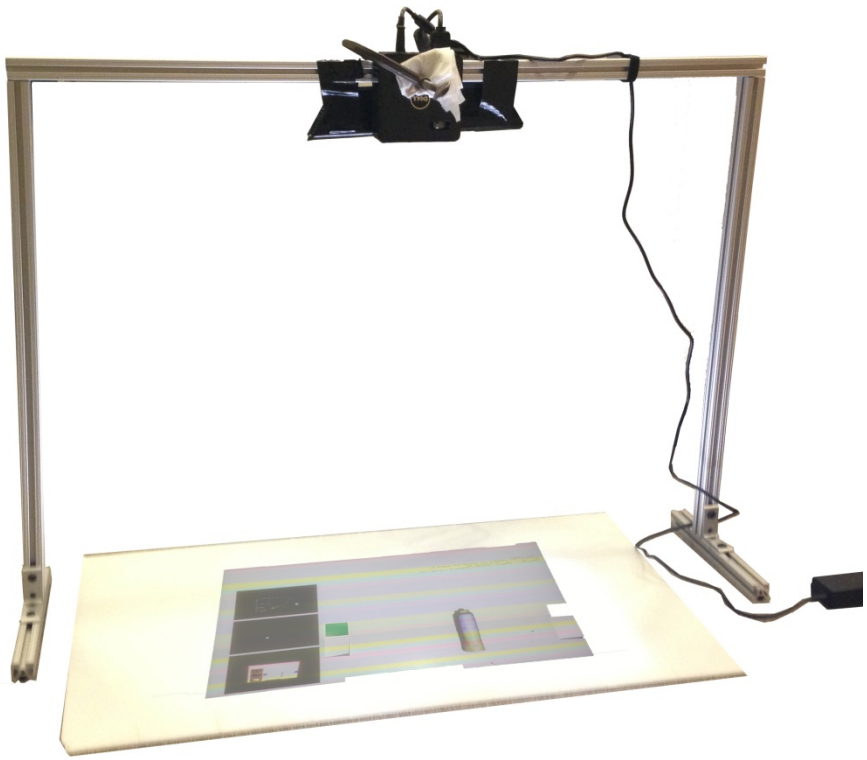
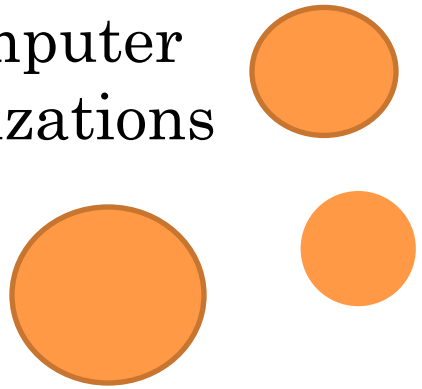


vMorph:
Visual Interface for Tangible morphing of objects

M. Ali Hashmi, Artem Dementyev, Heamin Kim, Amir Lazarovich, Hye-Soo Yang

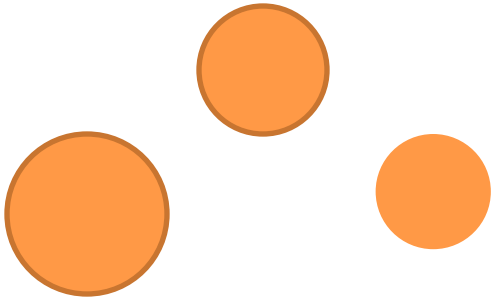
Why

- There is no physical means of interaction for creating hybrid design forms or do hybrid 3D modeling.
- How to extend and transform the physical world in a digital space. (Bring everyday objects into digital world)
- How do we create numerical geometry based on everyday objects for 3D metamorphosis.
- Applications: fabrication, 3D printing, computer aided design (CAD), and geometric visualizations

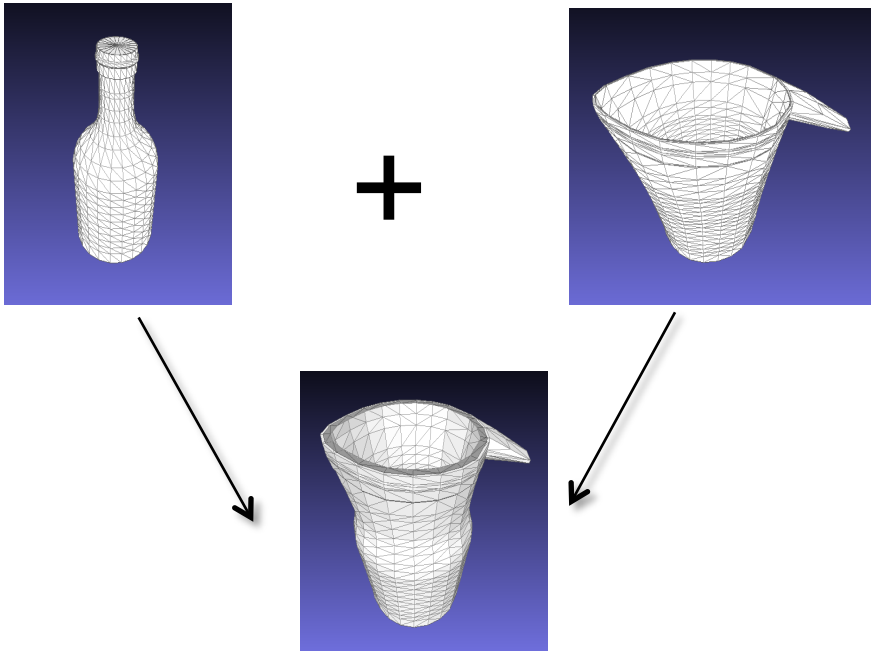


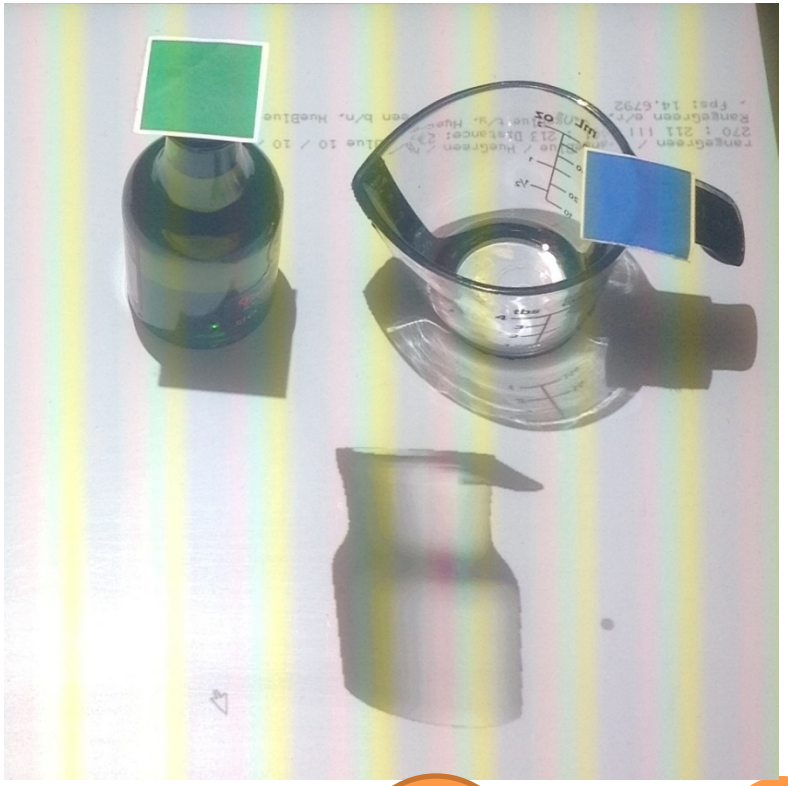
Description

- A physical way of grafting one form into other
- A way of capturing merged objects
- Interface for tangible interaction with 3D digital shadows
- Interaction results in a 3D metamorphosis of physical objects in the digital world
- For example, take object 1 and object 2, and through their interaction produce object 3 in the digital space.



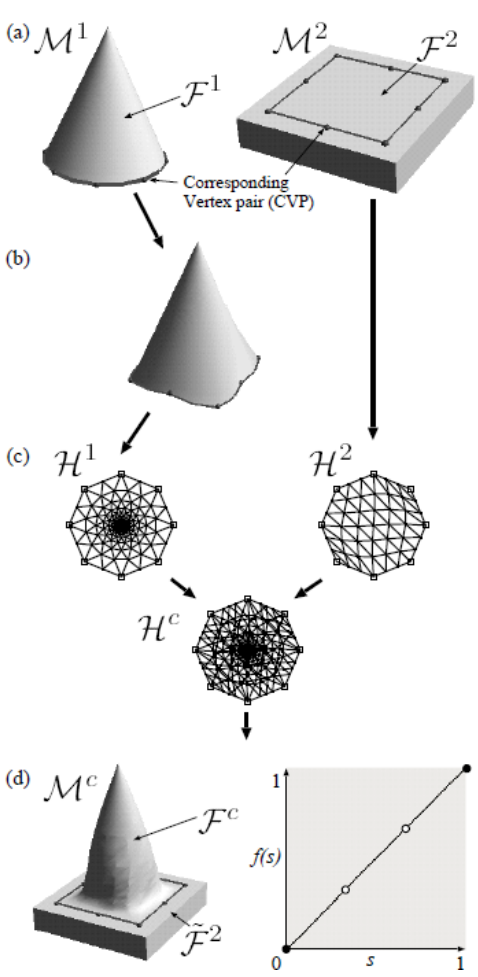
Description: object merge

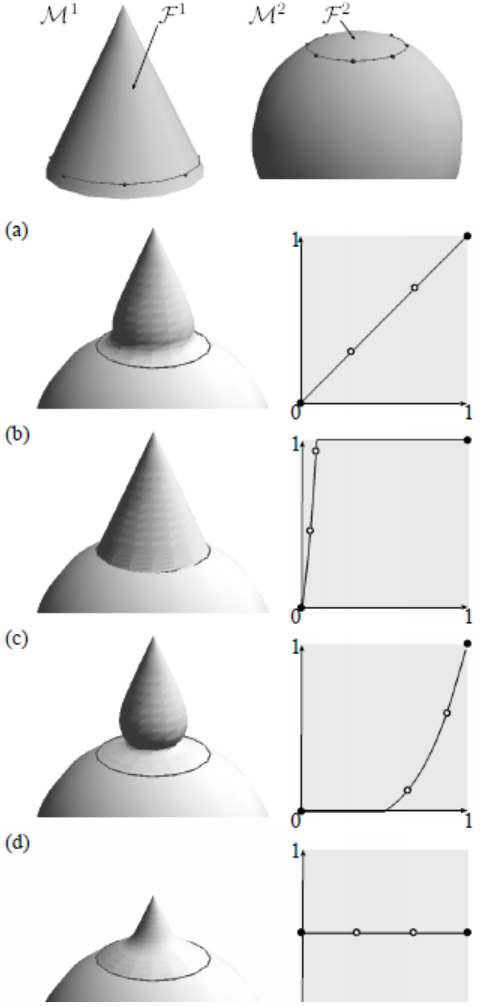




Past work

- Interactive mesh fusion based on local 3D metamorphosis (Kanai et al.,1999)
- This paper proposes a new mesh modeling scheme, called *mesh fusion*, based on three-dimensional (3D) meshbased metamorphosis.



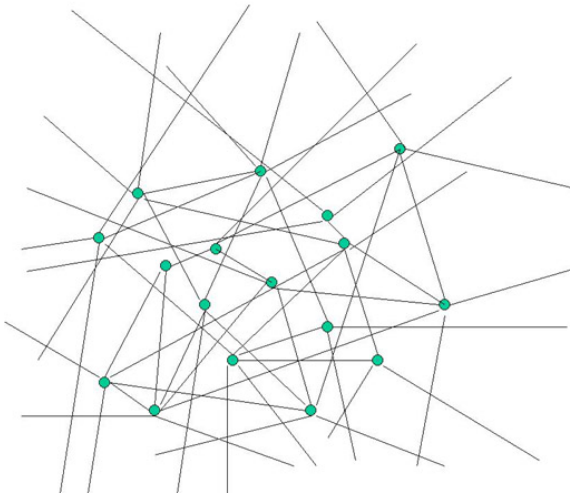


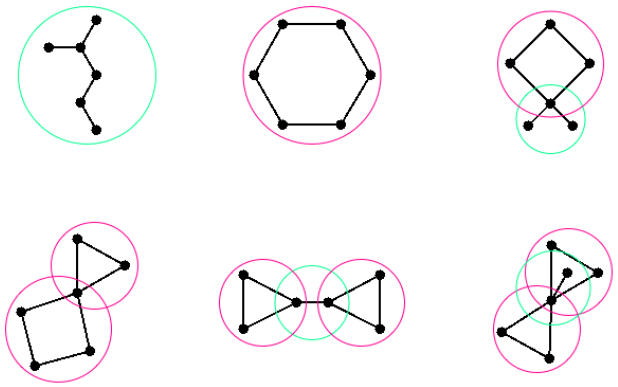
Grafting

- Tissues from one plant inserted into another so that the two sets of vascular tissues may join together
- Grafting one <u>form</u> into another
- Form <u>attaches</u> itself to another form and begins exploring its <u>new potential</u>

Rhizome

- Any point can be connected with any other
- However, a good design requires seamless fusion of form and function



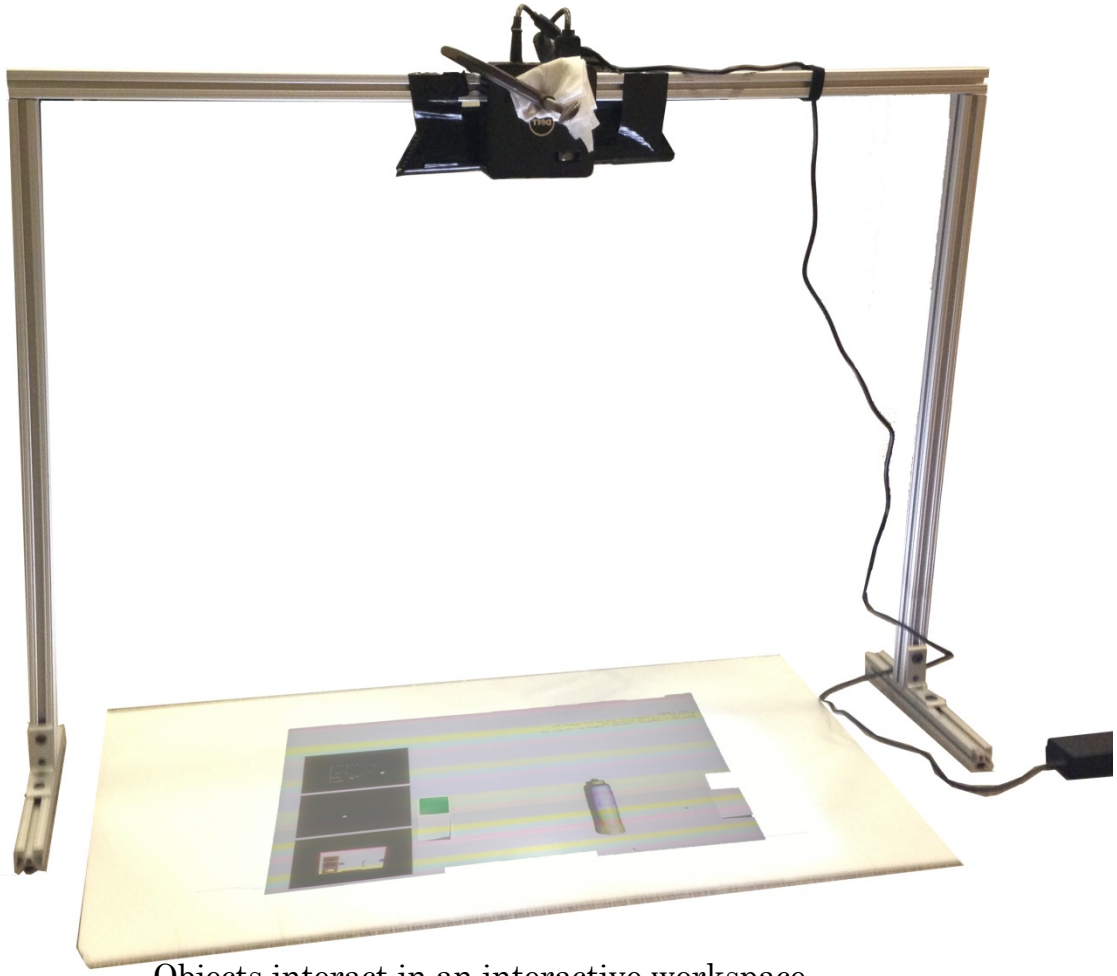


Adaptation: new forms

- Friedrich Kittler's notion of adaptation: "It is we who adapt to the machine. The machine does not adapt to us."
- Similarly, the new form does not have to adapt to us; rather, it is we who have to adapt to the form.

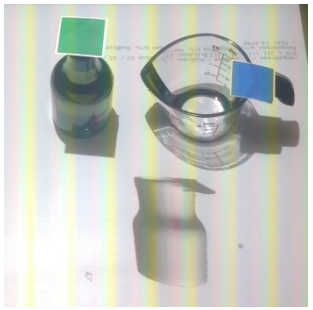
How it works

Physical workspace is augmented by Kinect sensor and image projector



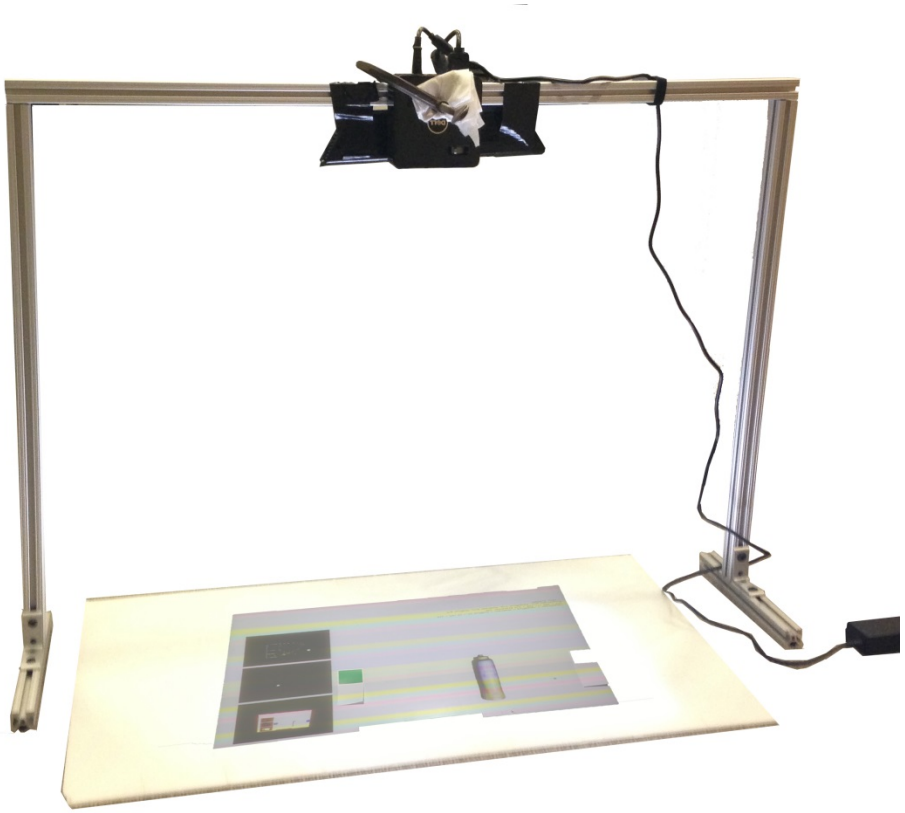
Objects interact in an interactive workspace

Objects are 3D scanned and are translated into geometric forms for machine interaction by a motion/vision interpreter program



Tangible object interaction is translated into 3D metamorphosis in digital world subject to algorithmic and geometric constraints

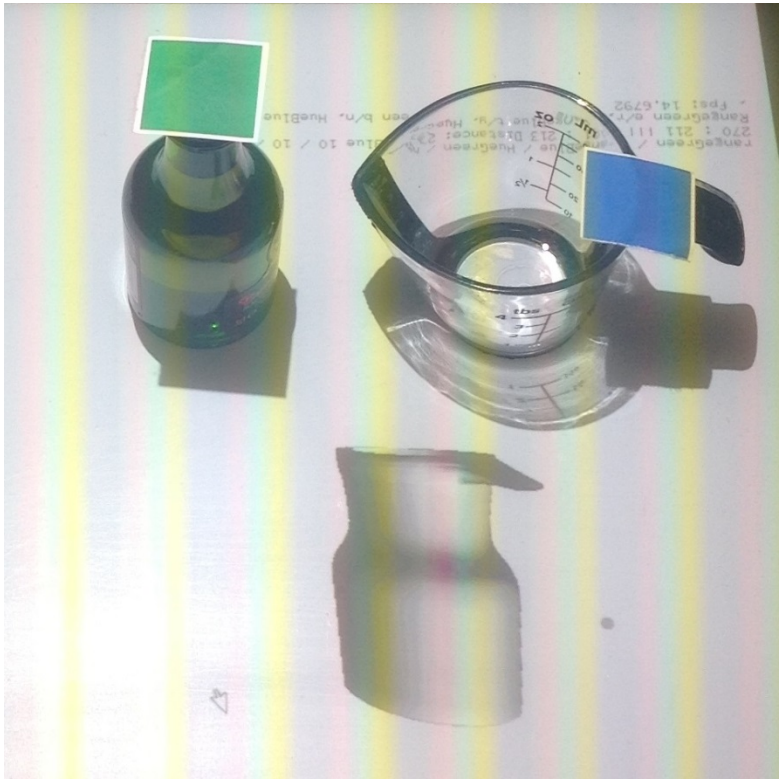
DEMO VIDEO



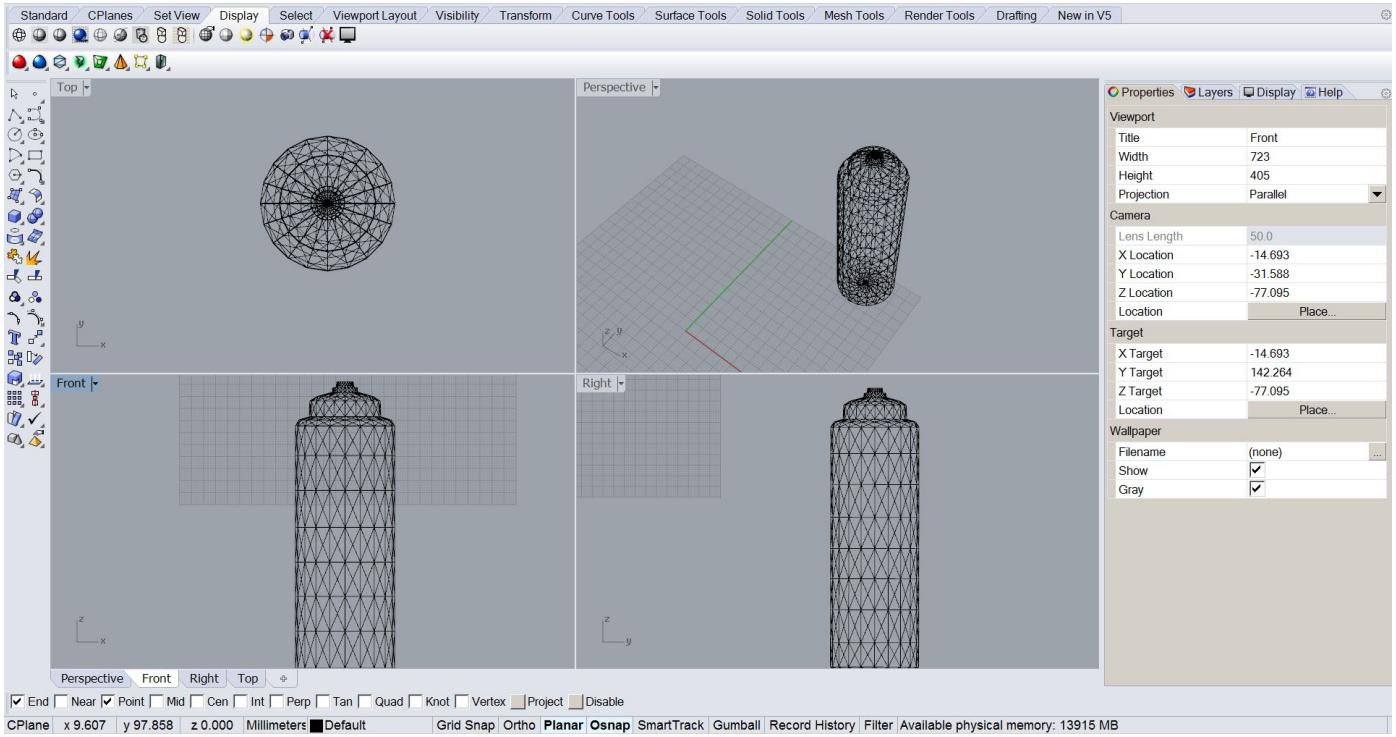
https://vimeo.com/77008275

Affordance inheritance

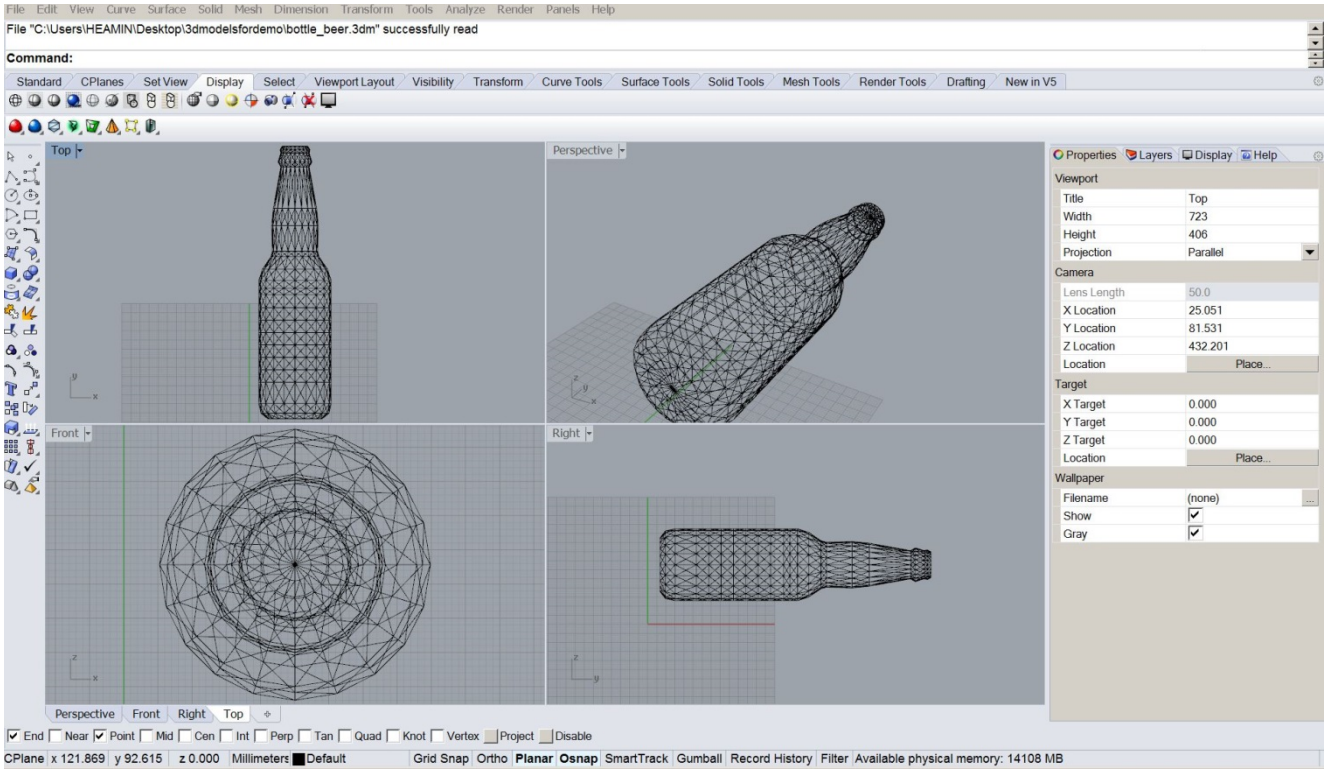
- Affordance matters (McGrenere et al.,2000)
- Physical objects inherit affordance from the material they are made of (Hornecker, 2012)
- Similarly, digital objects inherit affordance from digital objects they are made of.



Merging two objects: multiple scenarios

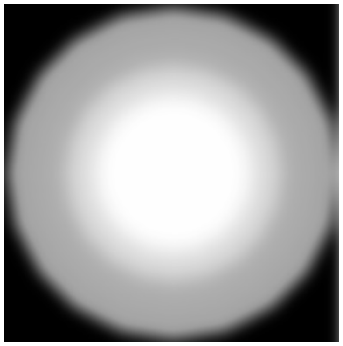


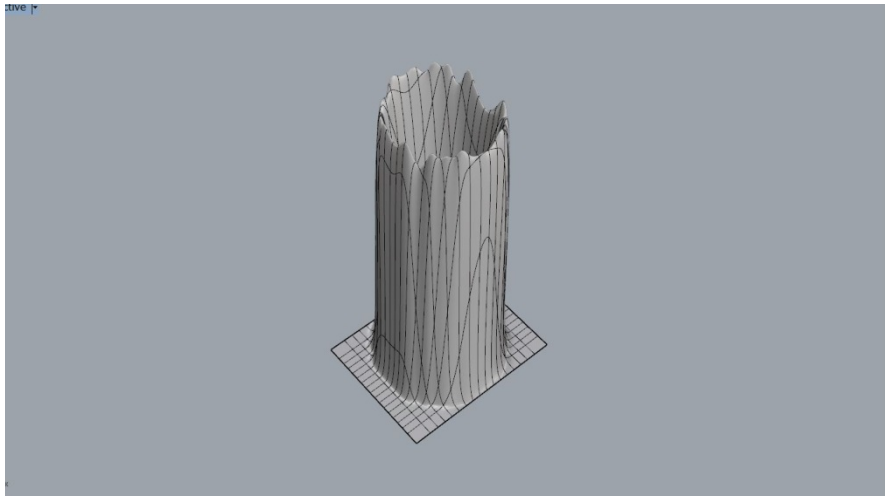
Merging two objects: multiple scenarios

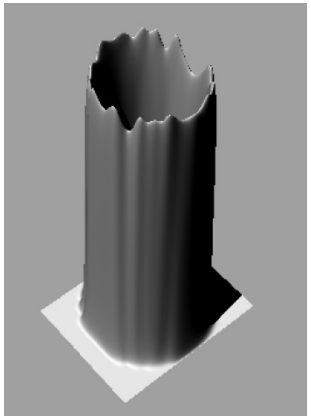


Object merging: final cross-section

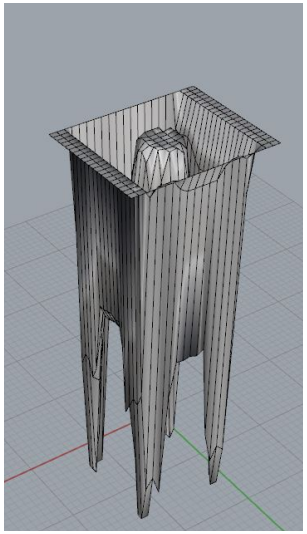
+

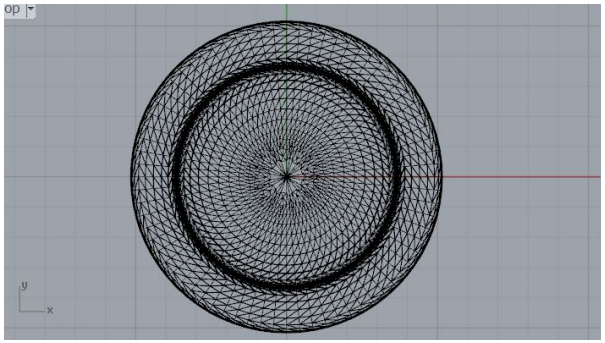






Coca-Cola

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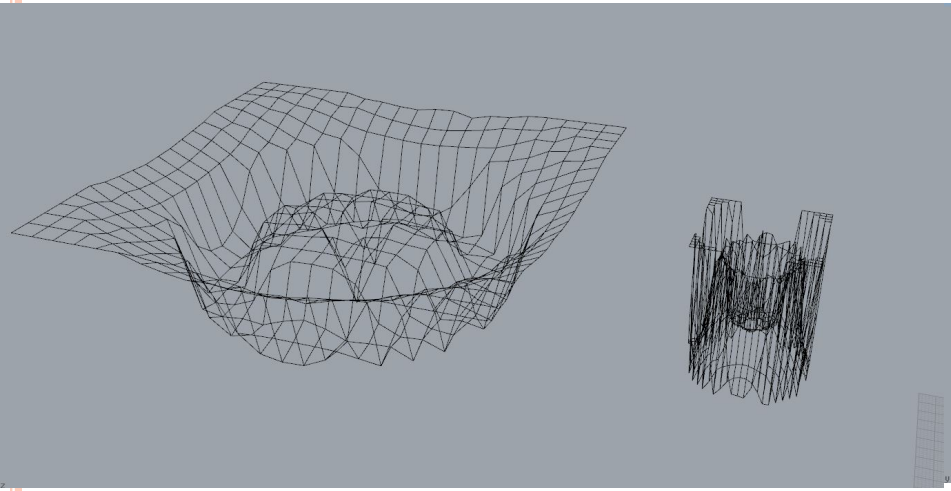
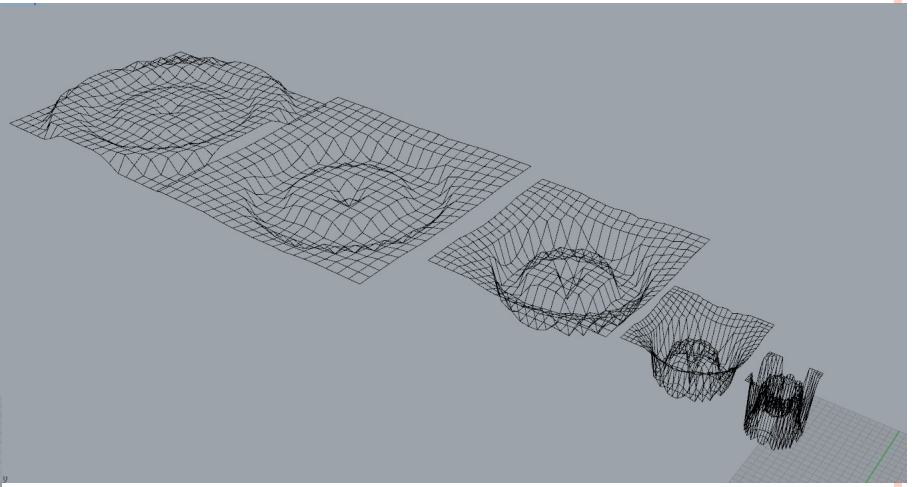
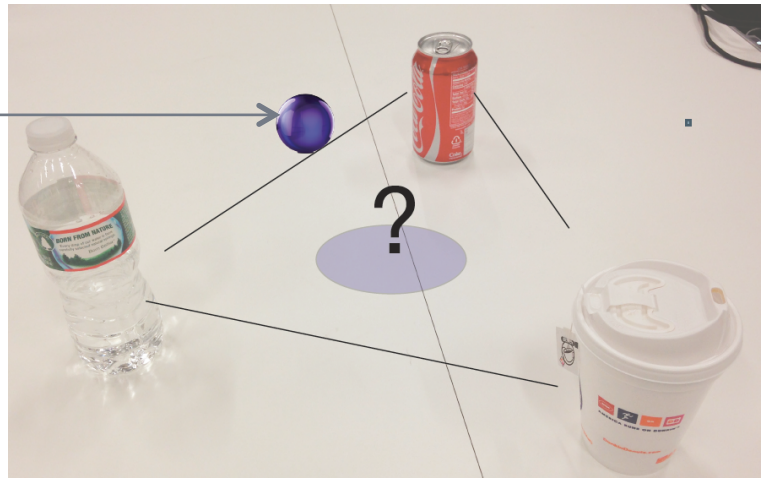
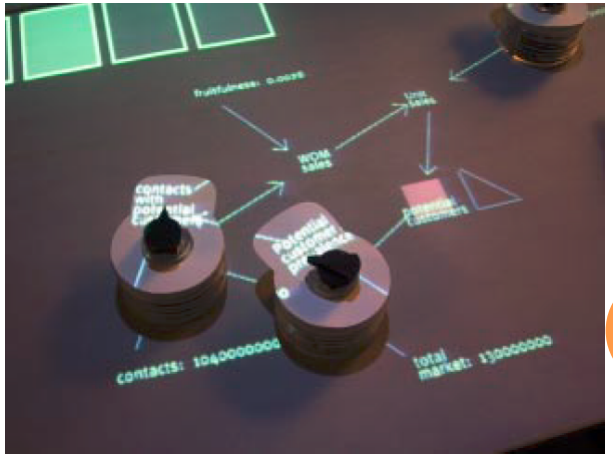




Future direction: physical object as algorithm modifier

- Physical workspace is augmented by adding constraints and freedoms through a physical constraint object
- Analogous to "physical dials and modifiers" in Sensetable (Patten, 2001)
- The physical constraint object has different modes and changes the interaction parameters for the objects. For example, you can change weights or coefficients for each interacting object for 3D fusion.
- Or you can switch to augment mode (i.e. attaching one form to another) instead of fusion mode (combining one form with another).