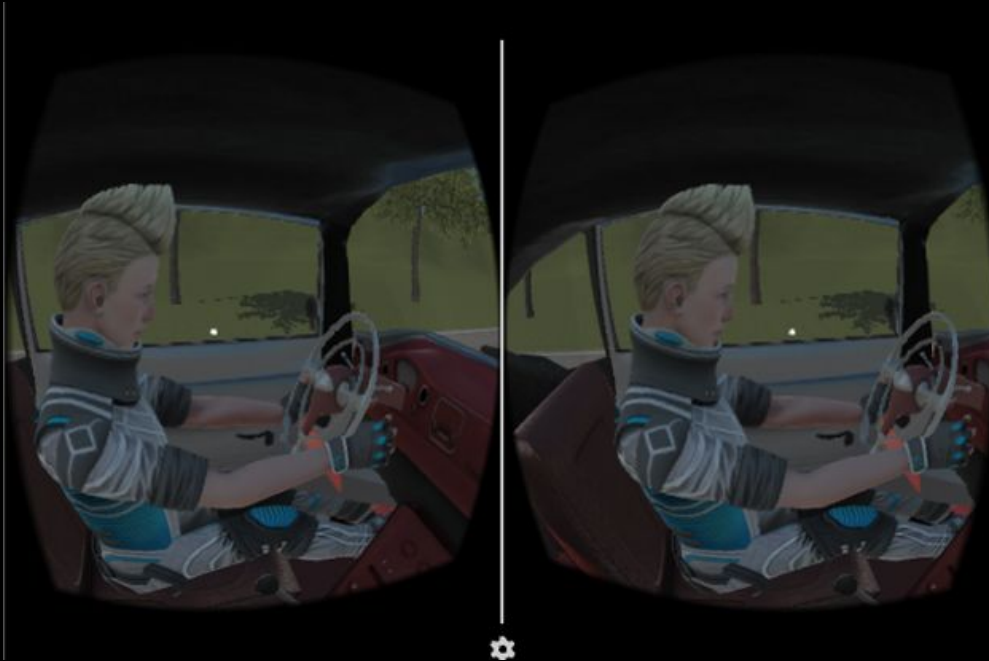
Current main menu

User Interface



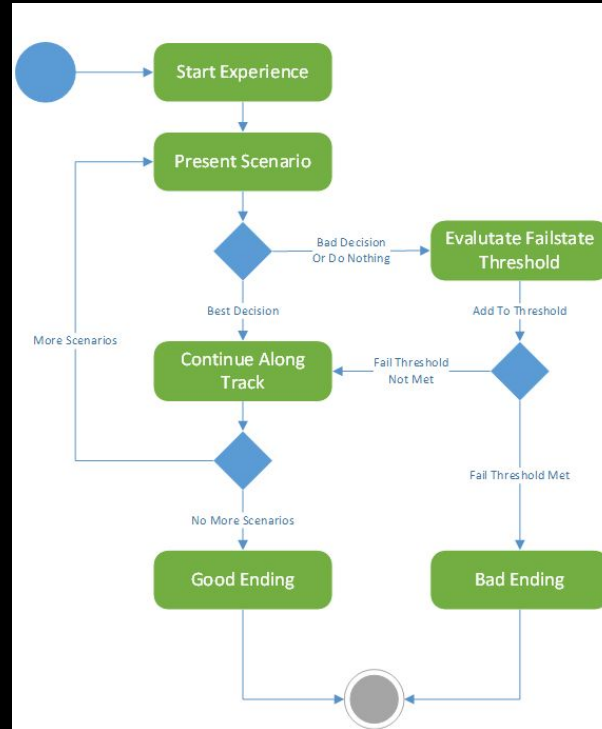
View as the passenger

User Interface



Temporary
driver

Behavioral Design



Activity diagram describing a scenario

Test Case List

Test Suite Name Scenario Interaction		
Test Cases in this Test Suite		
Test Case ID	Test Stage	Test Case Description
TC-002	System	Scenario Triggers
TC-003	Integration	Possible Scenario Solutions
TC-004	Unit	Camera Rotation
TC-006	System	Bad Scenario Outcomes

Test Suite Name Environment Interaction		
Test Cases in this Test Suite		
Test Case ID	Test Stage	Test Case Description
TC-001	Unit	Camera Recentering
TC-005	Integration	Environment Interaction
TC-008	System	Weather Modification
TC-009	Acceptance	AI Driver Actions

Test Suite Name System Performance		
Test Cases in this Test Suite		
Test Case ID	Test Stage	Test Case Description
TC-010	Acceptance	Hardware Validation
TC-011	Acceptance	Double Image VR Display
TC-012	Acceptance	System Frame Rate

Test Cases

Project Name:	Virtual Reality---Texting While Driving	
Test Suite	TS-002: Environment Interaction	
Test Case ID	TC-001 (Unit Test)	
What To Test	Camera Recentering	
Test Data Input		
Expected Result	Camera resets to the default view looking out of the windshield of the vehicle upon two rapid clicks of the input button.	
Traceability	Relevant User Req.(s)	UF-B
	Relevant System Req.(s)	SF-B-03
	Relevant Use Case(s)	UC-002
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Project Name:	Virtual Reality---Texting While Driving	
Test Suite	TS-001: Scenario Interaction	
Test Case ID	TC-004 (Unit Test)	
What To Test	Camera Rotation	
Test Data Input		
Expected Result	Rotating the phone moves the camera in the experience.	
Traceability	Relevant User Req.(s)	UF-B
	Relevant System Req.(s)	SF-B-01
	Relevant Use Case(s)	UC-002
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Test Cases

Project Name:	Virtual Reality---Texting While Driving	
Test Suite	TS-001: Scenario Interaction	
Test Case ID	TC-003 (Integration Test)	
What To Test	Possible Scenario Solutions	
Test Data Input	None	
Expected Result	3 solutions appear in the user's field of view during the occurrence of a scenario.	
Traceability	Relevant User Req.(s)	UF-A
	Relevant System Req.(s)	SF-A-01
	Relevant Use Case(s)	UC-003
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Updates on System Progress

- VR rendering
 - Player movement inside of a car
 - Interaction with objects
- Main menu has been implemented
- Small city environment
 - Car drives in a loop on the road
- Driver added into car
 - Animation is in progress
- Scenario triggering script has been written



WRAP UP

Demo &
Questions?