Computational Fabrication and Stabilization Method for Cartesian Diver

Amy Koike

In this thesis, we aim to combine interactive manipulation technology with digital fabrication for underwater expression.

To achieve this, we introduce a new method to add the controllability to underwater objects applied by a structure of a Cartesian Diver. The Cartesian Diver is a well-known demonstration of Pascal's law and Archimedes' principle. The diver is able to be manipulated to achieve up and down motion by a single external force to the primary container based on water pressure changes the overall volume of the diver or the volume of air in the cavity within the diver.

For this thesis, we develop a system setup to manipulate the divers; the length of the tank is 400mm and its diameter is 150mm and water pressure can applied it up to 200k Pa. We successfully designed and manipulate the object by our method.

We discussed the principles and methods to create a digitally designed and fabricated the diver and to stabilize it in the middle of water, then developed several applications: various shaped object, floating screen and the object has function of messaging.

Our work combines digital fabrication technologies with non-contact manipulation that uses the space transmission power of the object around it. We believe this combination extends the possibilities of new underwater expressions at many places such as theme park, public areas and our daily life.

（Advisor: Norihiko Uda）