ANIMAFLUID a dynamic liquid interface

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Metaphor: Water

Shapeless

Formless

Adopts shape

Adopts form

1. http://serc.carleton.edu/eslabs/drought/1.html

2. http://hdwallpc.com/fullwallpaperhdpc/water-wallpaper-hd-dekstop-free-download.html

Metaphor: Magnetism

Characteristics:

Cohesion, Attraction

Signified:

Act of "animation"

Liquidity + Magnetism

Animated Liquidity

3. http://www.organicui.org/?page_id=74

4. http://adhitsbgja.blogspot.com/2013/03/ferro-fluid-magic-liquid.html

Prior Work

Snoil

Property_physical display

Material_based on Ferrofluid

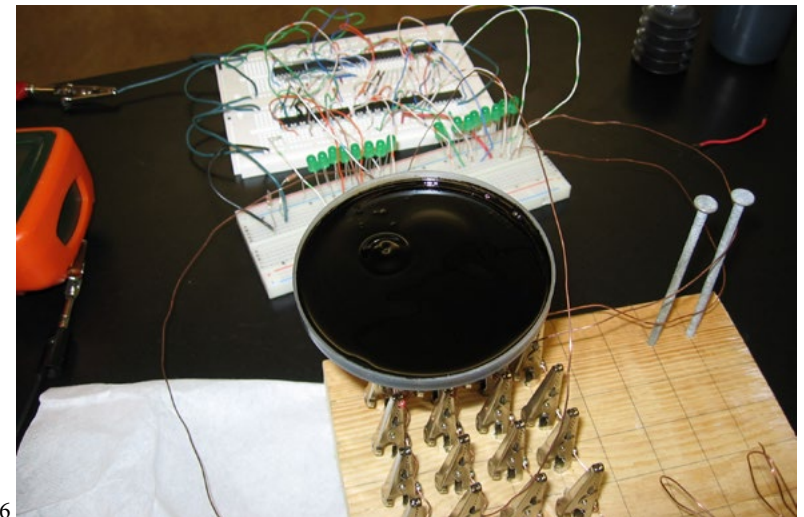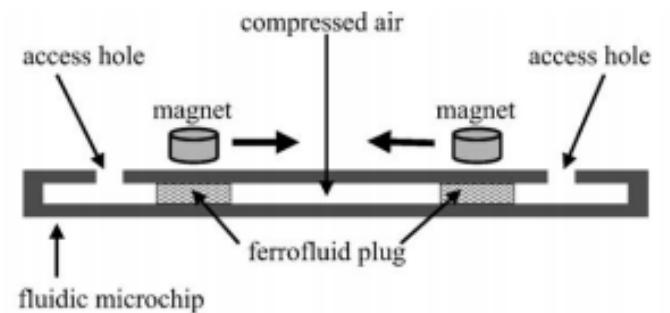Ferrofluid-based microchip pump
and valve (Hartshorne et al. 2004)

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http://www.freymartin.de/en/projects/snoil

http://www.sciencedirect.com/science/article/pii/S0925400504000322

5 ,6 snoil/ 7 Ferrofluid - based microchip pump

Prior Work

Create a Chemical Reaction

Sensetable (Patten et al. 2001)

.Fluid

A reactive surface (ideation)

http://dl.acm.org/citation.cfm?id=365112

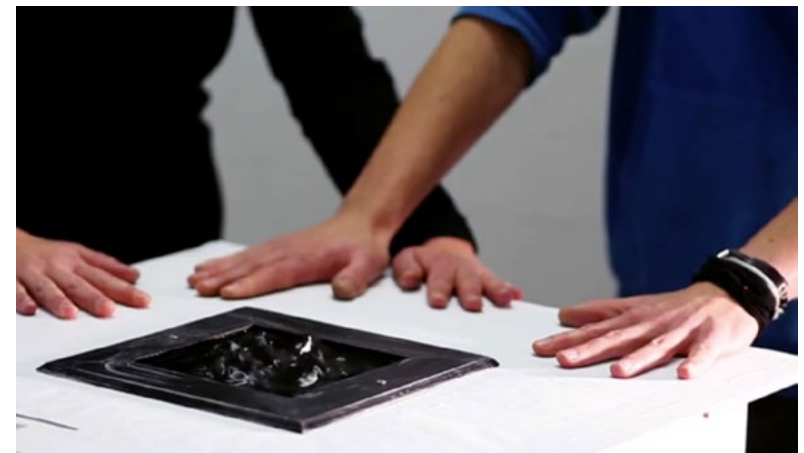http://cargocollective.com/hnx/fluid

8 Create a chemical reaction from Patten studio/ 9,10 .fluid
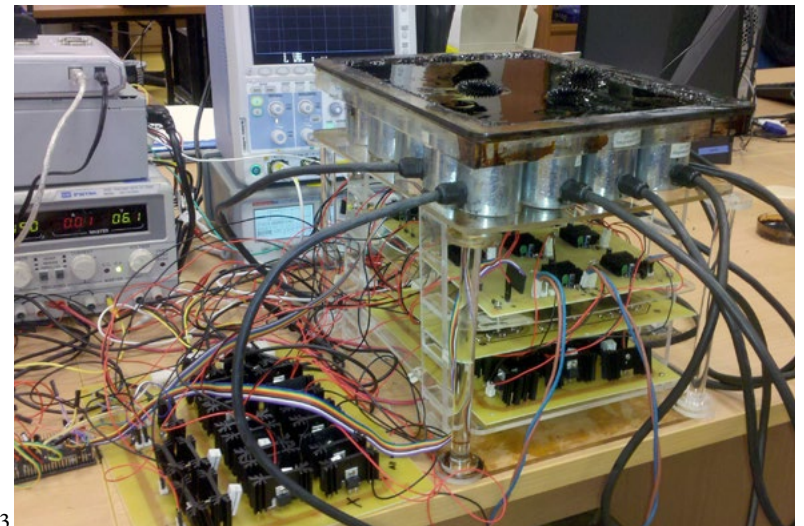
Prior Work

Liquid Interfaces

"A Malleable, Transient, Direct-Touch interface"
from Mixed Reality Lab

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http://www.mixedrealitylab.org//media/all%20videos/Liquid/LiquidInterfacesPerformanceVideo.m4v
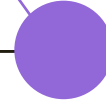
http://www.mixedrealitylab.org

11,12,13 Liquid Interface

**Strong Matter Property
Interaction with materials**
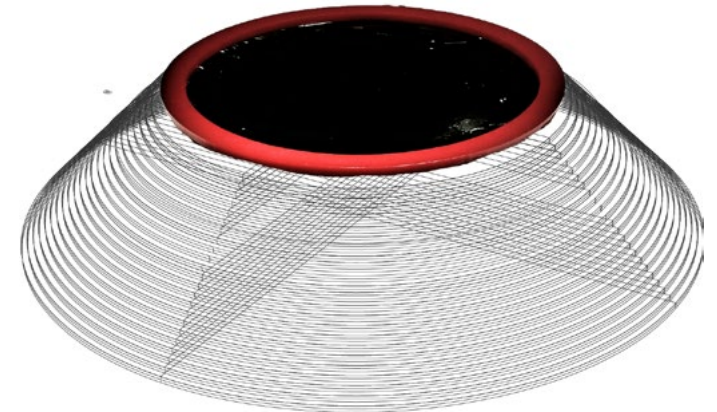
ANIMAFLUID
Liquid-Stream -Interface

Sensible Reactive surface

Dynamic liquid interface

Ferrofluid controlled by programmable switches and electromagnets

* Touch interface that actuates change, flux or movement
* Programmable material with a diverse range properties
* Could be programmed using touch, acoustic, magnetic and other sensors
* For instance, touching the material will invoke shape change

User interaction

Touch interface

Dynamic liquid interface (contd.)

Ferrofluid controlled by programmable switches and electromagnets
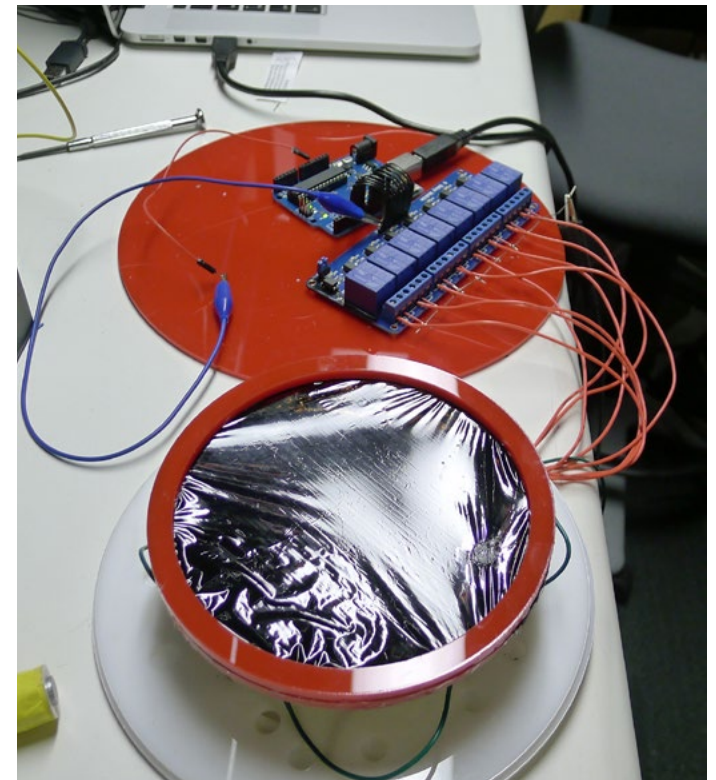
* Type of interaction or modality could be changed
  by using different materials:

  * Materials:

    silicone, plastic wrap, silicone-ferrofluid hybrid or
    any other material
  * Modalities:

    rotation, retraction, depression, elevation,
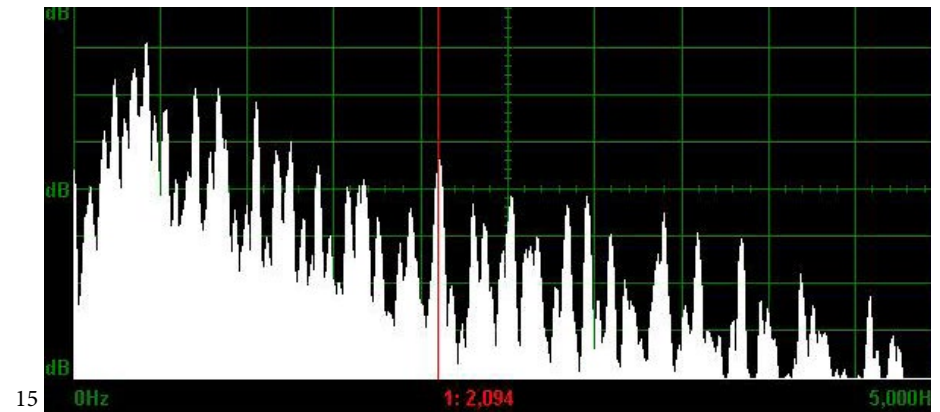   protraction, vibration, expansion

Dynamic liquid interface (contd.)

Ferrofluid controlled by programmable switches and electromagnets

Programmed interface & Automatic play

* Visual interface for music or sound input
(both tempo and volume)

* Translates musical form into liquid form
(fractal effect, warping, morphing)
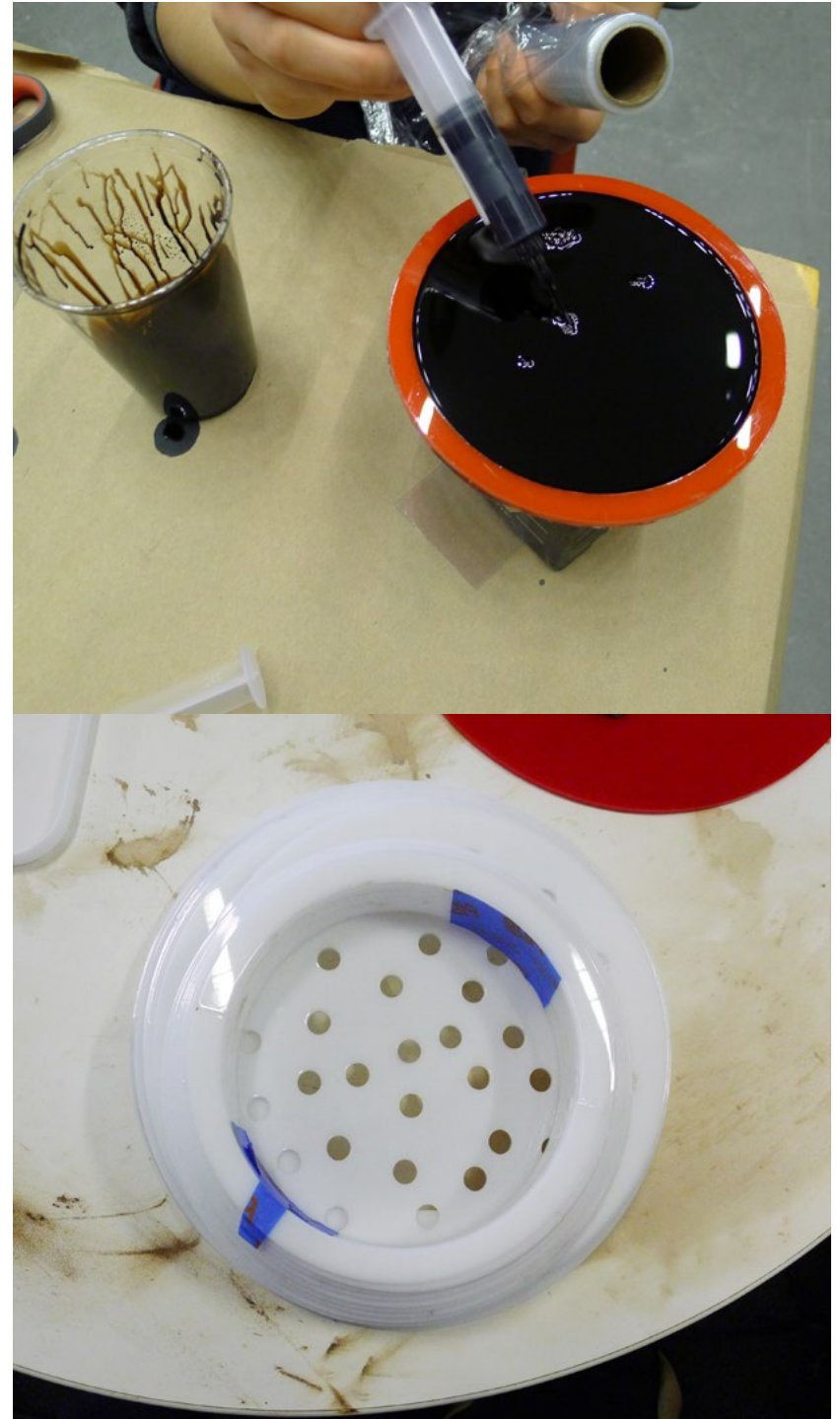

15. http://www.winradio.com/home/ds.htm

Structure

Layer 1: Ferro-fluid in plastic pack

Layer 2: Pressure sensor

Layer 3: Electromagnets on a grid matrix
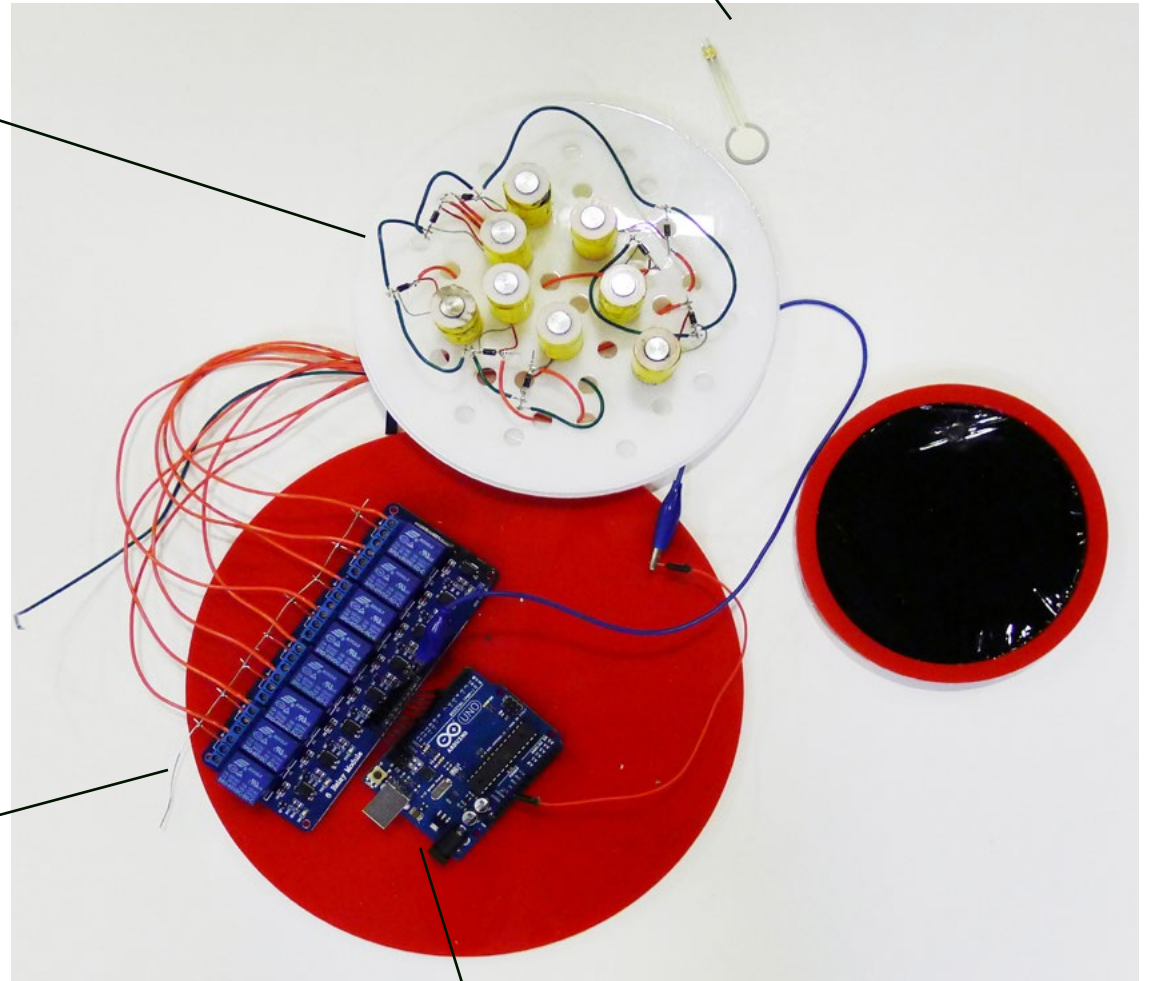
Layer 4: Controller

Touch sensors

Electromagnets on a grid matrix
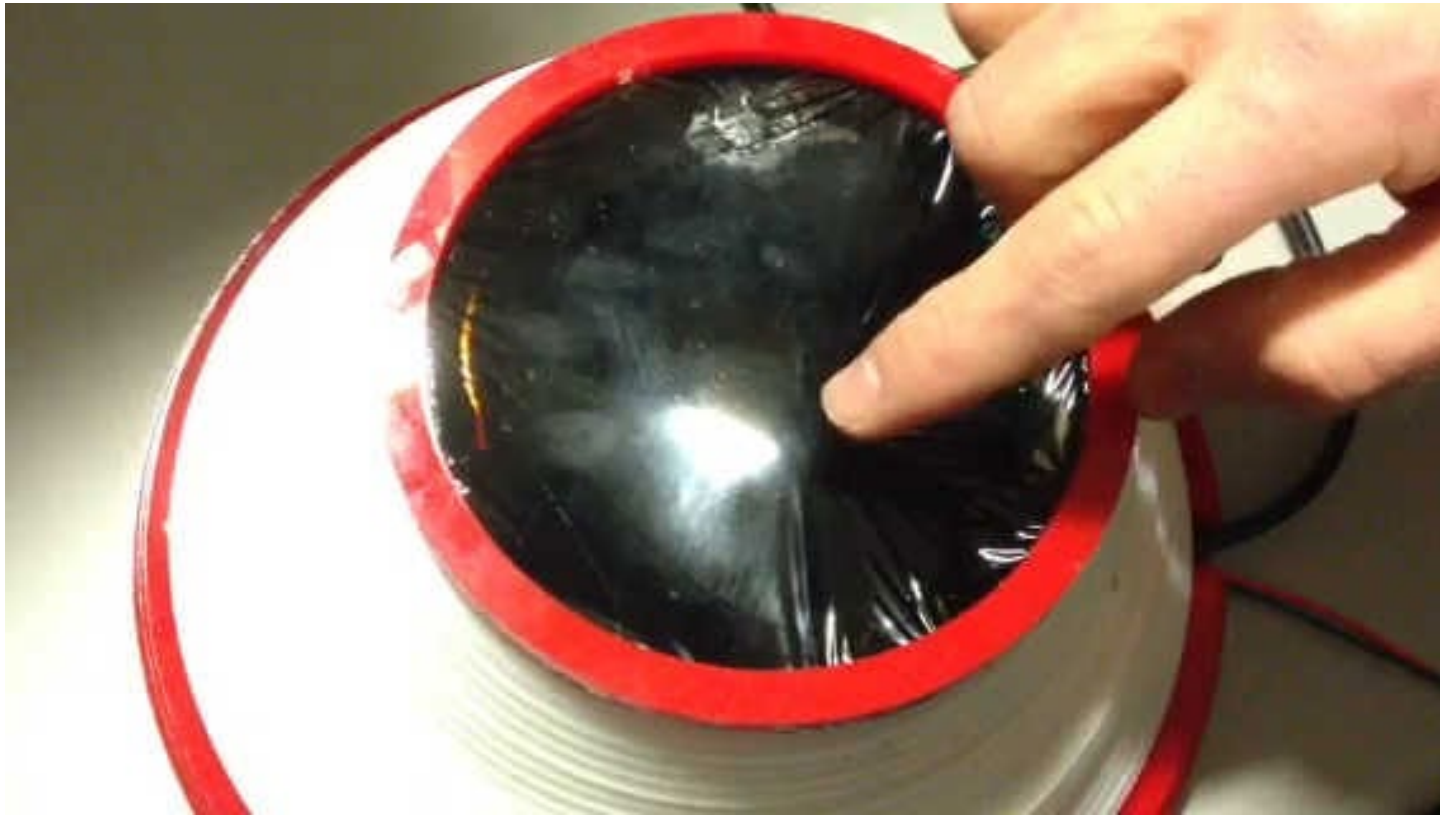
Relays

Arduino

Programmed Interface with input channels

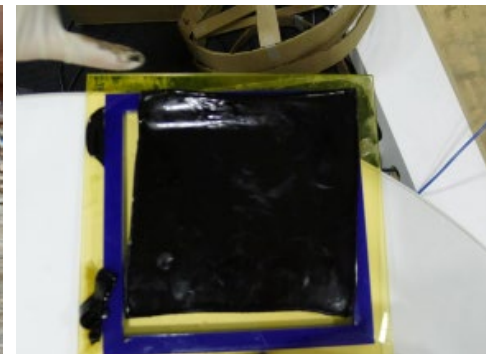13.12.08

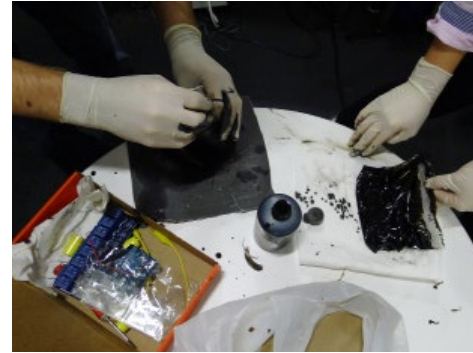music by Sang

Touch Interface
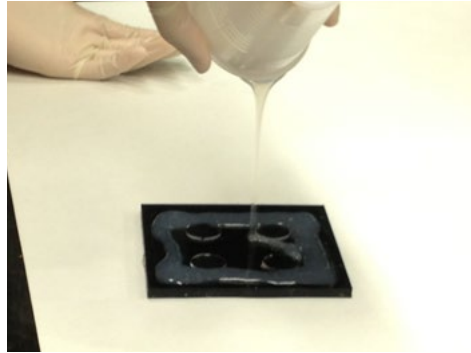13.12.08

Process for

Layer 1: Ferro-fluid in plastic pack

Layer 2: Touch sensors

Layer 3: Electromagnets on a grid matrix

Layer 4: Controller

Layer 1 & Layer 2

Layer 3 & Layer 4

Process for

Layer 1: Ferro-fluid in plasstic pack

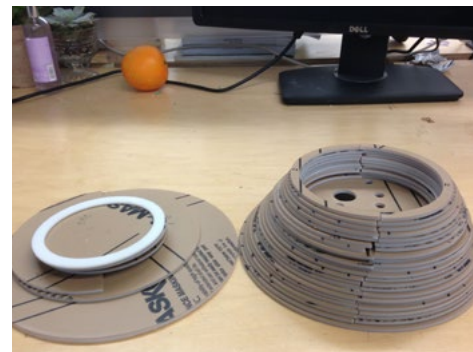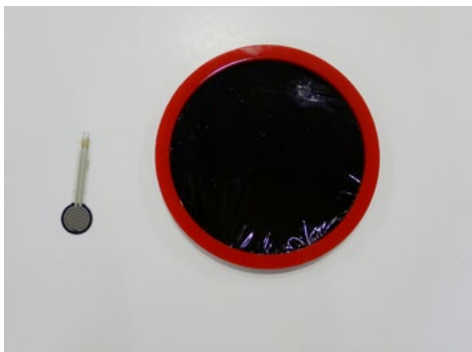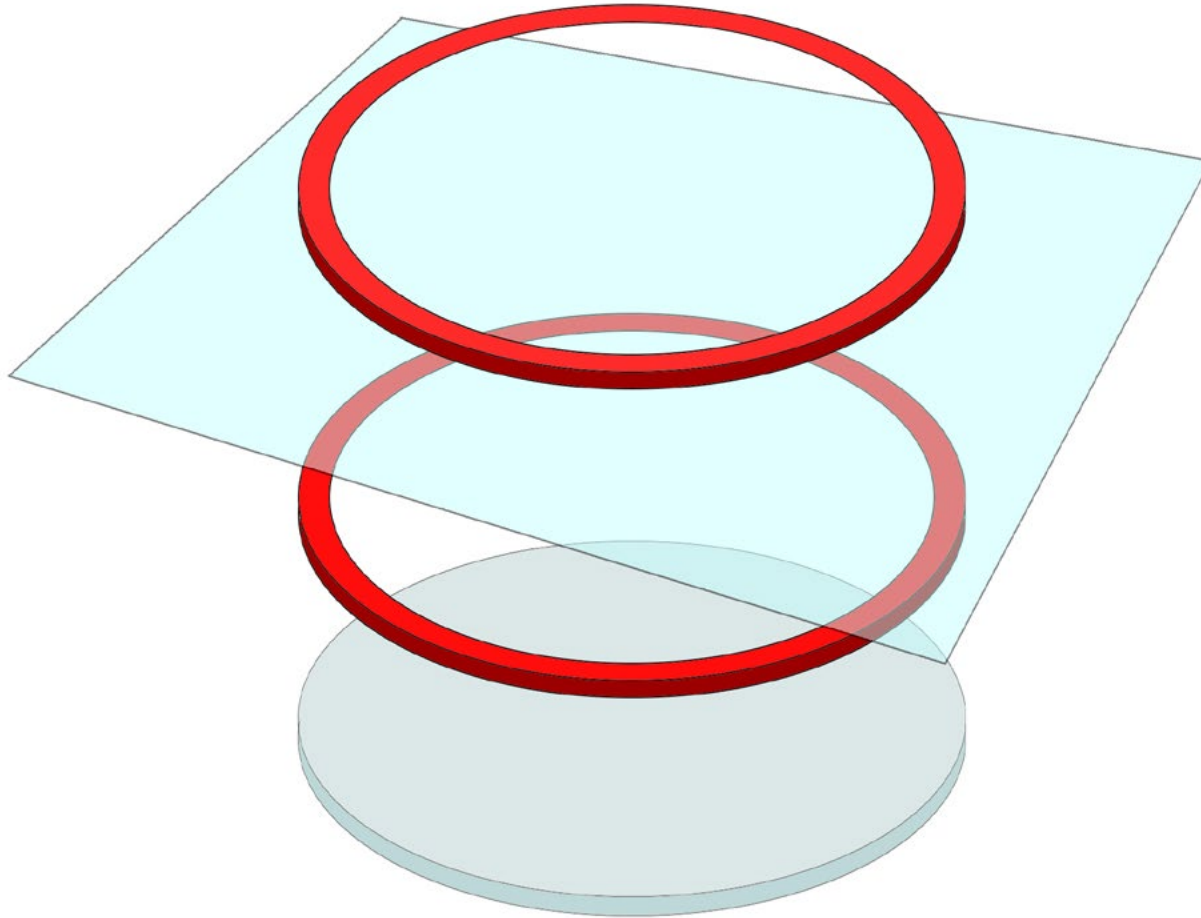Layer 2: Touch sensors

Layer 3: Electromagnets on a grid matrix

Layer 4: Controller

Property: Responsiveness

Force: pull

Response:

contraction, vector change

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http://www.pcsd.k12.ny.us/bwoods/Regents%20Biology/Chapter%2004%20Chemi-cal%20Compounds%20of%20Life/Chapter%204%20Home/Chapter4Notes.htm

16. http://www.123rf.com/photo_6605902_blue-water-drops-background.html

17. http://depositphotos.com/5645197/stock-photo-Woman-hand-in-water-splash.html

Property: Rotation

"Floating drops of magnetic fluid can be brought into rotation by applying a rotating magnetic field." - K. I. Morozov et al 2002

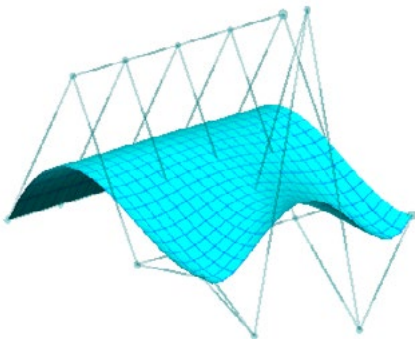
G=34.2 Oe

1 cm
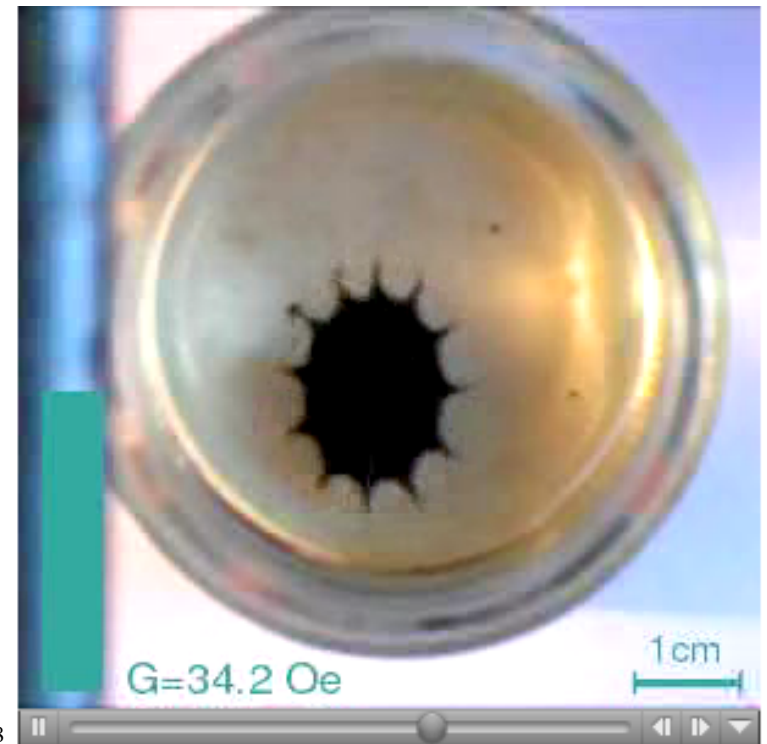
http://iopscience.iop.org/0295-5075/58/2/229/pdf/epl_58_2_229.pdf

http://www.statphys.uni-oldenburg.de/research/movie1.mpg Rotation

http://www.statphys.uni-oldenburg.de/research/magnetic_fluids.shtml

Future Direction

* Synthetic memory material combining properties of both ferrofluids and silicone
    * 3D surface interface instead of one plane surface

* Dynamic form adjustment:
    * Conforms to input form of an object:
    * Changes shape accordingly
    * Programmed using pressure and touch sensors

Concept image

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20
21
22

19. http://people.eecs.ku.edu/~miller/Courses/IntroToCurvesAndSurfaces/page5.html   20. http://global.rakuten.com/en/store/e-office/item/twistn30/

21. http://bangerzsunz.com/twist_n_flex.htm   22. http://www.extremetech.com/extreme/152970-shape-changing-plastic-could-give-touchscreens-real-physical-clicky-keyboards