

3D Printed Fluid Systems

Hydraulic Haptic Interface Concept

The project focuses on developing 3D printing technology to create a new form of product interaction. The primary objective was to research how three-dimensional fluid geometries can be 3D printed directly inside parts with the use of Polyjet printing. In addition, the design opportunities that this method could provide are explored, with a final concept demonstrating this technology.

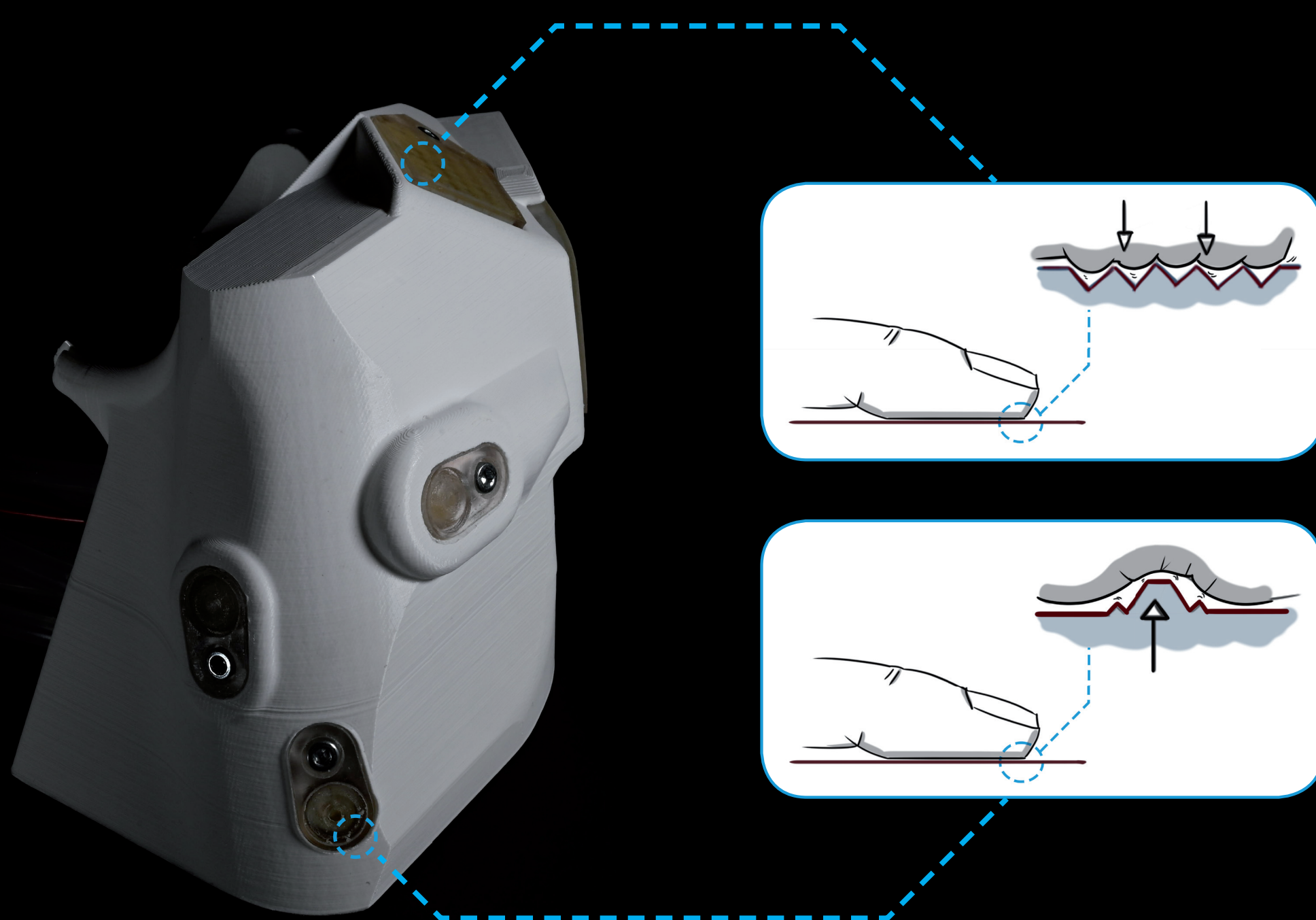
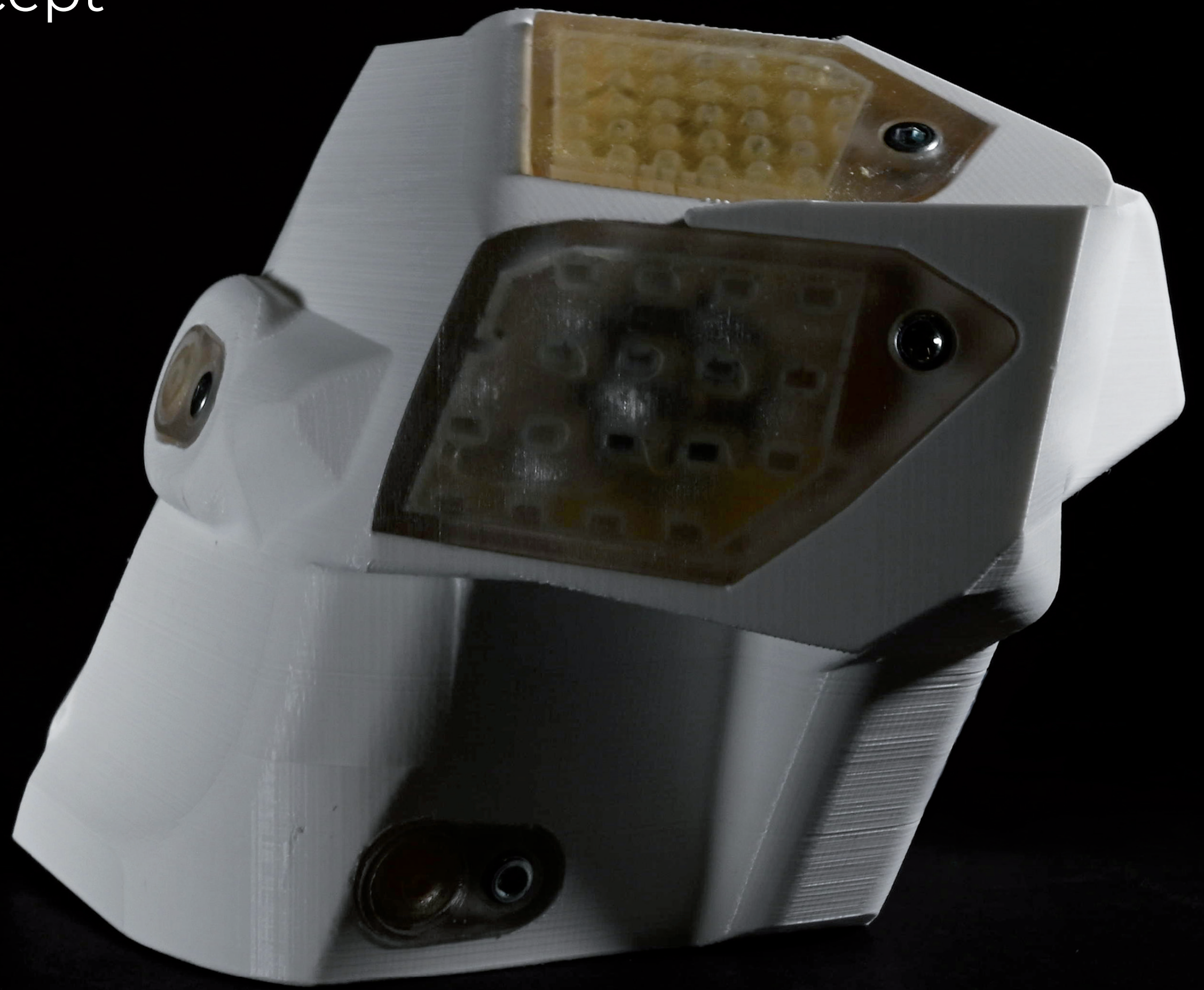
The designed concept is a haptic feedback controller, which serves as the communication interface between the user and a digital system, such as a CAD software or video game. The communication between these two is achieved with dynamic texture mechanisms which hydraulically vary the perceived surface texture from smooth to rough. These mechanisms are placed on the hand palm for the user to receive information, and on the fingertips, for the user to send information.

Through placing different of these dynamic texture mechanisms on a 'controller' the human-digital interaction could be transformed, bringing a tactile feel to digital actions

Haptic language

From user test observations, the value of this concept lies in two potential applications, either for an digital immersion or for creating a new haptic communication language (similar to braille).

This project provides the first steps into connecting 3D printed fluid systems with feasible haptic interface products.



3D Printed Dynamic texture mechanisms

Mechanisms are developed to be 3D printed as a whole (including the fluid), and deform to change the surface texture perception. These differentiate between the two communication channels:

1. User to product communication: In this interaction, the user will press with their fingertips into the smooth mechanism surface area, displacing the internal fluid serving as the input signal when measured. However, the more this smooth surface is pressed, the rougher it will become, allowing a varying tactile immersiveness. When pressure is no longer applied on the sensing surface, its texture will revert back to being completely smooth to the touch.

2. Product to user communication: In this interaction, the interface is instructed from the software to change its surface texture. This change in this surface relief will be noticeable on the palm of the user, and will have a certain informative meaning (when experienced). Through the placement of multiple texture actuators, and the use of different actuation patterns, numerous signals can be identified by the user.