RYERSON UNIVERSITY

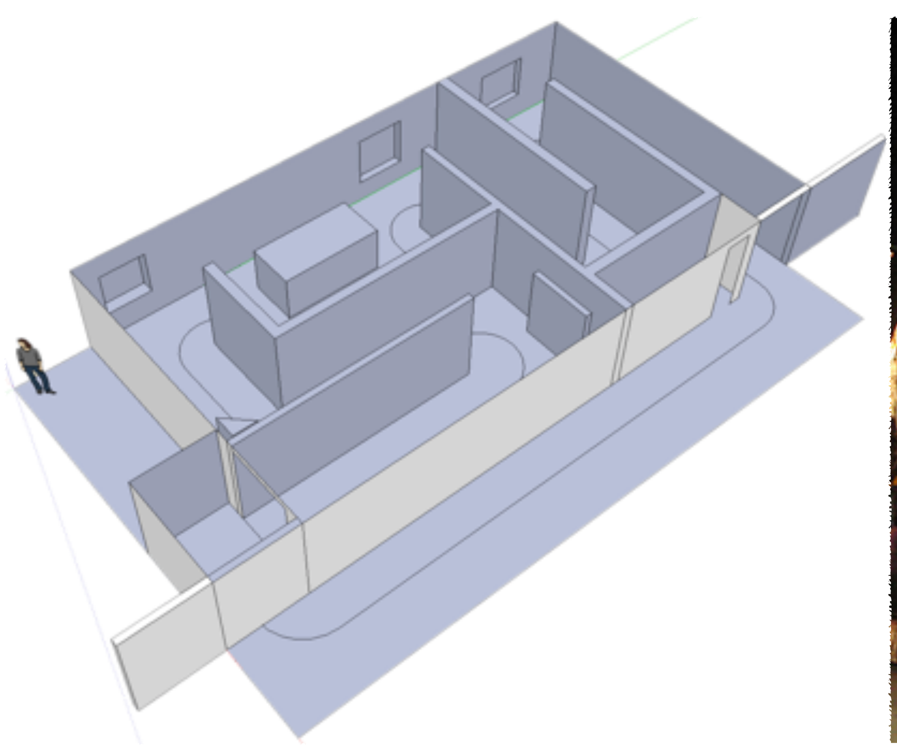
INTERACTIVE SHOW ENHANCEMENT FOR CARNIVAL DARK RIDE

By: Imtiaz Miah, Mirko Miljevic, Rob Kipping

FLC: Dr. Kamran Raahemifar, PhD, PEng

Advisor: Kathryn Woodcock, PhD, PEng

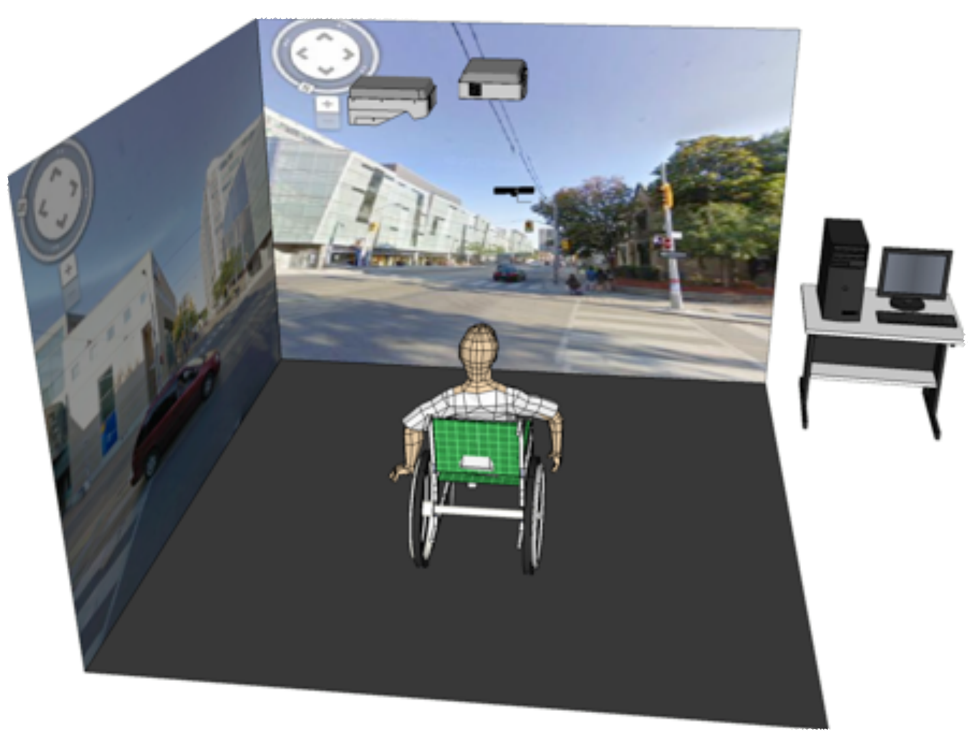
The "Haunted Mansion" is a travelling "dark ride" attraction featured at many carnival venues across the world, including the Canadian National Exhibition in Toronto, Ontario and the Calgary Stampede in Calgary, Alberta.



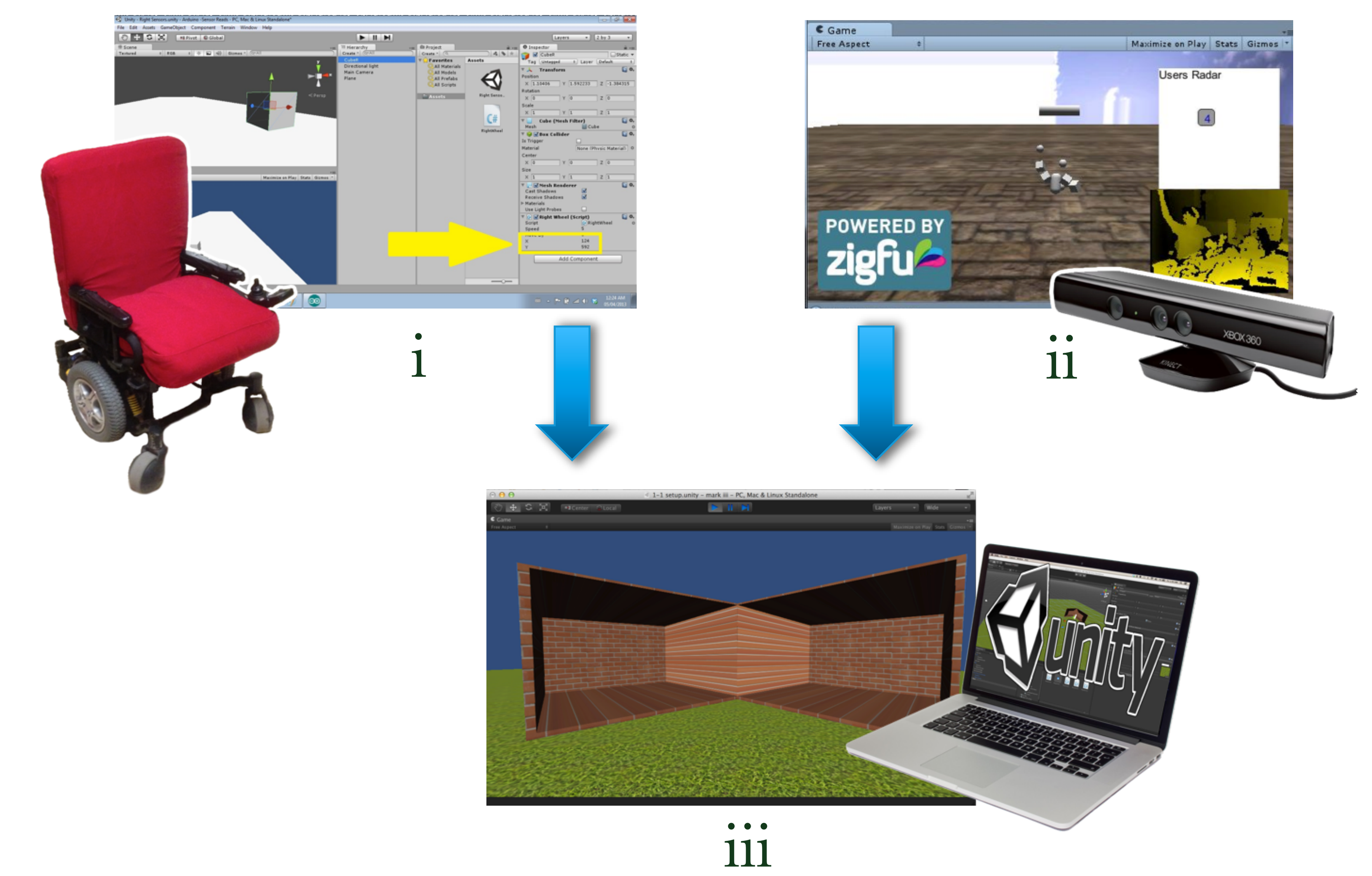
MOTIVATION

By replacing styrofoam "tricks" with floor-to-ceiling projection screens and Microsoft Kinect cameras, we can entertain riders in order to keep them within their ride vehicles, resulting in less injury and damage to the ride.

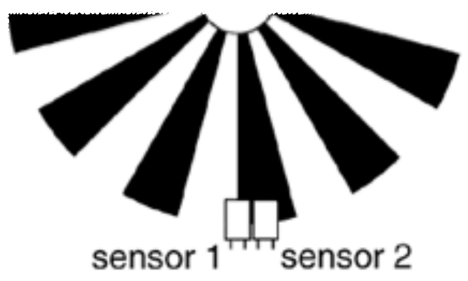
The project is composed of three distinct components:



i) An electronic system for tracking the specific location of the ride vehicle. For the demo, an electric wheelchair is used.
ii) A Kinect camera and associated software that detects gestures and actions of the riders.
iii) A 3D video-game engine that will generate video for the projection screens



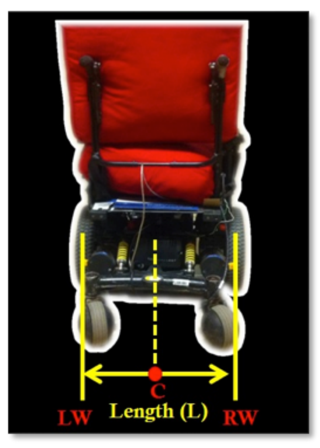
APPROACH

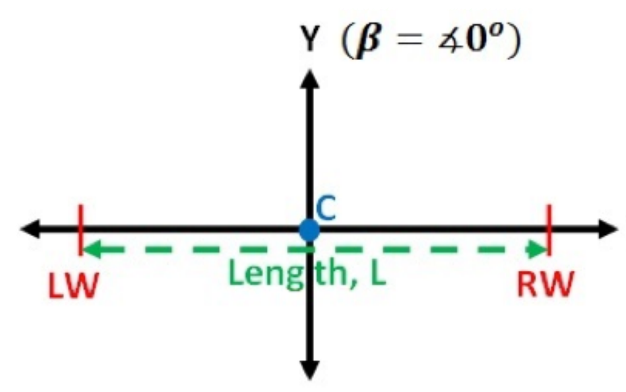


i) Position Tracking

Tracking the position of the wheelchair is performed by using optical disks attached to the wheels. By using two sensors, direction of the movement of the wheel can be calculated using an Arduino.

Data gathered from these sensors is used to decipher the position the chair moves based off of the width of the chair.



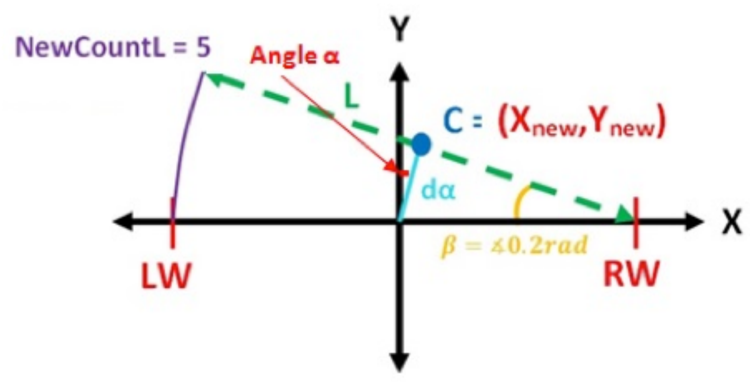


Movement of the chair is calculated by measuring the angle that changes between the wheels.

$$ARC = NewCountL \times d = 5 \times 3 = 15cm$$

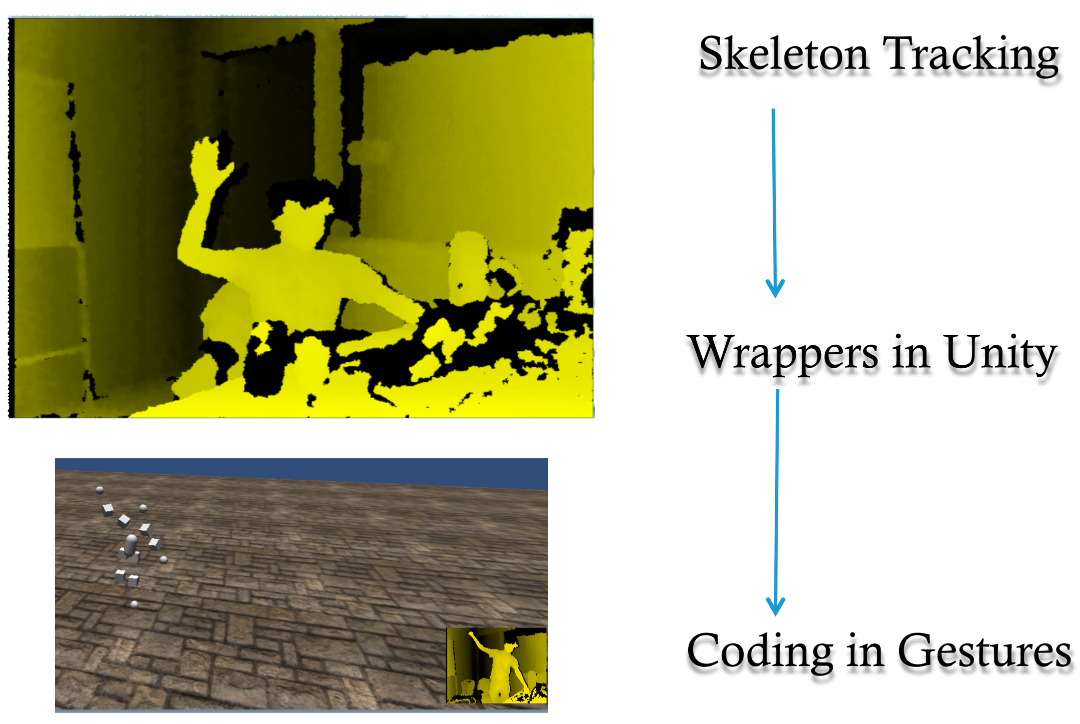
$$\beta = \frac{ARC \times 2\pi}{Circumference} = \frac{ARC \times 2\pi}{2\pi L} = \frac{ARC}{L}$$

$$\therefore \beta = \frac{15cm}{75cm} = 0.2\ radians$$



ii) Gesture Recognition

Gesture recognition is performed using a gesture recognition wrapper imported into the video game engine. The Microsoft Kinect SDK's skeletal tracking features are analyzed by the wrapper, and code is created to use this wrapper to detect specific gestures like ducking or waving.



iii) Video Generation and Skewing

The 3D game engine software Unity3D takes in the above information and uses it to skew a virtual set to be projected onto the screens. A specially written script skews the room to create the effect of a larger room existing beyond the screen.