Visualization via Virtual Reality

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Our Mission

- Introduce higher level geometrical concepts to younger audiences
- What's the best way to do that?
  - Video games
  - Oculus Rift virtual reality headset
- Math carnival

First Project: Roller Coaster

Our goal was to design a klein bottle "roller coaster" to introduce to kids the concept of

- Orientability in 3D space

in a fun, interesting way.

more about Unity

- Free game development software; code in C# or JavaScript

- Built-in technical features like
  - Gravity, friction
  - Rotation system based off of quaternions

Orientable surfaces

- A surface is *orientable* if you can consistently define a vector normal to the surface at every point
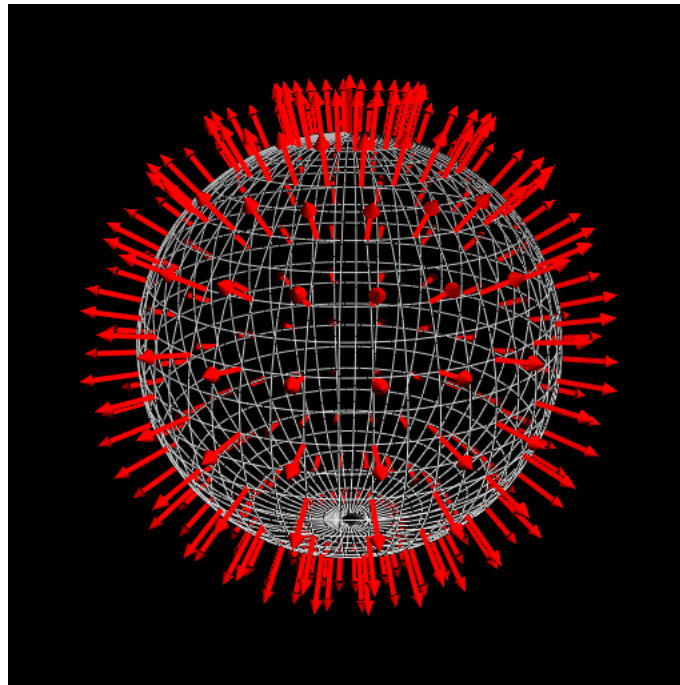

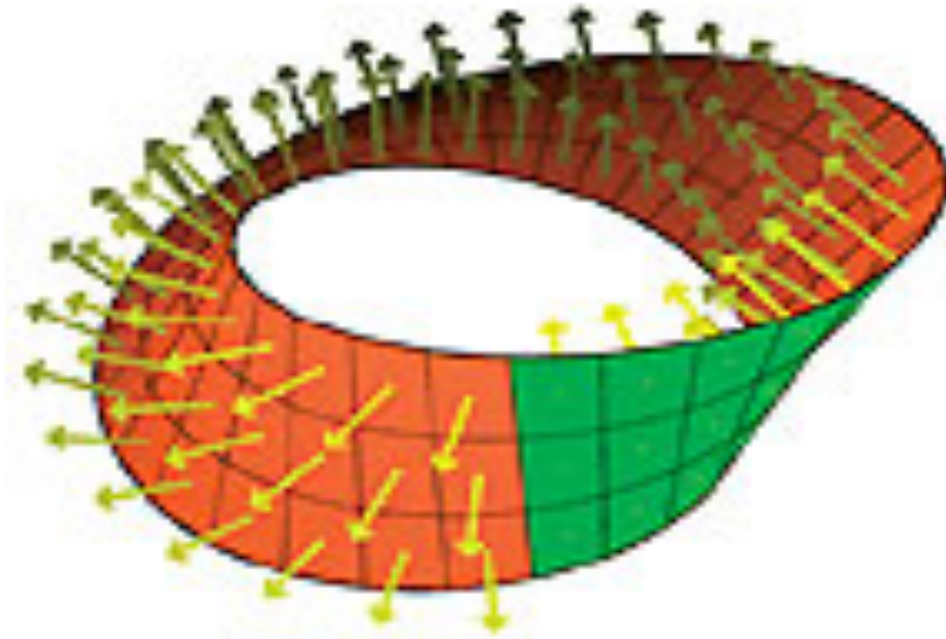Image: http://trecs.se/sphere.php

Non-orientable surface

Image: https://ec.europa.eu/research/rtdinfo/special_as/
print_article_813_en.html

Future/ongoing projects

- Visualizing the "double-tipping nullhomotopy"
  - Thanks to Dr. Daniel Ramras, IUPUI

- Hyperbolic geometry game
  - darts

- Come try out the Oculus!