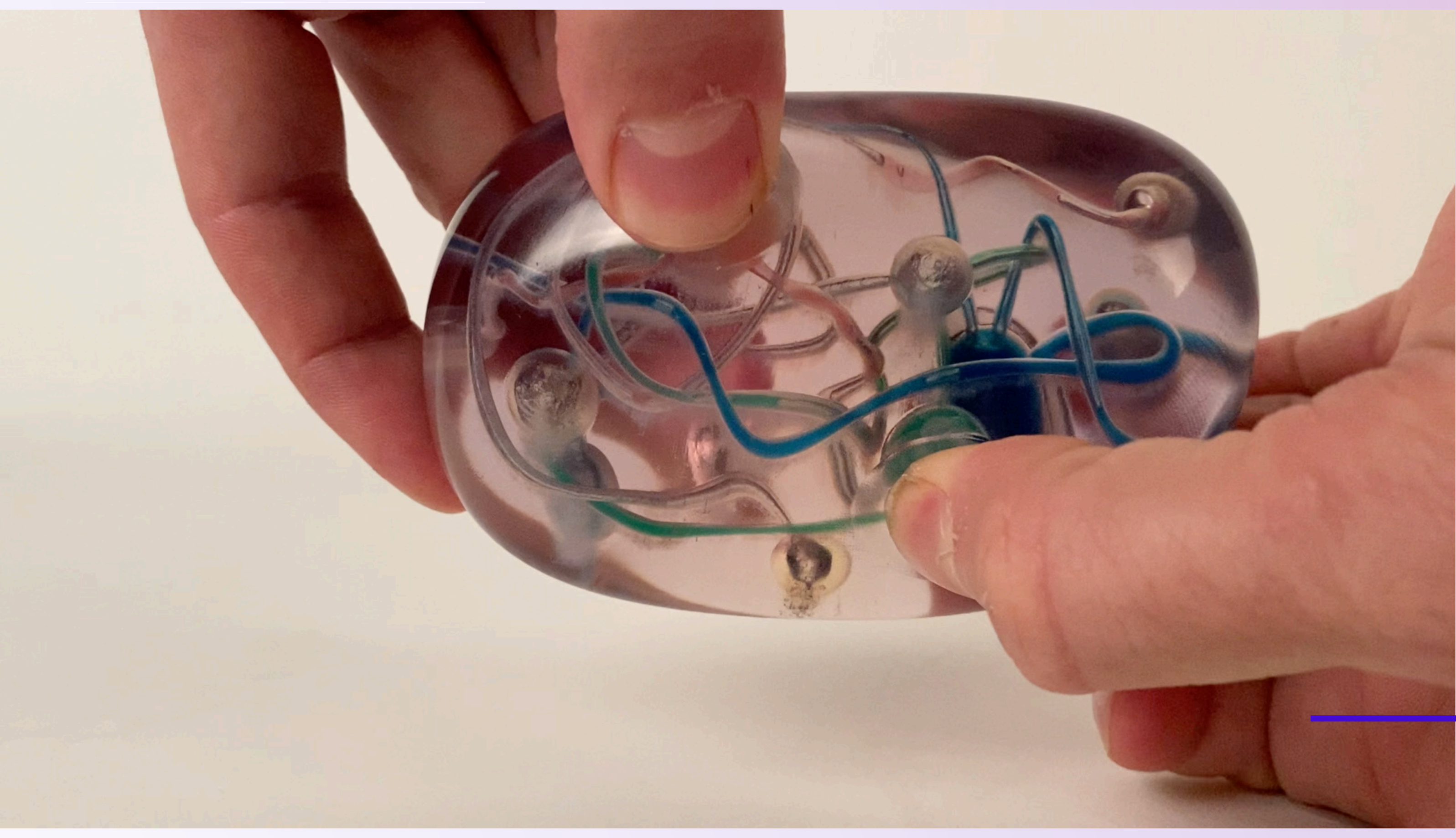
Venously printed

Multi-material 3D printed responsive fluidic interfaces with programmable dynamic appearance triggered by mechanical deformation

a single concept, tuneable for different material experiences and temperal form



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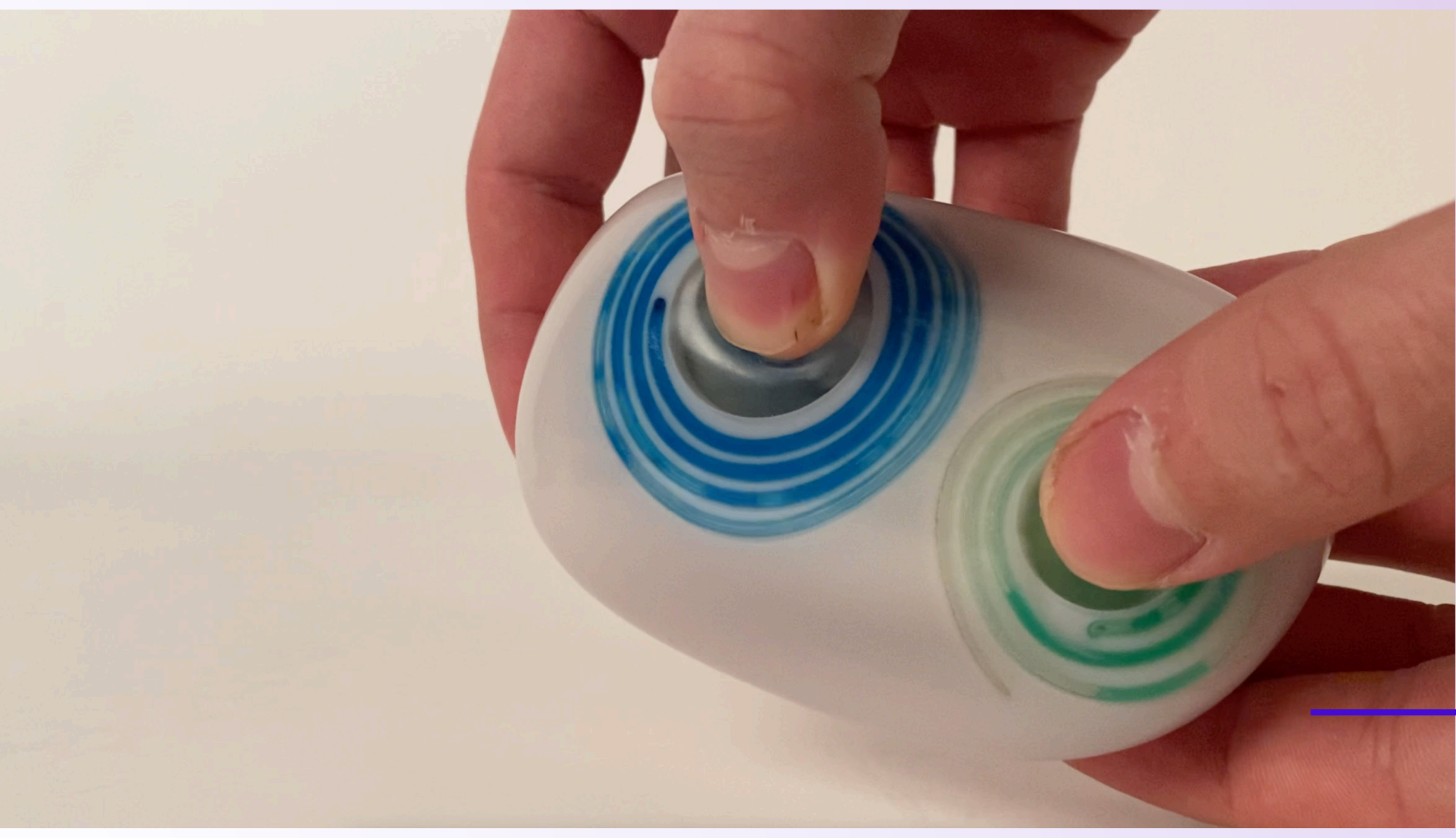

Controllable

Ephemeral

Venously printed contributes to the field of HCI and digital manufacturing by exploring the scope and possibilities for programmable and responsive fluidic interfaces, using multi-material 3D printing as a manufacturing technique. Novel meta-materials and computational composites have proven to open up new design paradigms and continue to expand the design space for HCI and material design with unprecedented I/O configurations and material experiences. By encoding the computational logic of dynamic and responsive behaviour into the material's structure and properties, these materials allow shifting away from typical 2D (digital) interfaces towards embedded responsive 3D objects and materials without the need for external logical operators or controllers.

A novel concept within this field is fluidic interfaces, which utilise liquid flow as a medium to drive dynamic appearance triggered by mechanical deformation input such as pressure, twisting or bending. Within this research, multi-material 3D printing is explored as a manufacturing tool for such fluidic interfaces to allow for more complex 3D geometries, dynamic visual output and encoded computational logic. A set of demonstrators are developed with programmable dynamic appearance, to showcase the capabilities of this manufacturing workflow and the possibility of being tuned for specific material experiences or temporal form in interaction design.

To allow for the fabrication of these interfaces Venously printed presents a fabrication pipeline, including a computational design and simulation tool for designers to validate the responsive behaviour and iterate on their design before going into manufacturing. Additionally, a voxel-based support structure for 3D printing complex internal cavities is developed to provide better printing quality as opposed to available workflows whilst still being able to be removed from complex internal structures. Finally, a first step for the characterisation of the experiential qualities of fluidic interfaces has been performed via a set of interviews. This led to promising future applications and material experiences which can be explored in future work.

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