

A Visualization Based Search System for Retrieving Mechanical Parts

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Motivation

- 3D CAD models are widely used and geometric information is usually archived for mechanical parts
- The archived geometric information is accessed *manually* for use in future projects, causing significant project delays
- Existing search methods for text or file name searches do not work on geometric information
- In many situations, designers cannot describe geometric details of the part that they are looking for. However, they can recognize it when they see it.

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Objectives

- Goal
 - » Create a system for retrieving parts by walking through a part database in a virtual environment
 - Useful when part names and geometric details are not remembered
- Potential applications
 - » Reuse of existing part models to greatly reduce part modeling time
 - Modeling complex parts can take days

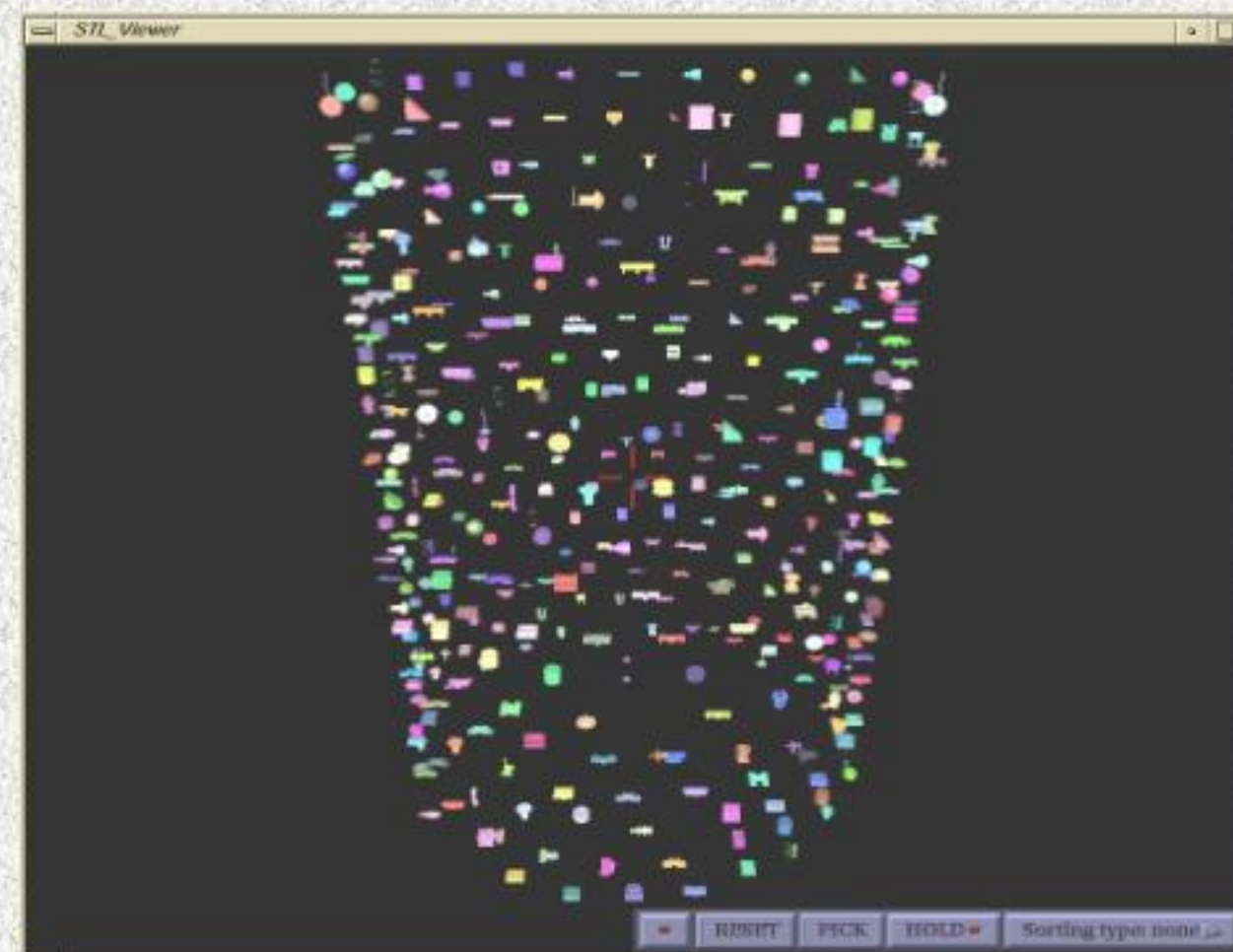
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Our Approach

- Spatially arrange parts for efficient walk through
 - » Determine positions of objects in virtual environment
 - Putting objects too close to each other might cause one object to occlude details of another object
 - Placing objects too sparsely decreases the visualization efficiency
- Sort objects by their attributes
- To navigate scene interactively on PC or in VR we use simplification techniques for part rendering

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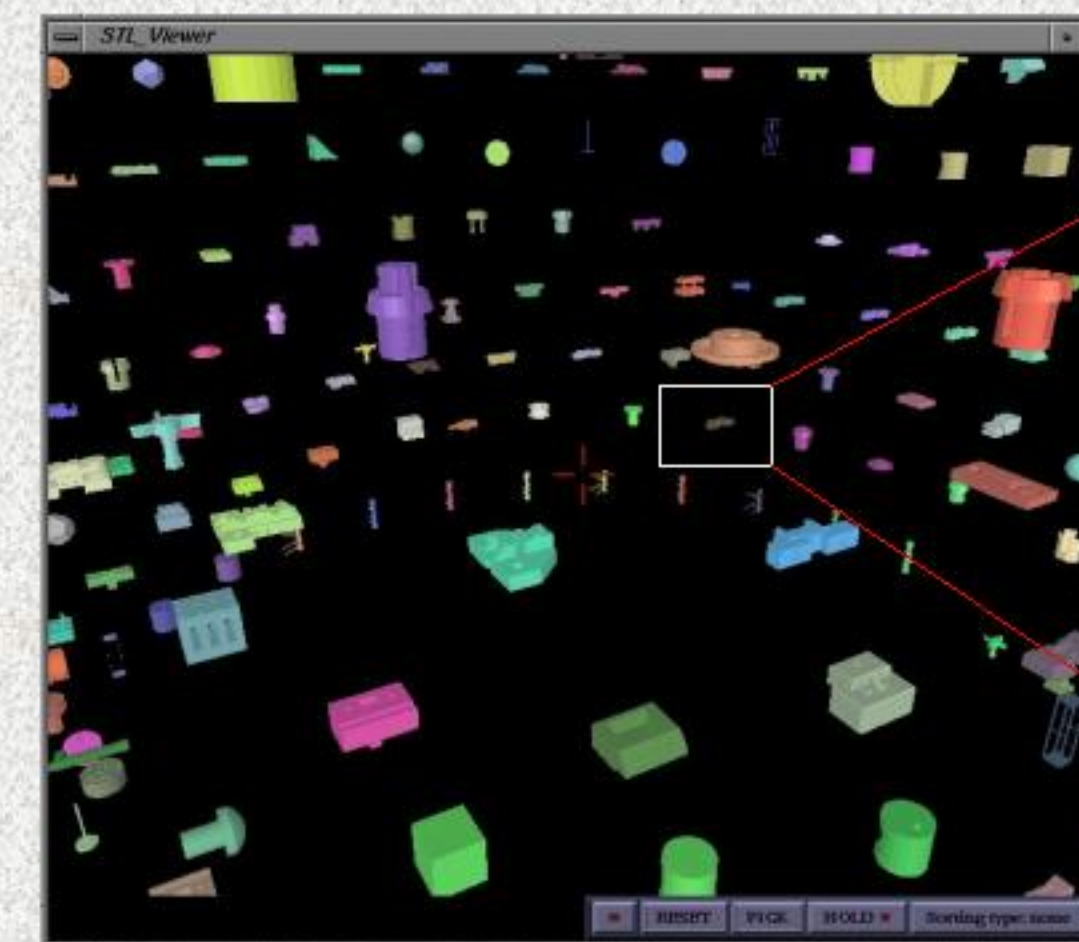
Panoramic View of Database



A databases of 500 mechanical parts can be rendered, manipulated and sorted in real-time

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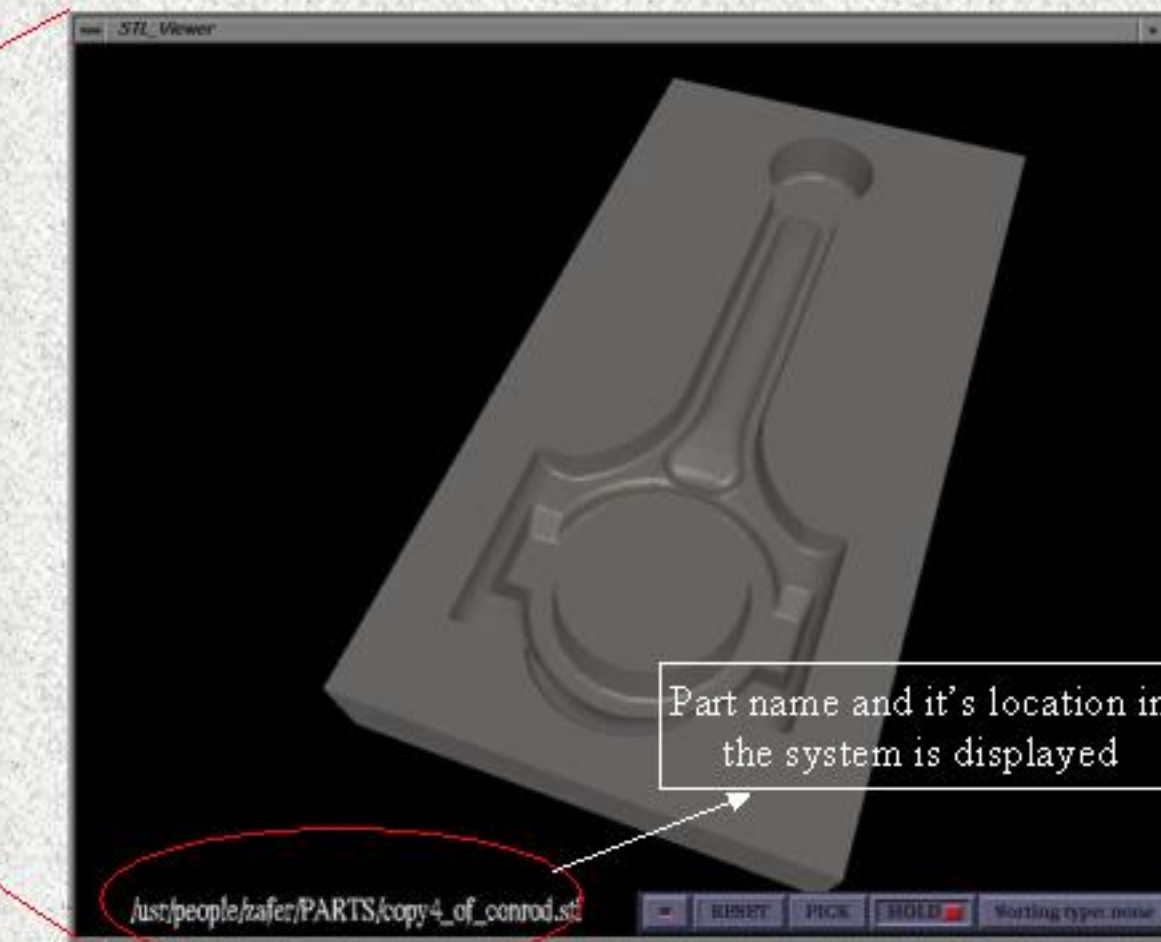
A Close Up View



The user can navigate in the virtual part database

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Picking A Part

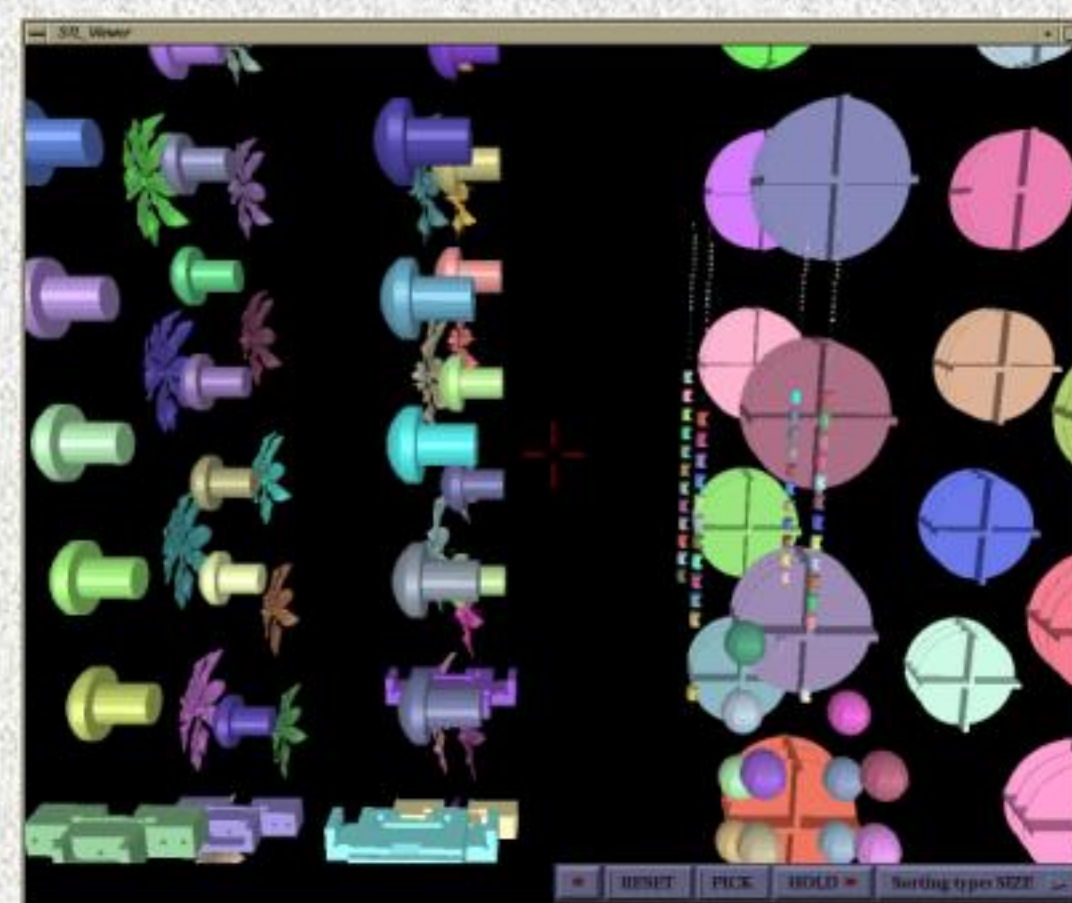


Individual parts can be picked and rendered separately for further visual inspection

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A Real-Time Sorting Example (Sort_By_Size)

The entire database can be sorted and grouped in real-time



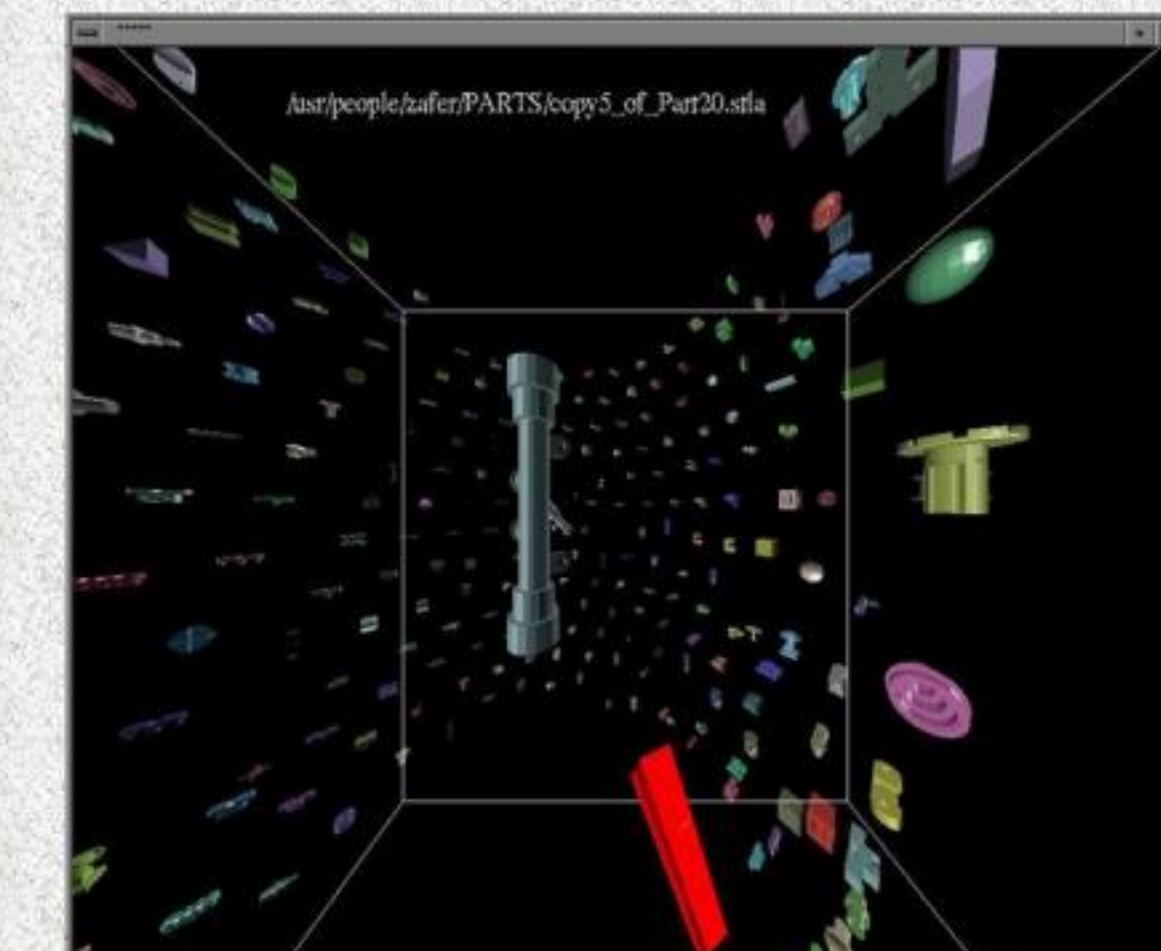
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Implementation Details

- Work Station Version:
 - » Silicon Graphics Octane 2
 - » IRIS 6.5 Operating System
 - » Uses SGI's OpenGL Performer Graphics Libraries
- CAVE Version:
 - » Implemented Using CAVE Simulator
 - » Uses CAVE Controls Instead of Keyboard and Mouse
 - » Interacts with the CAVE navigation equipment using CAVELib libraries

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CAVE Application



Application of the Visualization Based Search method in a CAVE Simulator

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