



SAN DIEGO STATE UNIVERSITY

Utilizing 3D Video Game Technology for an Immersive Laboratory Experience

Department of Computer Science

Co-Authors: Mark A. Thompson Jr. and Abhishek Sood

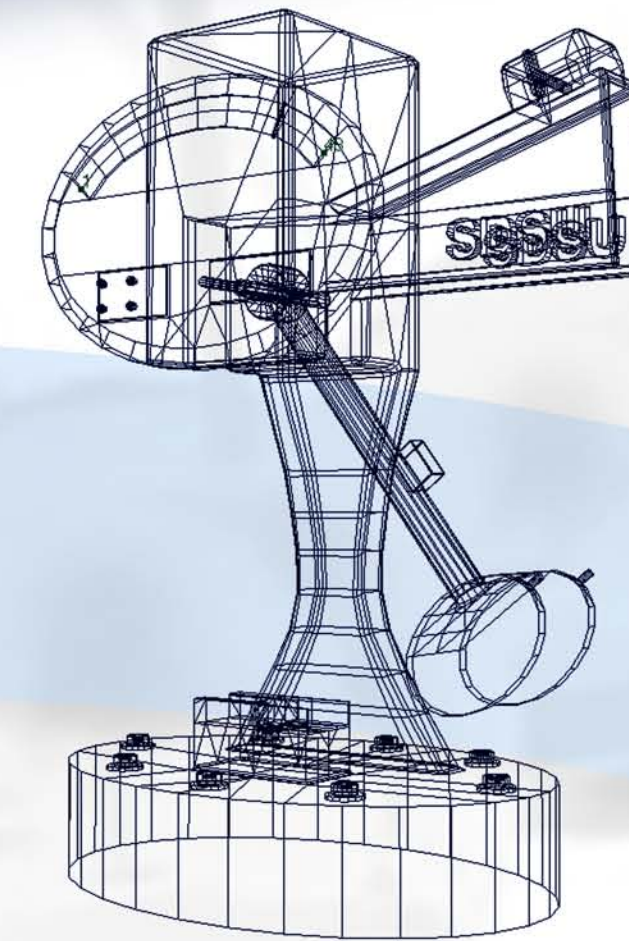
In collaboration with the Mechanical Engineering Department, School of Art, Design, and Art History, Department of Educational Technology.

Educational Content

MECHANICAL ENGINEERING

Laboratory protocols, safety protocols, and ASTM standards for materials testing.

This is the starting point for the creative processes that follow.



2D and 3D Digital Art

ART, DESIGN and ART HISTORY

Design the “look-and-feel” of the application.

Create buttons, icons, and logos (2D art).

Create realistic models of lab equipment (3D art).

The Objective:

Develop a virtual, interactive, game-based, materials engineering laboratory for use by both mechanical, and non-mechanical, undergraduate engineering majors. The goal is to provide a materials lab experience which may not always be provided a course.

The simulation could be used in instances where a university is not able to provide a materials lab, and or, be utilized by materials engineering students to supplement existing labs to enforce lab protocols, safety protocols, ASTM standards, and additional experimental conditions.

The project consists of a multi-disciplinary team of faculty and students with backgrounds ranging from materials science, computer science, digital arts, and student learning assessment.

This game-based laboratory experience will consist of two realistic virtual laboratory experiments (tensile and impact testing), as well as an innovative 3D immersive experience of atomic lattice structures.

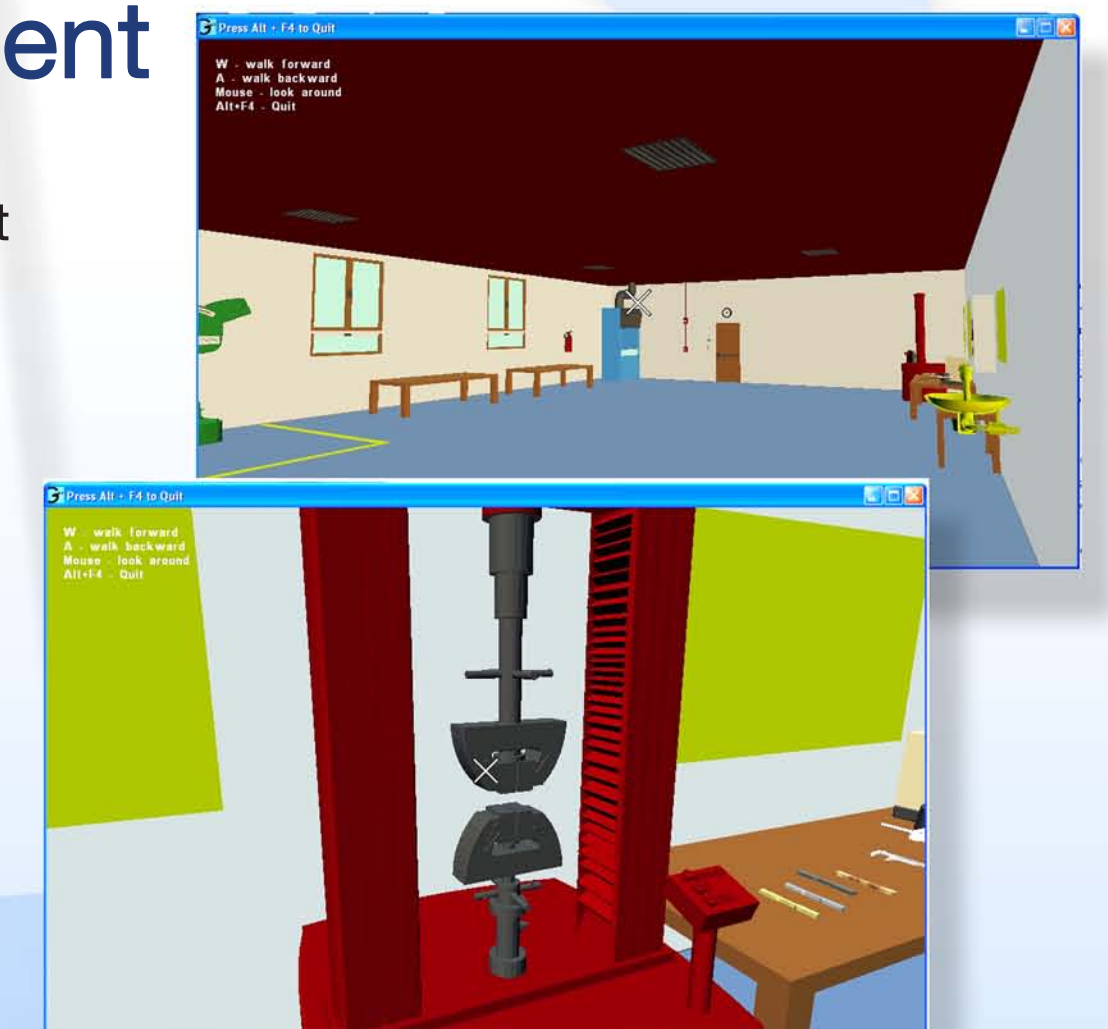
Gaming for Applied Material Engineering

A simulated environment of mechanical engineering labs

3D Application Development

COMPUTER SCIENCE

Implement the virtual 3D laboratory using Microsoft XNA Game Studio. The software will present the Educational Content via: real-time interaction with the 2D and 3D art assets, materials engineering-specific background material, quizzes. Tracking of student scores will be provided through a remote database.



Student Assessment

EDUCATIONAL TECHNOLOGY

Based on pre and post assessment surveys, do the students who experience the virtual lab learn as much as their counterparts who engage in the actual laboratory?

Students: Mark Thompson, Abhishek Sood, Christina Bertrang, Claudia Faulk, Allison Duncan, Jeanette Ibarra, Kumar Patel, Kunel Aher

Professors: Khaled Morsi, Kris Stewart, Mark Siprut, Marilee Bresciani
NSF DUE 0837162

