SDSU
presents
a thesis defense for
Master of Science
degree in
Computer Science

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GMCS 405

SAN DIEGO STATE
UNIVERSITY
Leadership Starts Here

Megha Shaseendran

A Journey through the Lattice

Abstract

Computer games have impact on improving thinking capabilities and inductive reasoning. Games are specifically developed for educational purposes that can motivate the students to gain better knowledge or understanding over the subject. One such scenario was that the Mechanical Engineering department of San Diego State University (SDSU) required a unique practice tool that provides the students a valid simulation of the Material Science lab. Dr. Khaled Morsi, professor at Mechanical Engineering department of SDSU, uses the following simulation for Material Science lab: Tensile Testing, Impact Testing, and Lattice Voyage. This research involves the Material Science lab to develop Lattice Voyage using XNA framework to enable students to improve their understanding of the crystallography in a fun manner.

My research involves the development a 3-dimensional model to represent the room designated for crystallography in the Mechanical Engineering department lab building, which called *cell*. Further, the game displays, in a 3-dimensional space, the act of a student entering the lab. The game starts when the 3-dimensional representation of the student, avatar enters the virtual lab. Now, the avatar is trapped in the cell. The student (human) is provided with the quizzes on the following:

- Finding the origin of a lattice structure
- Determining the lattice coordinates of atoms and crystallographic planes in the lattice structure
- Determining the crystallographic directions
- Identifying impurities in the lattice structure

When the student correctly answers these quizzes, the avatar can escape from the cell in the game. The game records the number of attempts and retries the student takes to complete the game. This information can be used by professor for grading purposes. This research collaborates Computer Science, Mechanical Engineering, and Arts departments. This research was further supported by Marilee Bresciani for assessment.

Thesis Committee

Kris Stewart, Thesis Chair, Department of Computer Science
Alan Riggins, Department of Computer Science

Khaled Morsi, Department of Mechanical Engineering