Art and Science in Virtual Worlds

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Link to Example Projects

The course “Art and Science in Virtual Worlds” is an integrative general education offering that bridges the Natural Sciences and Arts. This multidisciplinary course introduces students to the theories, concepts, and technologies underpinning virtual worlds. By leveraging the open-source WebVR framework A-Frame, students are empowered to create immersive virtual objects and spaces that align with their unique narratives and storylines. Throughout the course, students delve into the implementation of virtual physics, exploring object interactions, lighting, material effects, and animation. This hands-on approach not only enhances their understanding of physical sciences but also fosters creativity and innovation in the digital arts. The course exemplifies the synergy between narrative arts and physical sciences, providing a comprehensive learning experience that prepares students for the evolving landscape of technologically mediated environments. In recent iterations of the course, students have used generative AI to help with both the creative writing aspects and the technical development, to mixed levels of success.

Course created 2017 as part of PSU general education initiatives

- Integrated, Interdisciplinary
- Natural Sciences and Humanities
- Creators: IST, English and Physics Faculty; originally team taught

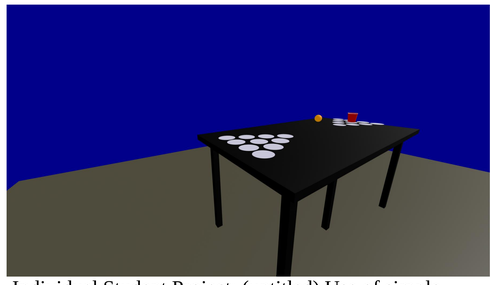
Implementation

- Lecture/Practicum
- Project Based with individual and group Projects, with lots of scaffolding
- Web VR with A-Frame web framework
- Narrative and Visual Arts

Science Themes:

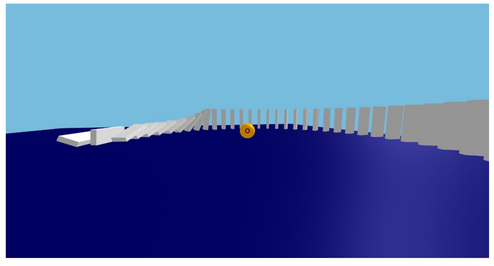
- Problem Solving = Scientific Method
- Spatial Reasoning
- Modeling (animation and physics system)
- Physical Nature of Environment (textures, lighting)

Example Snap Shots

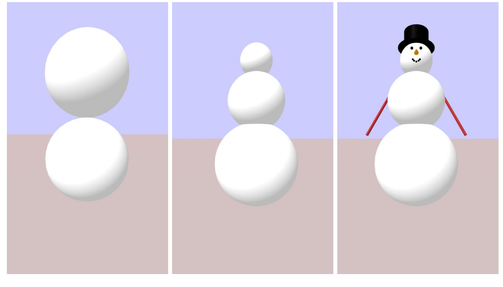


Individual Student Project: (untitled) Use of simple geometric shapes to build a scene

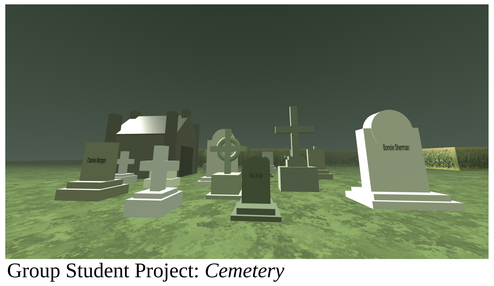
Individual Student Project: *Echos of the Ancients* Includes modded stock environment, avatar, student built creature cabin and campfire



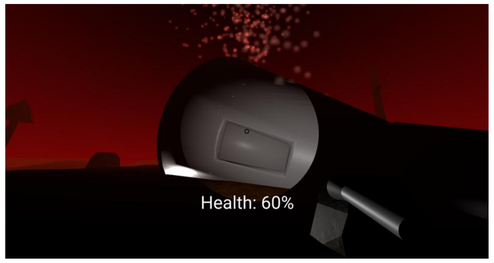
Instructor Demonstration: *Dominoes*, includes JavaScript setup and physics engine demonstration



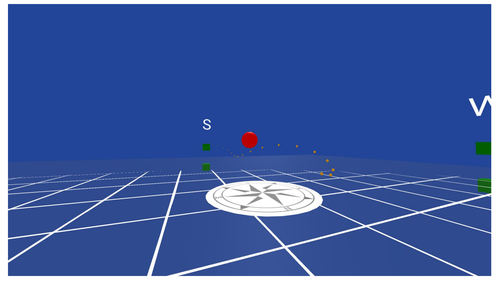
Tutorial: *Do You Want to Build a Snowman*? with early, mid, and end snapshots of a tutorial on object construction from basic shapes.



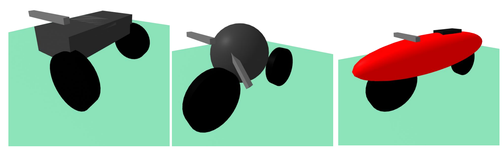
Group Student Project: *Cemetery*



Group Student Project: *Alien Planet* Includes modded stock environment, lighting effects, added special effects, HUD



Student/Faculty Collaboration: Gamified exploration of the motion of electric charges in a static, uniform electromagnetic field.



Faculty Generative AI Demo Project: *A Simple Motorcycle* , A-Frame code with a simple prompt, follow-up prompts, with human intervention.

Important Observations

- Students need scaffolding, encouragement
- Teams must be talent balanced (Tech Wizard, Creative Writer, Tech Writer, Artist, Manager).
- Significant in class practicum time
  - Early semester tutorials
  - Student experimentation time
  - Immediate access to “experts”
- Generative AI can help the creative process
  - Brainstorming, all prompts to be included
  - Especially helpful on individual projects
  - Sometimes things aren’t quite right (AI does not seem to be visually aware)
  - Can be good for creating project “concept art”
  - Experimental: mandatory AI component for some early projects, with tutorial session. This help sets expectations. Instructor having prompts helps with assessment of student contributions.

Acknowledgments

Course Co-Creators:
Dr. Jeffery Stone (IST, lead)
Dr. Nichole Andel (English)
Dr. Michael Gallis (Physics).

Student Honors Projects participants

Game 180N: Liam Ortiz, Poetic Session, Maleeha Bano

Physics 212: Kathryn Silverberg, Aaron Polansky

- **A-Frame** https://aframe.io/
- **Shared examples** https://phys23p.sl.psu.edu/~mrg3/game180n/