Visualizing 3D Flow through Cutting Planes

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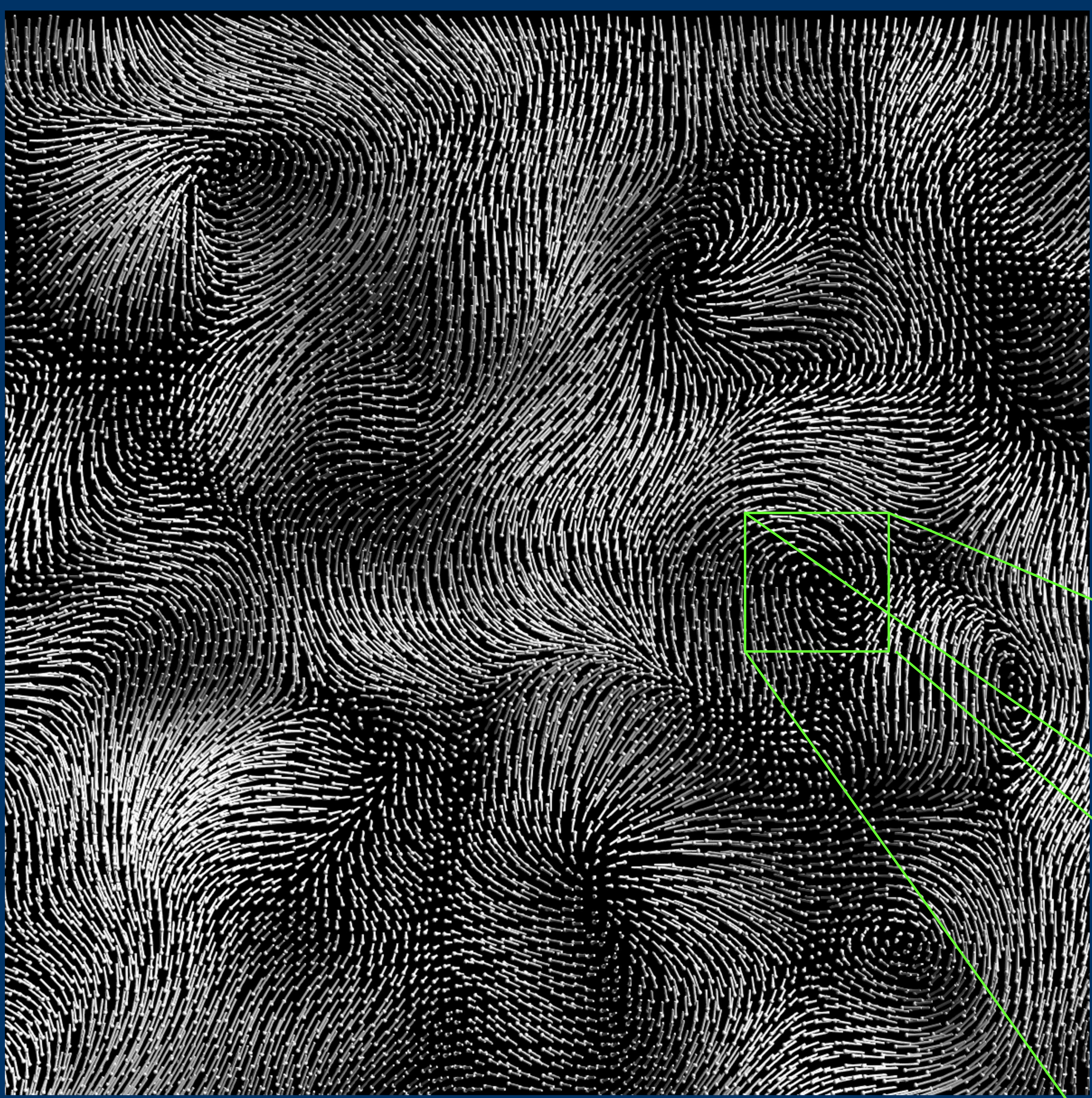
Introduction

Cutting planes have long been an effective tool for visualizing discrete slices of 3D vector fields. The following research-in-progress focusses on evaluating a variety of cutting plane rendering techniques at various seeding densities to find those conditions which provide superior perceptual cues for accurately estimating the direction of flow through a point on a cutting plane.

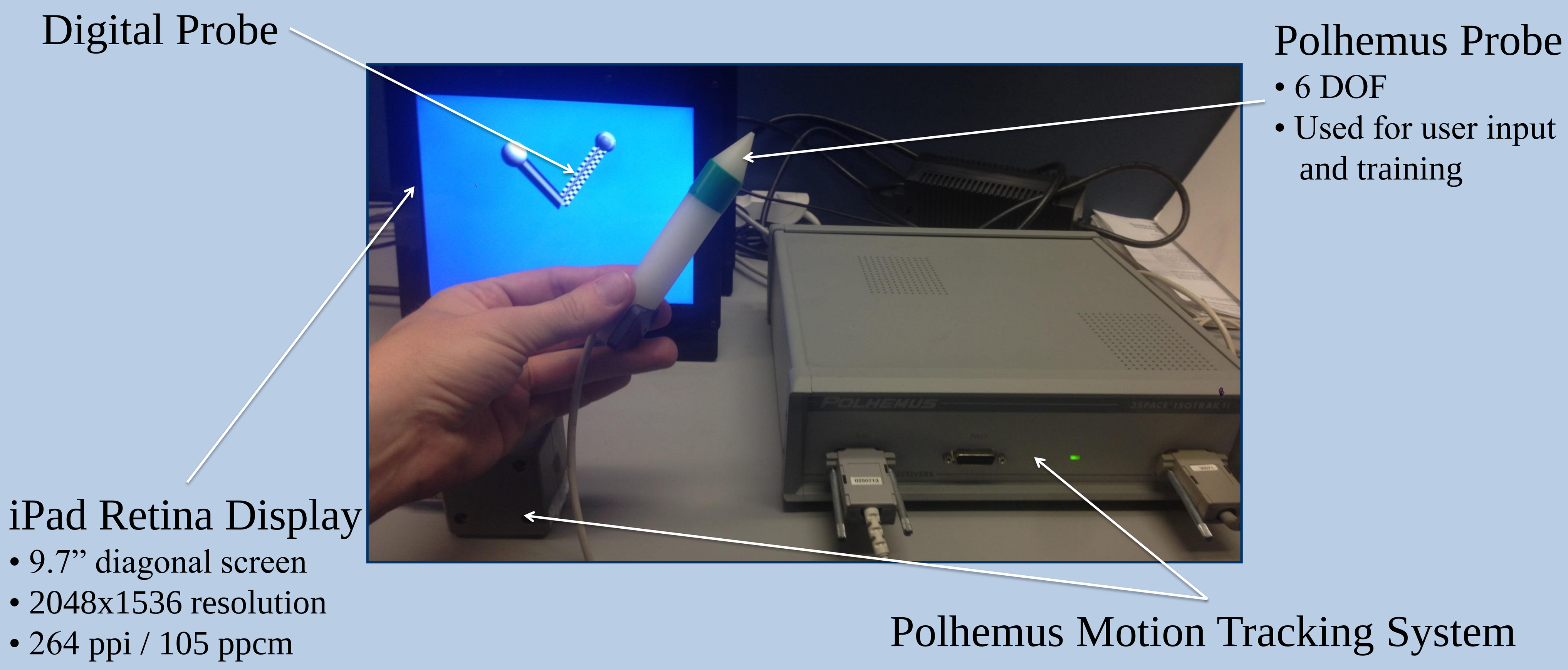


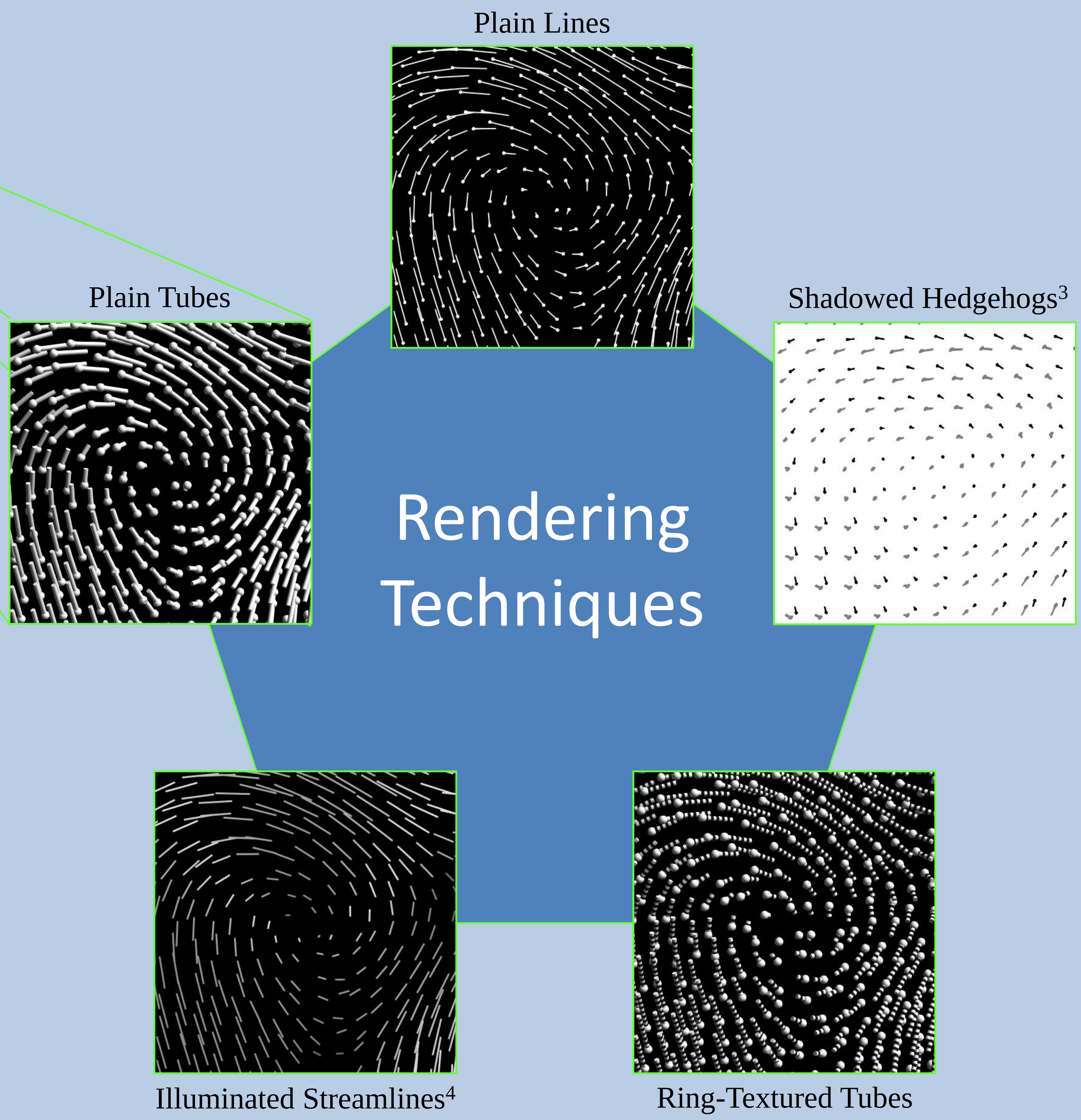
Pilot Study & Preliminary Results

A reduced-scale pilot study was undertaken to evaluate the feasibility of a full-scale study and to help guide the design of a more robust and complete evaluation. An early iteration of this study yielded the following data from two subjects with one replication each.

Absolute mean errors for glyph angle with respect to the viewer's line of sight: 13.4° (textured tubes); 14.6° (plain tubes); 17.3° (shaded lines); 17.9° (plain lines). Absolute mean errors for glyph rotation about the axis formed by the line of sight: 19.8° (textured tubes); 19.2° (plain tubes); 23.2° (shaded lines); 24.8° (plain lines).

Current Method & Apparatus





References

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About CCOM

Based at the University of New Hampshire, The Center for Coastal and Ocean Mapping (CCOM) / Joint Hydrographic Center is a national center for expertise in ocean mapping and hydrographic sciences, operating in partnership with NOAA's National Ocean Service, with projects funded by the USGS, ONR, NRL, DARPA, NSF and private sector partners. The centers educate a new generation of hydrographers and ocean mapping scientists, while conducting research to develop and evaluate hydrographic and ocean mapping technologies and applications.

Within CCOM, The Data Visualization Research Lab studies and develops advanced interactive visualization techniques that can be applied to ocean mapping and ocean technologies in general. The science of data visualization is a major part of founder Colin Ware's research, grounding data visualization in theories of human perception and cognition. This approach provides theories of what makes visualizations effective thinking tools.

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