Project Plan Presentation
Yard Wars: Weathering the Storm
The Capstone Experience
Team Auto-Owners
Brandon Byiringiro
Graham Cornish
Carolus Huang
John Reichenbach
Department of Computer Science and Engineering
Michigan State University
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Functional Specifications

• Storms can cause various amounts of damage to homes and properties
• Trees can help protect or pose greater risk from falling
• Gather data on damage caused or prevented by trees and storms
• Store data in a database and use it for current and future analyses
Design Specifications

• Virtual Reality Application
  ▪ Place trees
  ▪ Simulate storms
  ▪ Collect data

• Database
  ▪ Receive and store data

• Website
  ▪ Display and organize data
Screen Mockup: VR Main Menu

Welcome to
Yard Wars: Weathering the Storm

Presented by:
Auto-Owners
INSURANCE

Please Select a Difficulty

Easy: Unlimited trees and light weather conditions

Custom Difficulty Settings

Start!
Screen Mockup: Custom Storm Menu

Create Your Storm

- Wind
- Rain
- Hail
- Trees

Options:
- Extreme (50+ mph)
- Moderate (0.3 in.)
- Small (0.25 in.)
- Unlimited

Buttons:
- Main Menu
- Save Settings
Screen Mockup: Tree Selection Menu

Select Your Tree

- Type
- Deciduous

Height (feet)
12 ft

Diameter (inches)
15 in.

Explore the Home
Place Tree
Screen Mockup: Fallen Tree Information

- Fallen Tree:
  - Deciduous
  - 20 ft tall, 15 in. diameter
  - Damage: Broken window
  - Cause: Heavy winds
Screen Mockup: Simulation Data Page

<table>
<thead>
<tr>
<th>Simulation Number</th>
<th>Difficulty Level</th>
<th>Rain</th>
<th>Wind Speed</th>
<th>Hail</th>
<th>Number of Trees fell</th>
<th>Fallen Trees Info (TreeID - Damage - Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sim1</td>
<td>Hard</td>
<td>50m</td>
<td>55mph</td>
<td>Small</td>
<td>4</td>
<td>Tree 01 - Low - 2:34 Tree 03 - None - 2:45</td>
</tr>
<tr>
<td>sim2</td>
<td>Easy</td>
<td>15m</td>
<td>7mph</td>
<td>Large</td>
<td>1</td>
<td>Tree 03 - Medium - 4:44</td>
</tr>
<tr>
<td>sim3</td>
<td>Medium</td>
<td>35m</td>
<td>29mph</td>
<td>Large</td>
<td>2</td>
<td>Tree 01 - High - 3:01 Tree 02 - Medium - 3:05</td>
</tr>
<tr>
<td>sim4</td>
<td>Custom</td>
<td>35m</td>
<td>20mph</td>
<td>Small</td>
<td>1</td>
<td>Tree 05 - None - 5:01</td>
</tr>
<tr>
<td>sim5</td>
<td>Custom</td>
<td>5m</td>
<td>3mph</td>
<td>Medium</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>sim6</td>
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<td>50m</td>
<td>0mph</td>
<td>Small</td>
<td>0</td>
<td>N/A</td>
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<tr>
<td>sim7</td>
<td>Custom</td>
<td>25m</td>
<td>29mph</td>
<td>Medium</td>
<td>1</td>
<td>Tree 07 - High - 3:20</td>
</tr>
<tr>
<td>sim8</td>
<td>Custom</td>
<td>60m</td>
<td>45mph</td>
<td>Large</td>
<td>6</td>
<td>Tree 02 - Low - 2:32 Tree 03 - Low - 2:45</td>
</tr>
</tbody>
</table>
Technical Specifications

• Virtual Reality Application
  ▪ Accessed through Oculus Rift headset
  ▪ Developed through Unity, C#, and XR Interaction Toolkit

• Database
  ▪ Developed in MySQL
  ▪ Hosted on MSU Rack Server

• Website
  ▪ Requires authentication
  ▪ Developed in Sublime Text using PHP, Bootstrap, CSS, HTML, and JavaScript
  ▪ Hosted on MSU Rack Server
System Architecture

User → Oculus Rift

VR Application

Development Environment

Database

Website Development Environment

Sublime Text

Website

Website Development Resources

C# XR Interaction Toolkit

VR Application Resources

CSS HTML JS
System Components

• Hardware Platforms
  ▪ Oculus Rift
  ▪ MSU Rack Server

• Software Platforms / Technologies
  ▪ Unity Game Development
  ▪ XR Interaction Toolkit
  ▪ Sublime Text
  ▪ PHP/Bootstrap/CSS/HTML/JavaScript
  ▪ MySQL
Risks

- Game to Database Data Transfer
  - Data needs to be gathered and sent from the VR application to the database
  - Research existing ways to connect Unity to MySQL
- Tree Placement in VR
  - Trees of different types and dimensions need to be able to be placed by users with the Oculus controllers
  - Adopt XR scripts to implement grabbable objects
- Storm Simulation Algorithm
  - An algorithm for various storm types needs to be developed to handle various storm types and interact with the home and trees
  - Research data from real storms and construct equations and models that will be implemented in the simulation
- Inspecting Residence After Simulation
  - Users need to be able to inspect the residence and damages after the simulation
  - Adopt XR scripts for free movement for inspection
Questions?