

# 3D Printing Irregularly Shaped Digital Displays

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**Motivation:** Everyday objects we interact with have all manner of size, shape and tangible properties. Digital interfaces are almost all regular and rectangular. Why is this? And how is it limiting how we interact with computers?

## Why 3D print displays?

- Traditional display manufacturing: limitations in methods linked to flat objects (e.g. screen printing), production unsuited to small numbers of objects, inability to produce custom-shaped objects.
- Simulating irregular displays (augmented/virtual reality [1], projected displays [2]): limited resolution, reduced interactive immersion, issues with obscuration and realisation of designs.

3D printing and fabrication have the potential to produce physical interactive objects through *decentralised* production with user-centric *configurability* for irregularly shaped display objects [3].

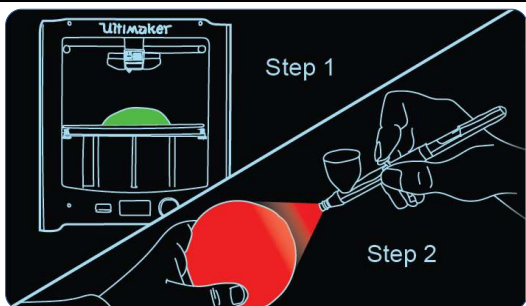


Figure 1: Our fabrication process for displays [4].

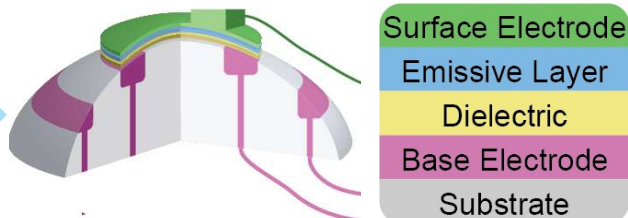


Figure 2: Technical layered structure for interactive objects.

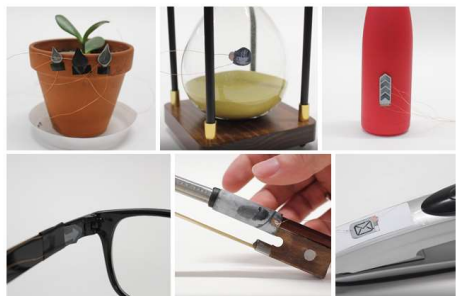


Figure 3: Fabricated E ink demonstration pieces [5].

**Evaluations:** Investigations into limitations around resolution, robustness, material layering and fabrication process.

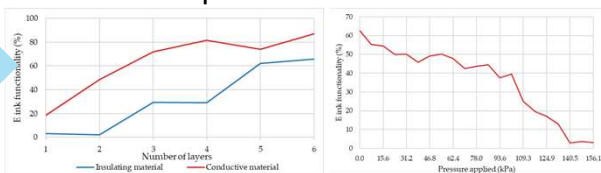


Figure 4: Evaluations on layer structure and pressure tolerance.

**Vision of display additive manufacturing:** We envisage unlocking the true potential of human computer interaction through *decentralisation* of display production and *democratisation* of fabrication processes.

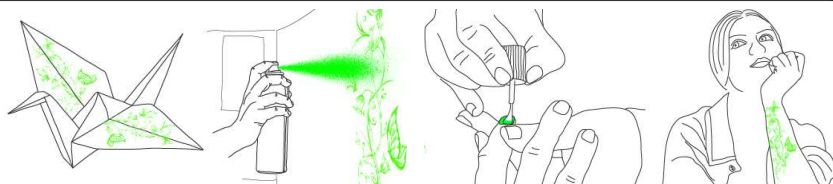


Figure 5: Our vision of digital origami, spray paint, nail polish and tattoos.

[1] Billingham et al., 2001, "Collaboration with tangible augmented reality interfaces"

[2] Benko et al., 2008, "Sphere: multi-touch interactions on a spherical display"

[3] Olberding et al., 2014, "PrintScreen: fabricating highly customizable thin-film touch-displays"

[4] Hanton et al., 2020, "ProtoSpray: Combining 3D Printing and Spraying to Create Interactive Displays with Arbitrary Shapes"

[5] Hanton et al., 2022, "FabricatINK: Personal Fabrication of Bespoke Displays Using Electronic Ink from Upcycled E Readers"