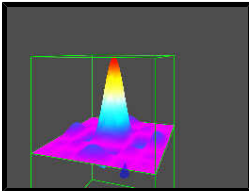


## APPLICATIONS DEVELOPED AT VALPO

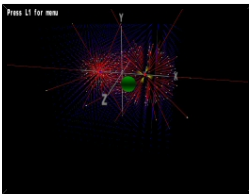
One of the greatest challenges for students learning subjects in science, mathematics, and engineering is the need to visualize items or concepts in three dimensions. The main focus of the Scientific Visualization Laboratory is the creation of software applications that supplement existing courses which have a high visualization content. A description of how visualization is being used in different disciplines and links to specific applications are given below.

## Applications Developed at Valparaiso University



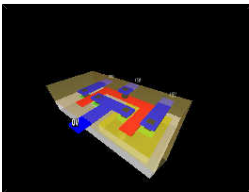
### [MATLAB Graphing Tool](#)

The system is fully integrated with the MATLAB system. Data can be graphed in three dimensions on the VisBox to be understood more fully.



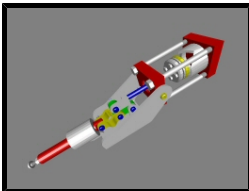
### [Valpo Vector](#) (representing electromagnetic fields)

The display of electromagnetic fields shows how test charges will react when placed at any point.



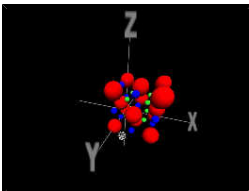
### [VLSI Tutorial](#)

These models help in the visualization of transistor functionality, and the transistor fabrication process.



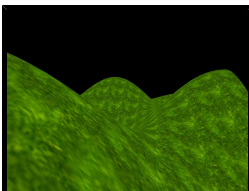
### [CAD Drawing Import](#)

Mechanical Engineering students import CAD models to be displayed and manipulated on the VisBox.



### [Xtal](#) (atomic and ionic arrangement)

These interactive models show different types of atomic structures, and aid in the visualization of related concepts in Materials Science.

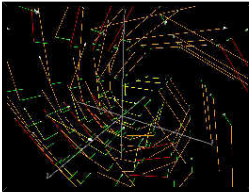


### [Terrain](#)

Applications in Civil Engineering include the ability to load topographic information to view land contours and features.

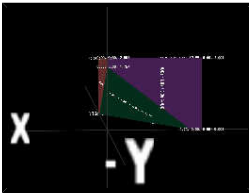
[Vector Calculus](#) (mapping vector fields)

Students can display any three-dimensional vector field, showing calculations of curl and divergence.



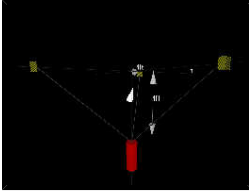
[Linear Programming](#)

The VisBox allows students to visualize and understand solution techniques for three-variable linear programming problems.



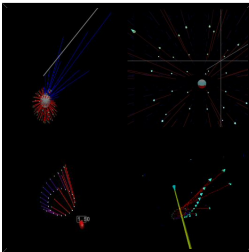
[StaticVU](#)

Three dimensional models for statics can be created and viewed on the VisBox.



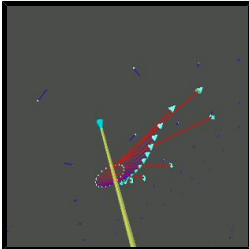
[MaxwellVU](#)

The MaxwellVU suite is a set of programs designed to help students understand the principles stated by the famous Maxwell's equations:



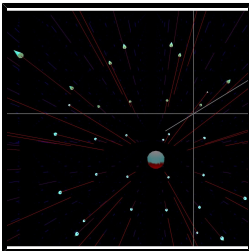
[AmpereVU](#)

Electrical Engineering students can view and interact with an Amperian loop to help their understanding of Ampere's Law.



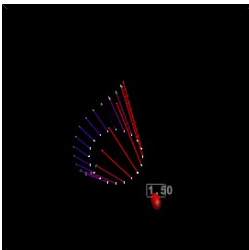
[CoulombVU](#)

Electrical Engineering students can view and interact with a ring of points inside an electric field that show the electrical and magnetic fields.



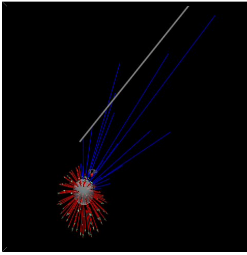
[FaradayVU](#)

Electrical Engineering students can view and interact with points showing the electric field and the magnetic flux.



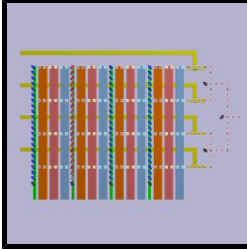
[GaussVU](#)

Electrical Engineering students can view and interact with a Gaussian surface in a electric field to help their understanding of Gauss Law.



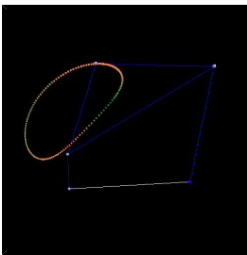
[QCAVU](#)

Allows for visualization of gate-level and medium-scale level devices utilizing Quantum-dot Cellular Automata.



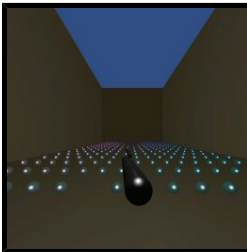
[MechanismVU](#)

Mechanical engineers can view how a crank-rocker mechanism will function when operated by a motor. The path of the coupler is also displayed.



[Blaster](#)

Allows you to fire different projectiles at different speeds at several stationary targets along the floor.



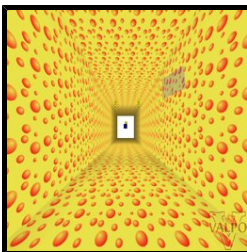
[Arkanoid](#)

A game where the objective is to break all the blocks along the back wall and prevent the ball from going past your goal. To prevent the ball from going past your goal you have a paddle that can be moved around to block the ball and change its direction of travel.



[Pong](#)

A game where a ball travels from side to side. The ball can be blocked on your side by paddle you control. The other side is controlled by the computer.

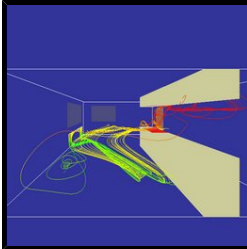


**Other applications utilized at Valpo**



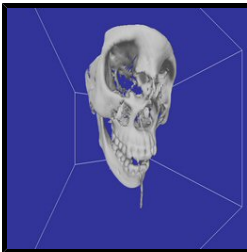
[Boxfly](#) (Visbox, Inc.)

Allows students to view 3D model that are the results of computer simulation.



[Kitchen CFD](#) (Visbox, Inc.)

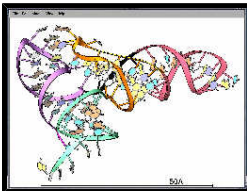
Shows Mechanical Engineering students the computed results of air circulation through a kitchen.



[MRI \(Magnetic Resonance Imaging\)](#)

(Visbox, Inc.)

Nursing students can move through the different layers of the human head.



[Ribbons](#) (University of Alabama - Birmingham)

Complex protein molecules displayed in 3D give better insight into their physical structure.



[Boxnav](#) (Visbox, Inc., Design Organization)

Civil engineering students can import building or landscaping designs and walk through them to view in life size.



[Mars Rover Pictures](#) (NASA)

Observe the photographs of the Martian landscape taken by the Mars Rovers in 3D.



[BoxLib](#)

Libraries needed to run Applications