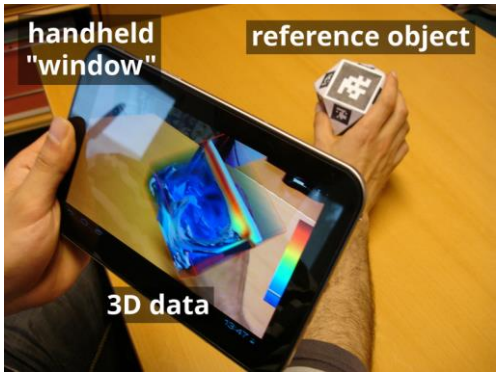
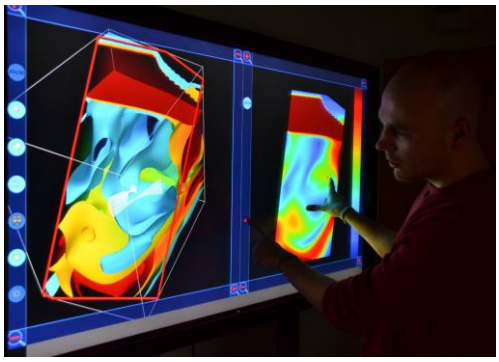
Master's Internship Project Proposal:

Tangible Interaction for 3D Flow Data Visualization



Tangible User Interfaces (TUIs) have become more and more popular since Fitzmaurice and Ishii's work in the early 90's. By using physical objects, they proposed to create a new interaction paradigm with computers that would benefit from our experience with physical objects and their affordances. However, they have seldom been used in scientific visualization projects and presents benefits that could be of great use to different scientific fields of study (medical images, flow datasets…). Consequently, the project aims at developing, for flow datasets analysis, a working set of interaction techniques that could cover the specific needs that arise from flow analysis.



The work will be carried out as a collaboration between the Aviz Team at Inria and the Hapco team at Limsi/CNRS. The first team, specialised in scientific visualization, has provided contributions in the use of touch interaction for scientific visualization while the latter is specialised in the use of Tangible Interaction for various purposes. This project will be integrated within the collaborative work of both labs to better understand interaction inputs in order to provide an interaction continuum for scientific visualization.

The challenge of this project lies within the vast and precise needs for interaction with 3D datasets as well as the numerous questions that have not been elucidated yet when it comes to TUIs in the context of scientific visualization. For instance, one could wonder whether there exist a "natural" way of zooming-in/out a dataset that would not be a simple z-translation or how to navigate time-dependent datasets with a Tangible User Interface.

The goal of this project is to develop a set of interaction techniques with a tangible interface that could help the analysis of 3D time-dependent datasets such as the ones provided by the fluid dynamic department at Limsi. In particular, this work has to be included in an already existing and under-development framework for 3D interaction with other input technologies (mouse-based, touch-based, mobile-based…).

Using interaction prototypes developed in the past at Limsi and building upon the previously defined expectation of scientific visualization by Inria, the student will have to integrate its development into an already existing framework/software and may develop new Tangible User Interfaces to better suit the needs that arise from fluid analysis. Development skills will be required for this project (C/C++ mainly) as well as skill and interest in electronic devices development.

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