National Science Foundation

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DUE #0837162

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INTERACTIVE simulated laboratory EXPERIENCE

Role of Game Programmers for Serious Games in Academia: Colleague, Collaborator AND Client

The Collaborators at San Diego State University

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Discipline Silos at the University

Typical Situation (faculty)

- **Colleague**
  by assumption
- **Collaborator**
  when there is a need (can it be mutual?)
- **Client**
  depends on role definition
- **Credit**
  convincing your chair and dean of the value to your discipline

Our Unique Team

- **Content Specialist**
  material science
- **Design & Big Picture**
  school of art design
- **Implementation**
  3d Maya assets from art provided to XNA game programmers
- **Assessment**
  text for questions and capturing user responses in database for later analysis

This Talk Focusses on the Game Programmer

- **Instructor** is analog, built z80 kit in ‘78 and helped Internet grow up
- Typical “silo” traits
- Course prerequisites – data structures - ensure real programmers
- Course content –
  2d game individually
  3d game as team

- **Students** are born digital, gamers
- New to collaboration outside their field
- Teamwork in field is not new (CS 583), teamwork beyond field is challenging (vocabulary and skills)

Project Success

- Diverse faculty to maintain focus and “interesting” weekly discussions
- Sequence of coders over 3 years all took CS583 for common background
- IGDA and ESA current status of game development world (CS583 and after)
- MatsISLE Useful example of Serious Games (thanks to Chris Harz who speaks to CS583)

Fig 1: The samples on lab table with Task List for this lab

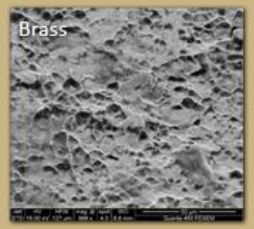
Standard: each lab starts with Task List

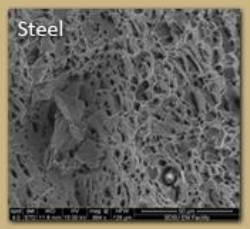
Tensile Test

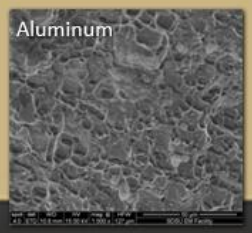
TENSILE TEST

The tensile test is used to measure certain mechanical properties of materials in tension. From this test, a number of important properties can be obtained, such as Young's modulus, yield strength, tensile strength and ductility. A tensile test is conducted using a Universal testing machine in accordance with certain standards. In the tensile test, the test specimen is gripped at both ends and is pulled apart. Instantaneous force and instantaneous extension are measured and recorded as the material deforms.

The fundamental output from the test is a plot of instantaneous force vs. instantaneous extension, which is easily converted to engineering stress vs. engineering strain.







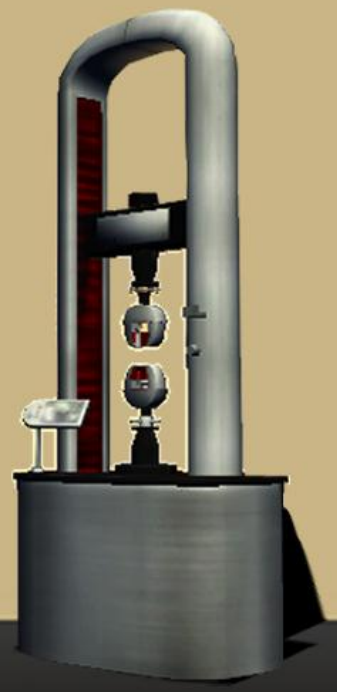


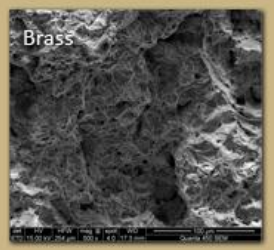
Fig 2: The Virtual Tensile Testing

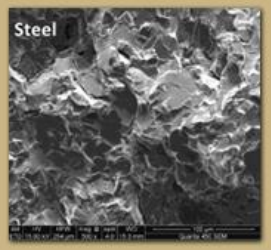
Impact Test

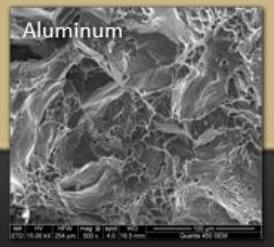
IMPACT TEST

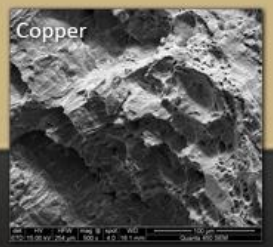
The Charpy impact test is used in this lab. The Charpy tester measures how much energy it takes to fracture a material under fast impact loading conditions. In the Charpy test, a swinging arm rapidly strikes the material and fractures it. Test specimens must be of dimensions that conform to certain standards.

The test has been used to identify ductile-to-brittle transition temperatures for materials, by testing materials at different temperatures.









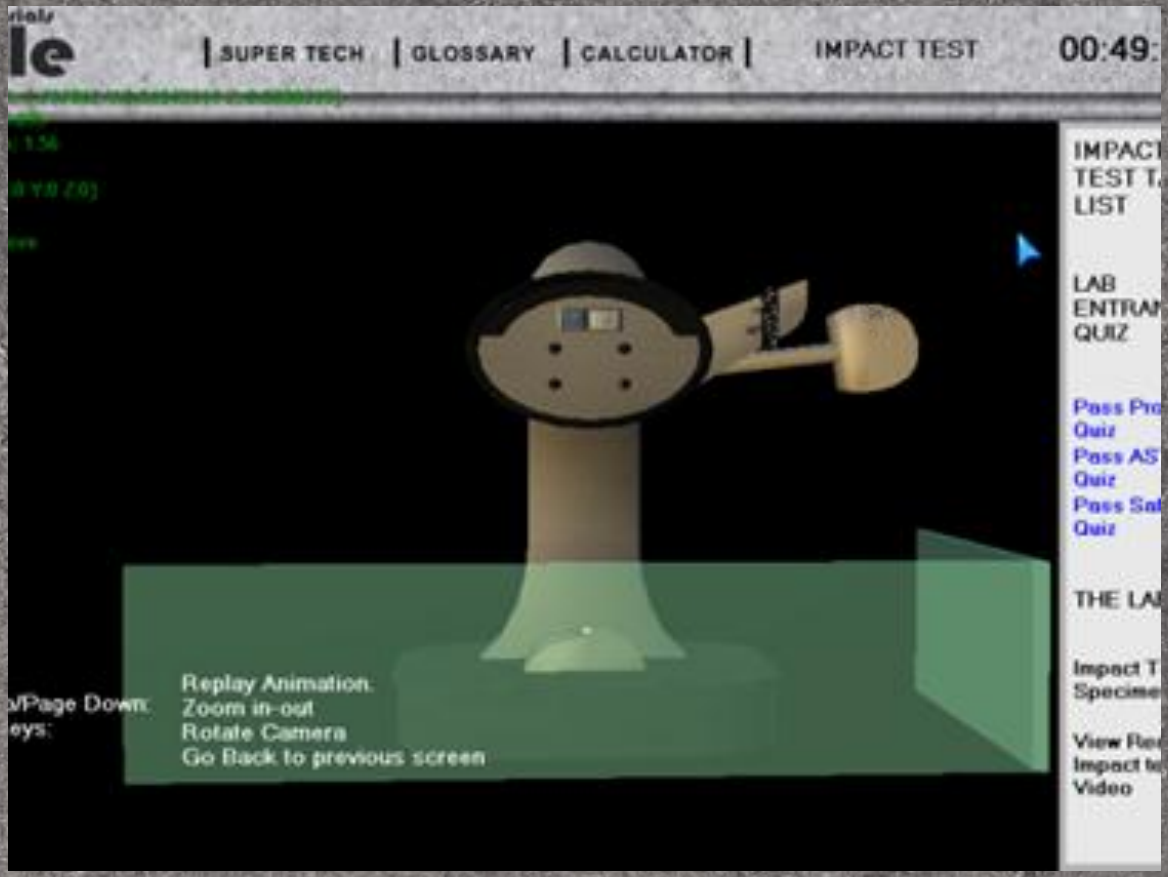


Fig 3: Safety screen to protect users during impact testing

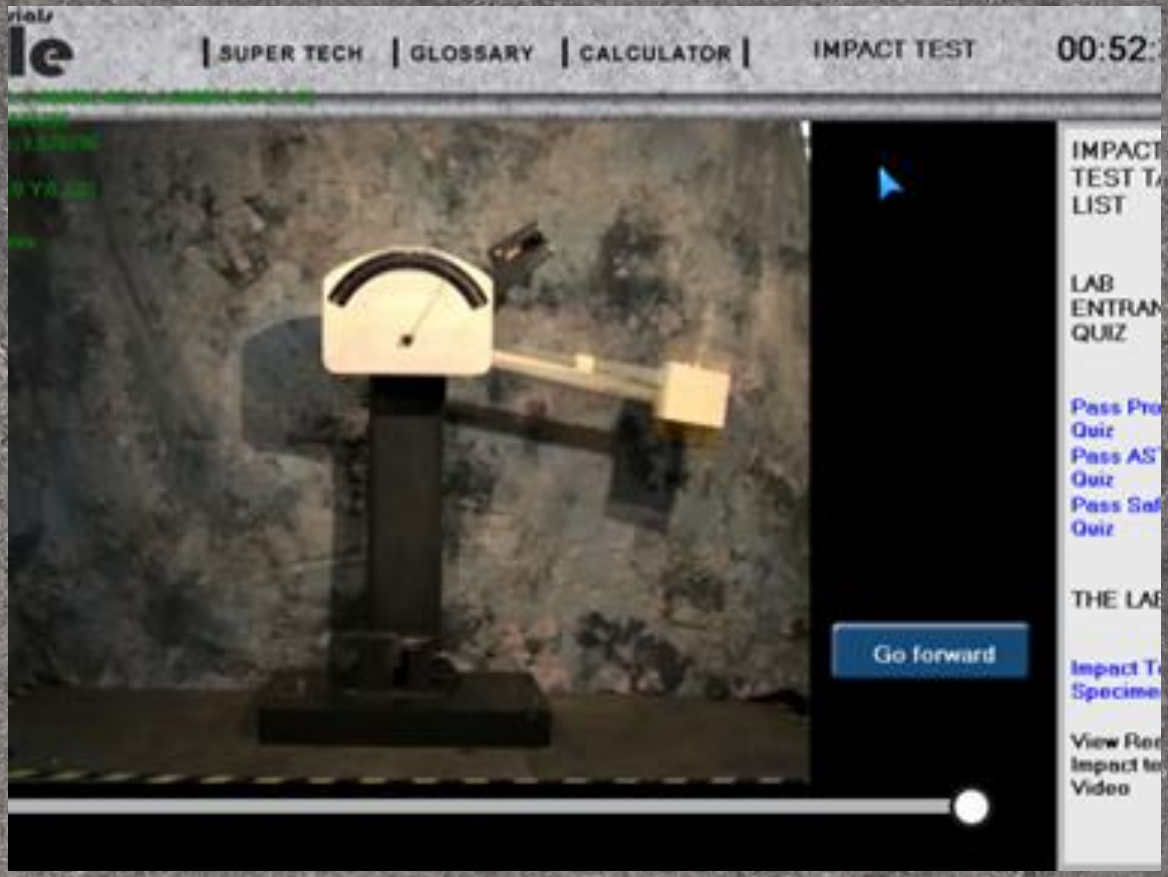


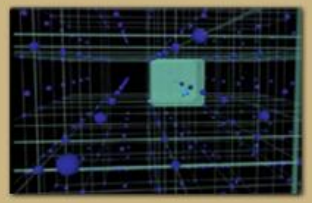
Fig 4: Actual high-speed video of actual Impact Test Machine, included in Materials-ISLE

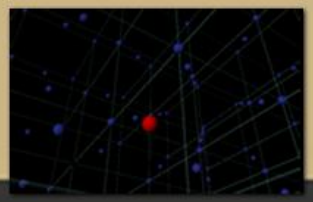
Lattice Voyage - Virtual/Virtual

LATTICE VOYAGE

Crystalline materials are defined as materials with long range atomic order. That is the atoms making up the materials are arranged in an ordered periodic fashion. The basic building block is the unit cell, showing the basic arrangement of atoms for a particular material. When the unit cell is repeated in all directions it is called the crystal lattice.

In this lab the student is teleported inside the material, where he or she becomes surrounded by atoms. The student then explores the unit cell and lattice, during which he or she gains fundamental knowledge of the subject.





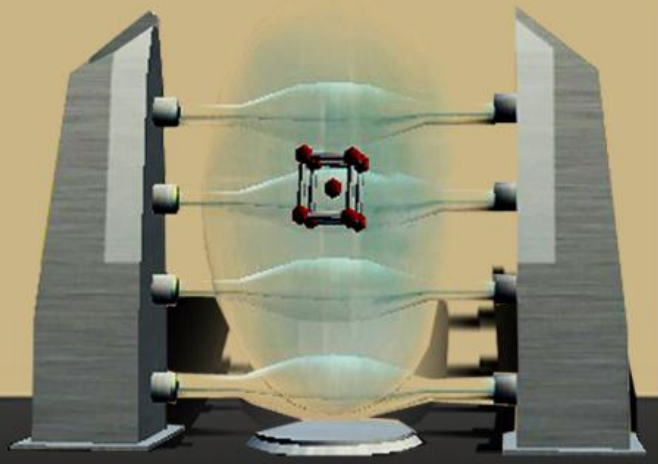


Figure 5 Virtual Image of teleporter in the virtual lab environment

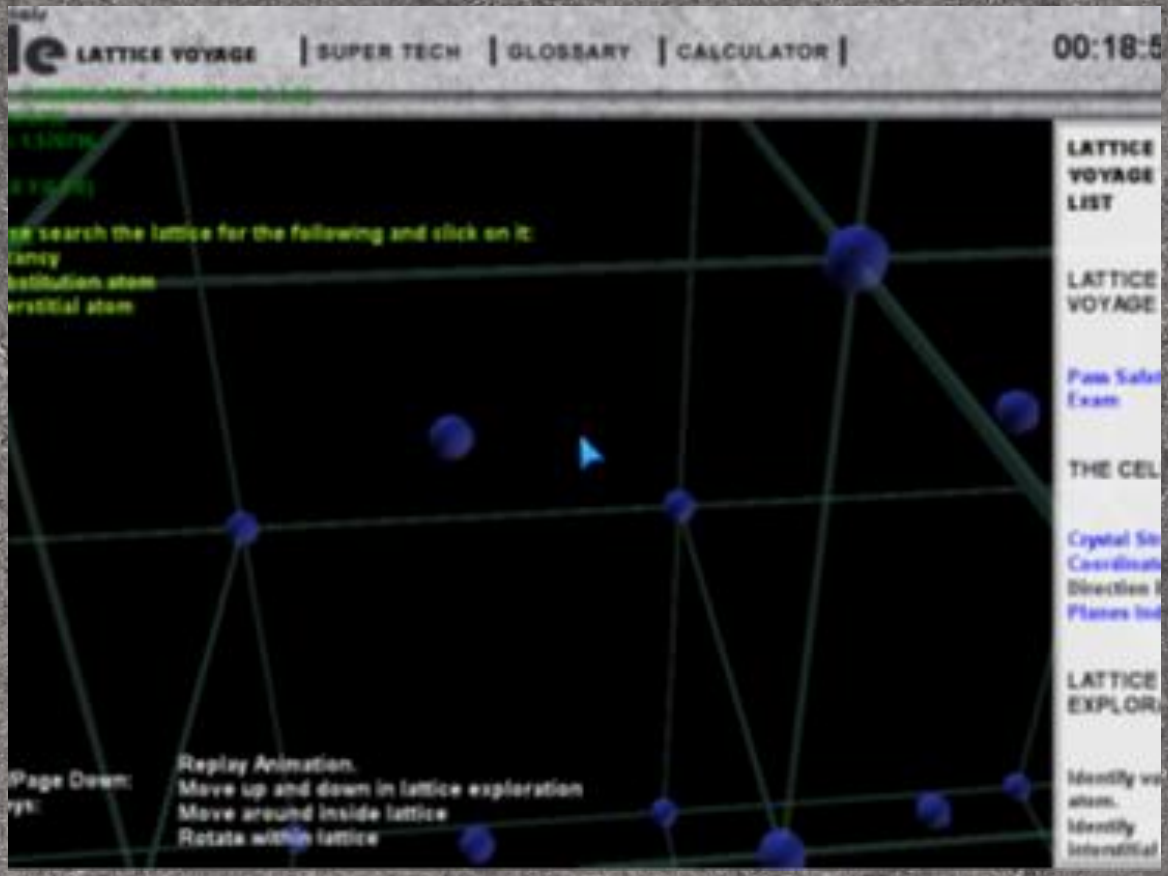


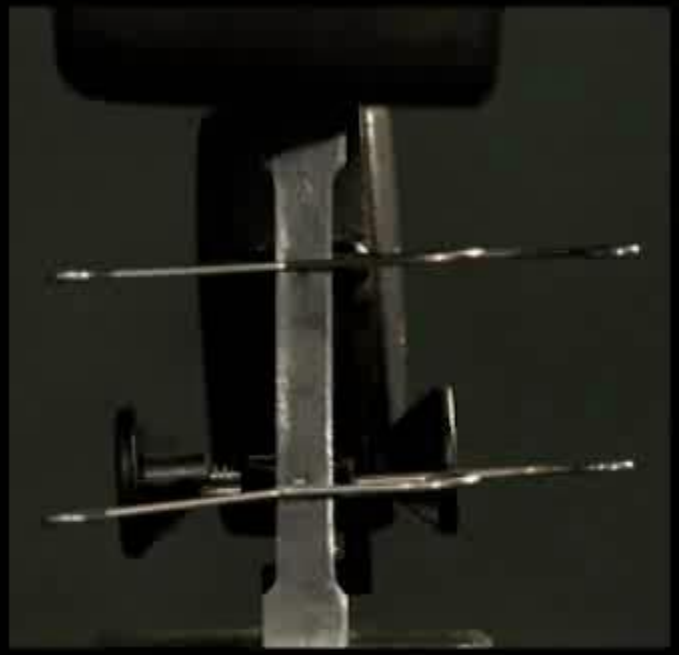
Fig 6: Student will search the virtual 3D space environment

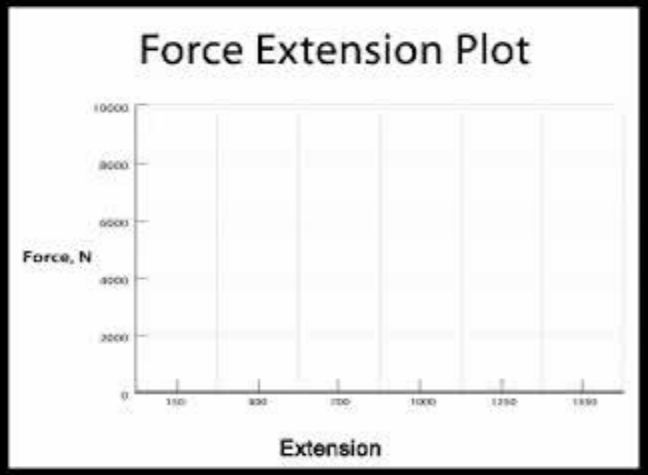
Quick Demo of Tensile test game

Back up high speed video shown in game

1018 STEEL: Crosshead speed = 0.1"/min (2.54 mm/min)

8X SPEED 00:00:00





This is a plot of instantaneous force versus instantaneous extension data generated during the tensile test.

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