

One-Handed Interaction Techniques for Multiple Pressure-Sensitive Strips

**Gábor Blaskó
Steven Feiner**



**Computer Graphics and User
Interfaces Lab
Department of Computer Science
Columbia University**

Goals

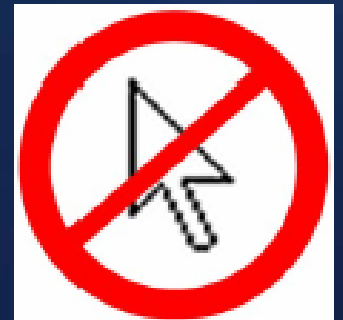
- Small form factor manual input device & GUI
- Wearable friendly
- Single-handed operation
- Minimize interaction time

In WIMP interfaces:

1. Move hand to device

~~2. Move cursor to widget~~

3. Change parameter with widget



- Eliminate on-screen cursor navigation

Results

- One handed
- Mobile
- Off the shelf technology
- Control up to 14 widgets
- Minimize/eliminate widget screen space

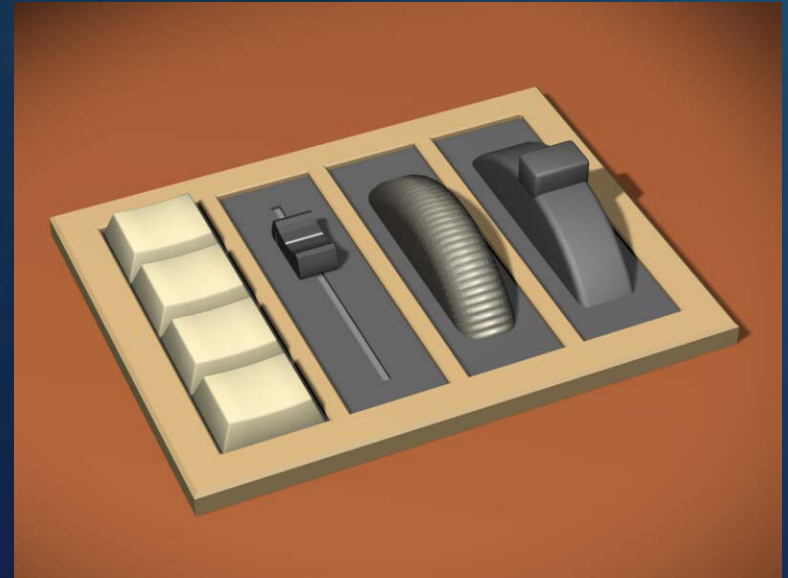


Basic Approach

Subdivide touch-sensitive surface into four 1D linear strips



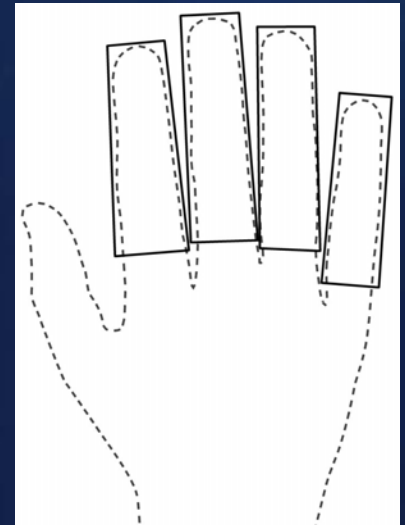
Changes a traditionally 2D device into a 4 x 1D device



Virtual Widgets:

- Buttons of variable sizes
- Slider
- Spinner wheel
- Spring loaded wheel

→ Fast reconfigurability in software



Enhancement 1: Pressure

“Pressure” with
capacitance sensing

**Can I sense
pressure?**

Finger presses harder



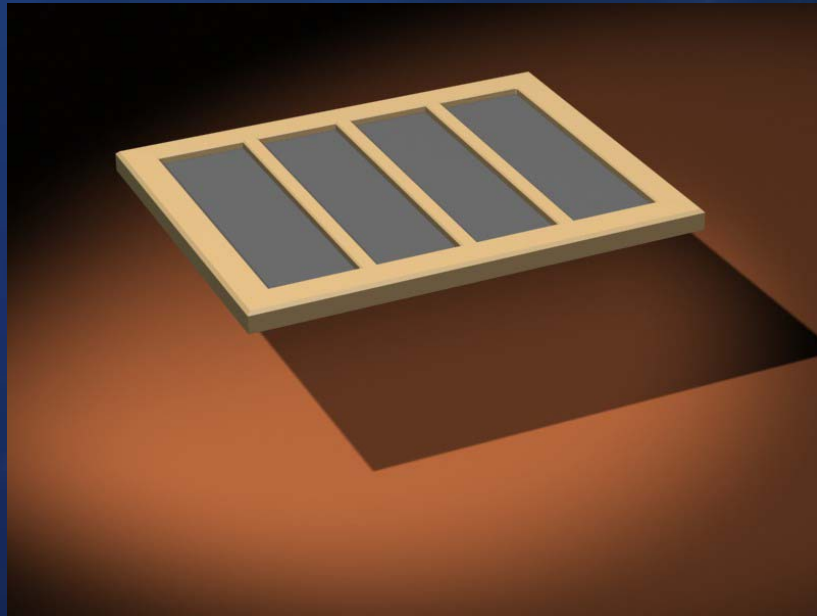
Contact area increases



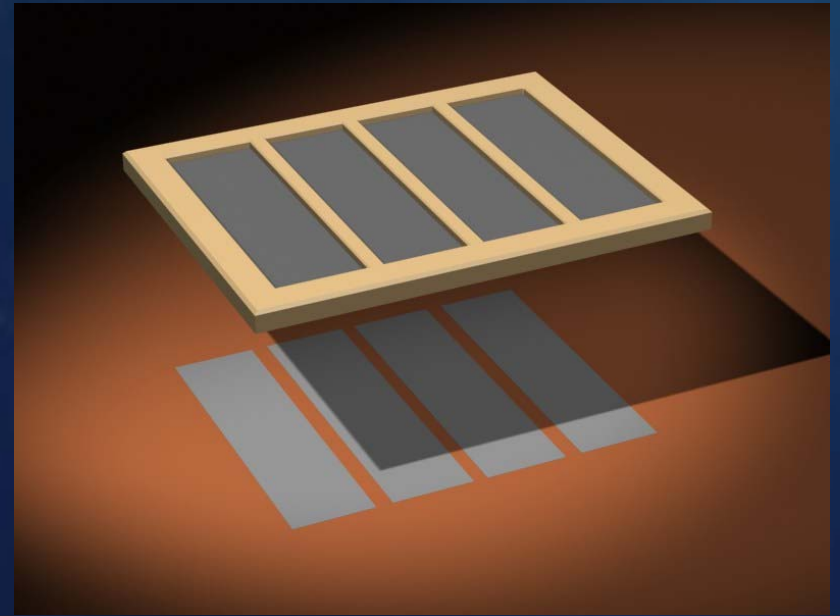
Capacitance increases



Pressure sensitivity virtually doubles number of strips



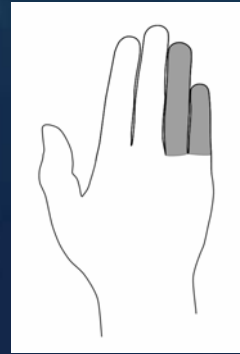
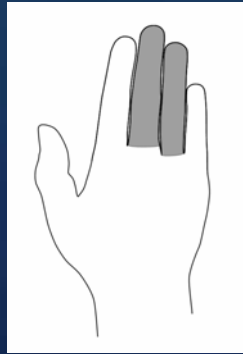
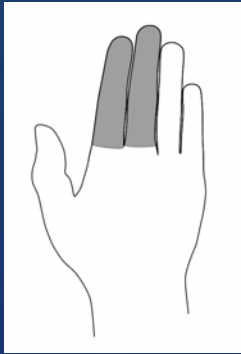
4 x 1D



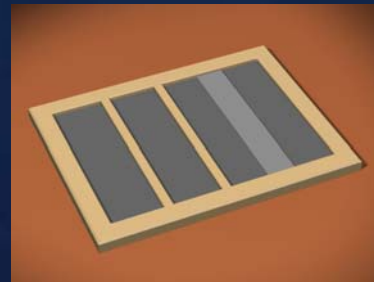
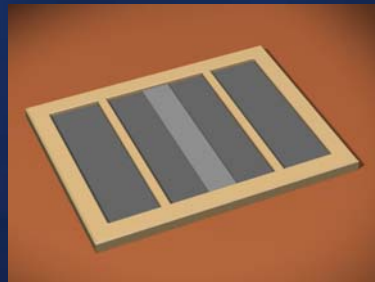
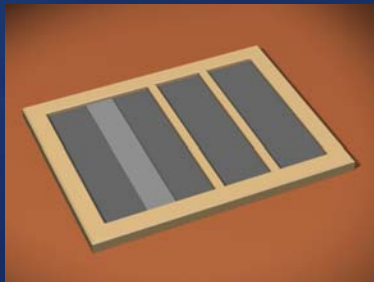
8 x 1D



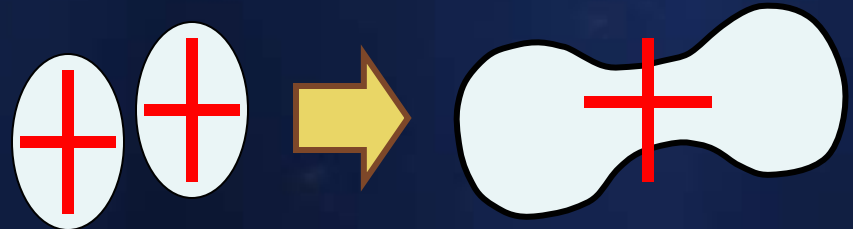
Enhancement 2: Dual-finger Strips

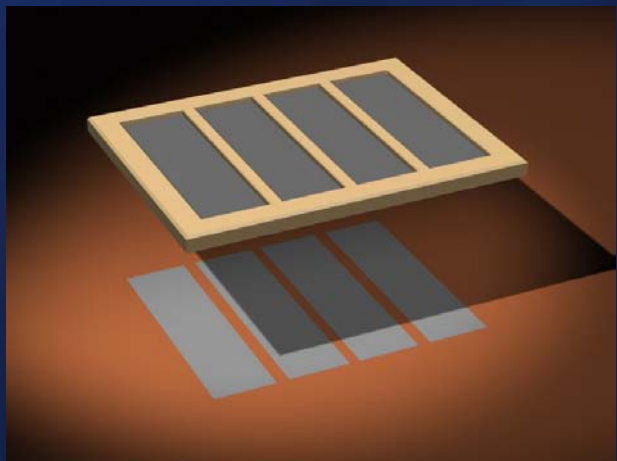
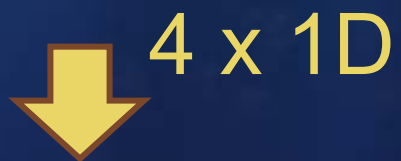
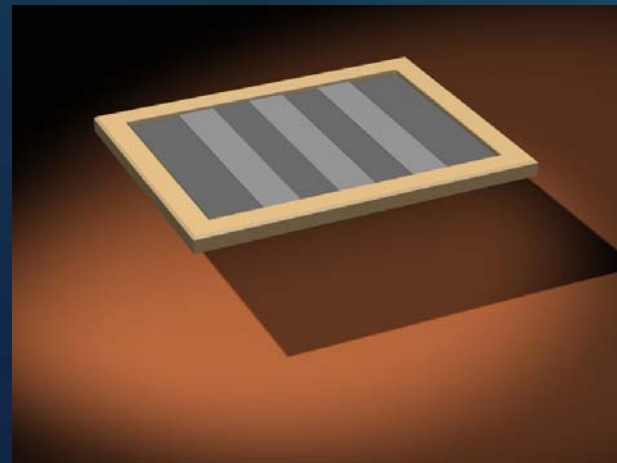
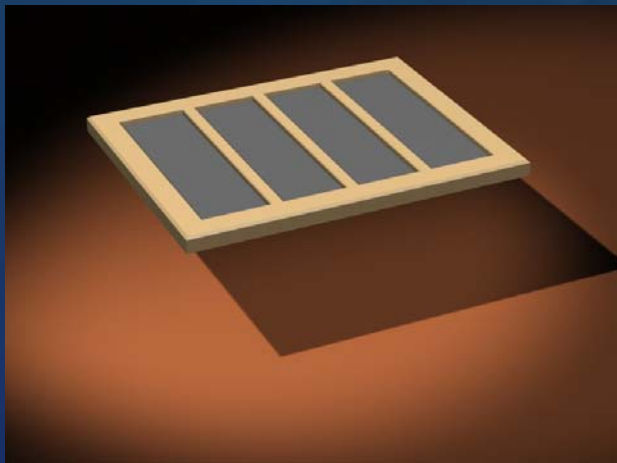


**Can I sense
multiple
fingers?**

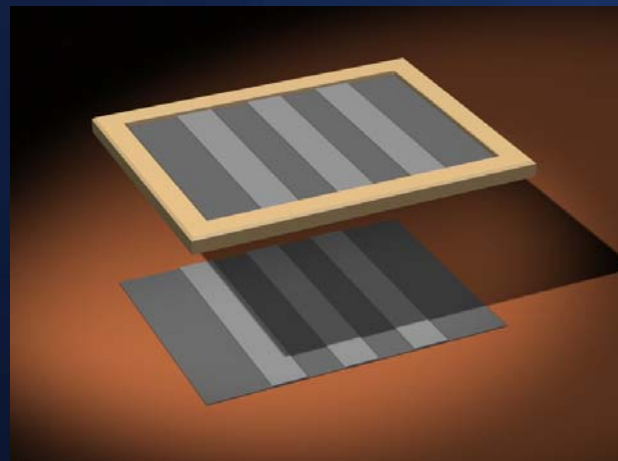


- Position of centroid of two contact areas
- Larger capacitance

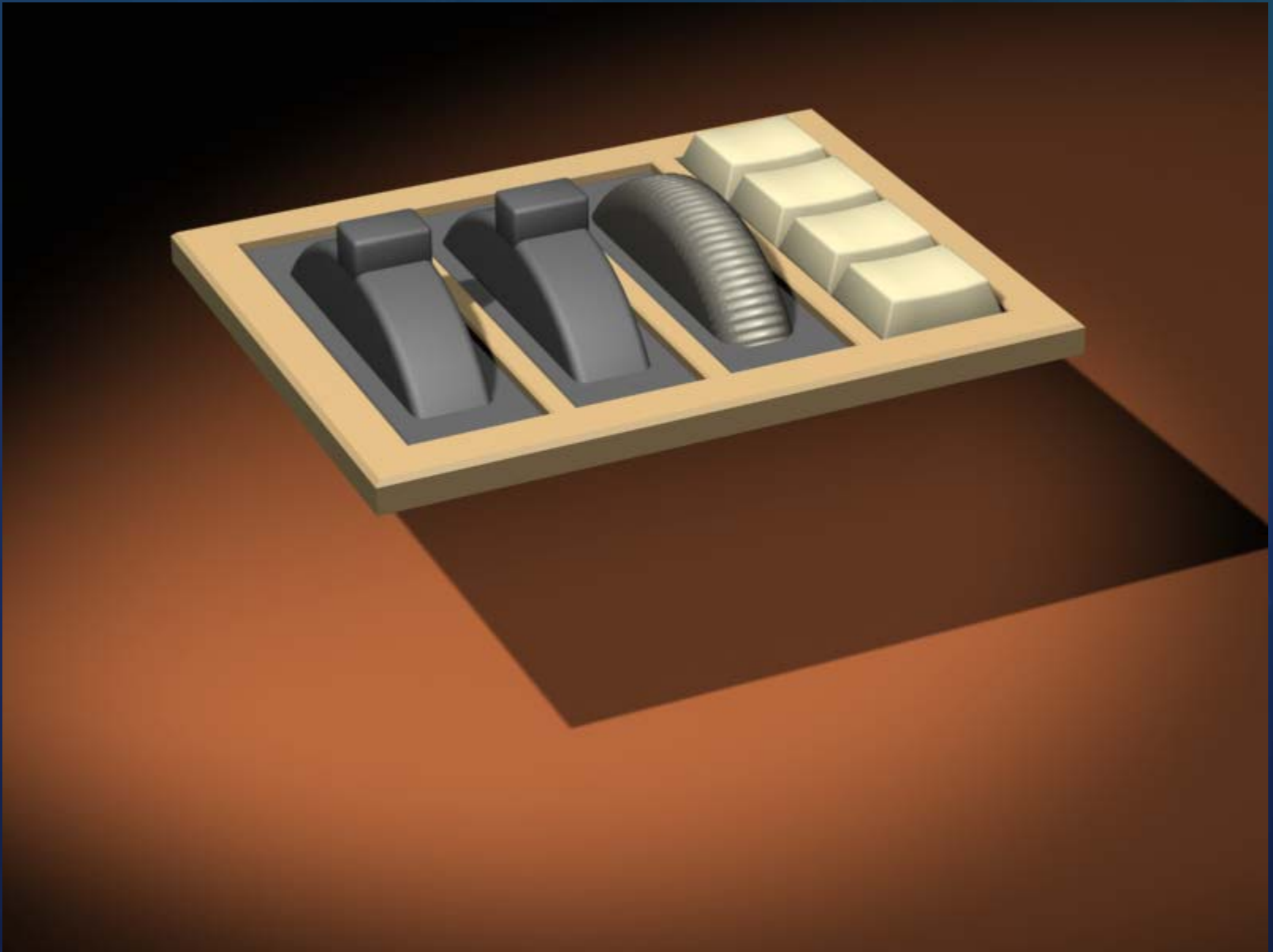


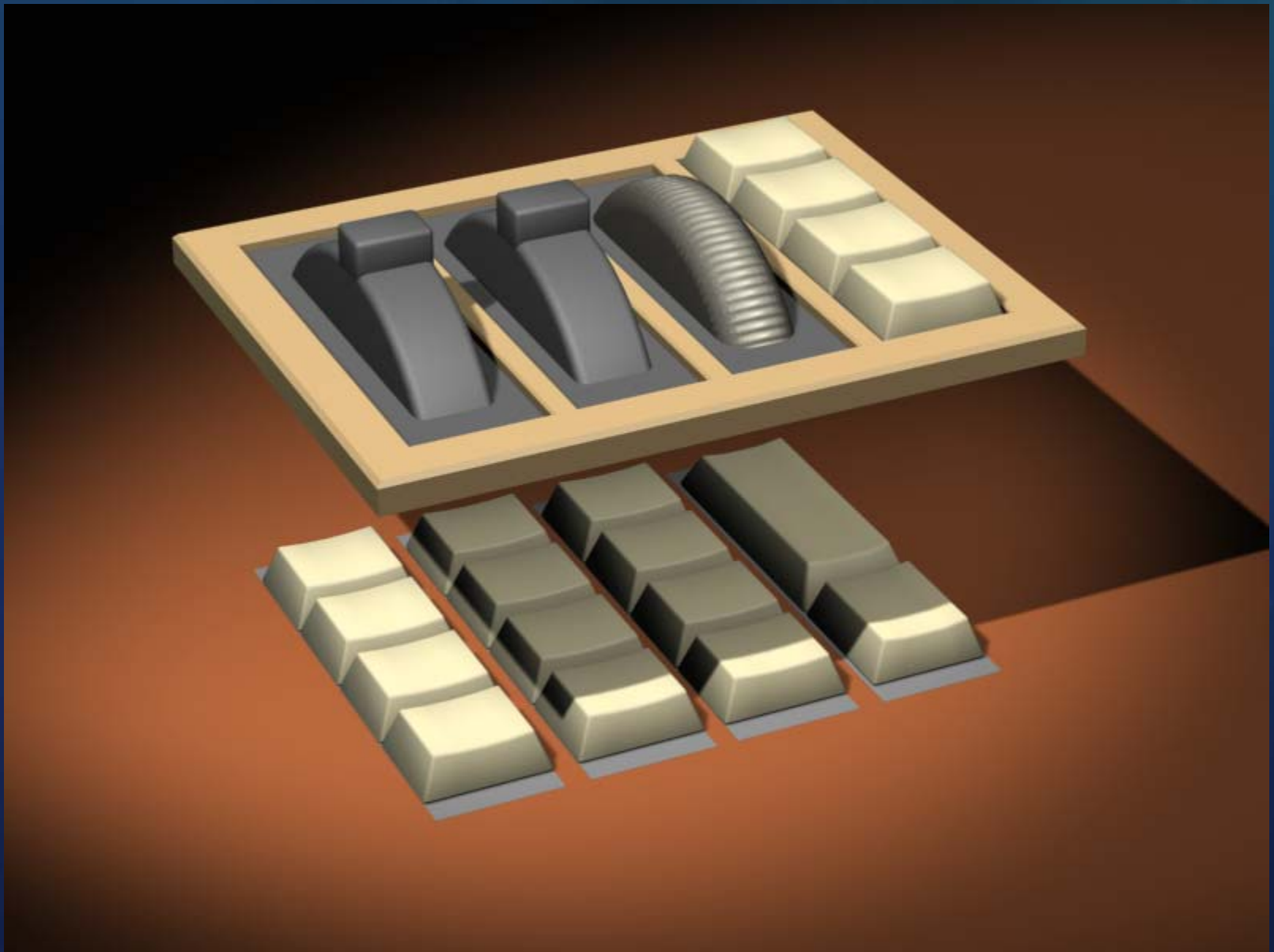


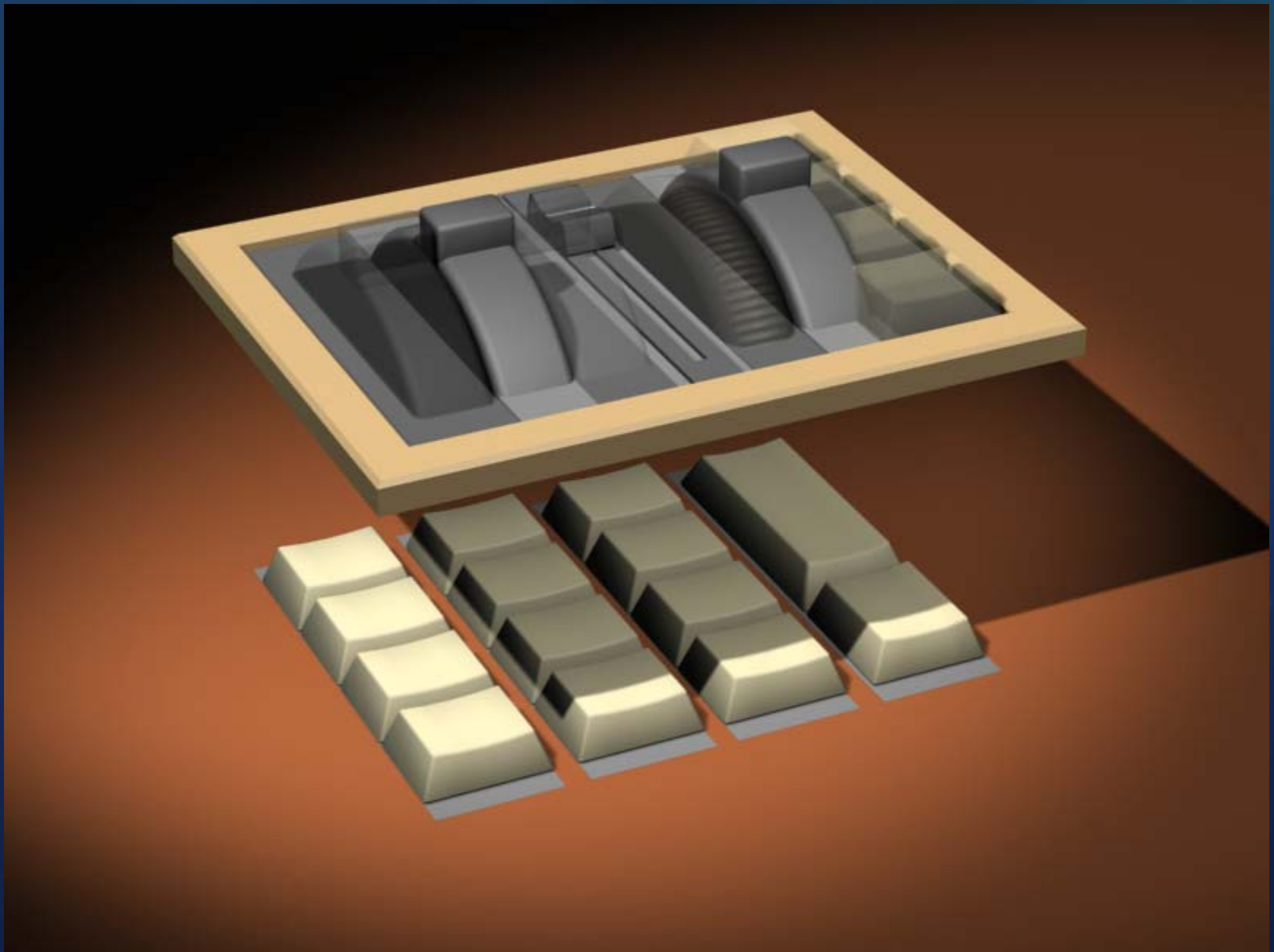
8 x 1D

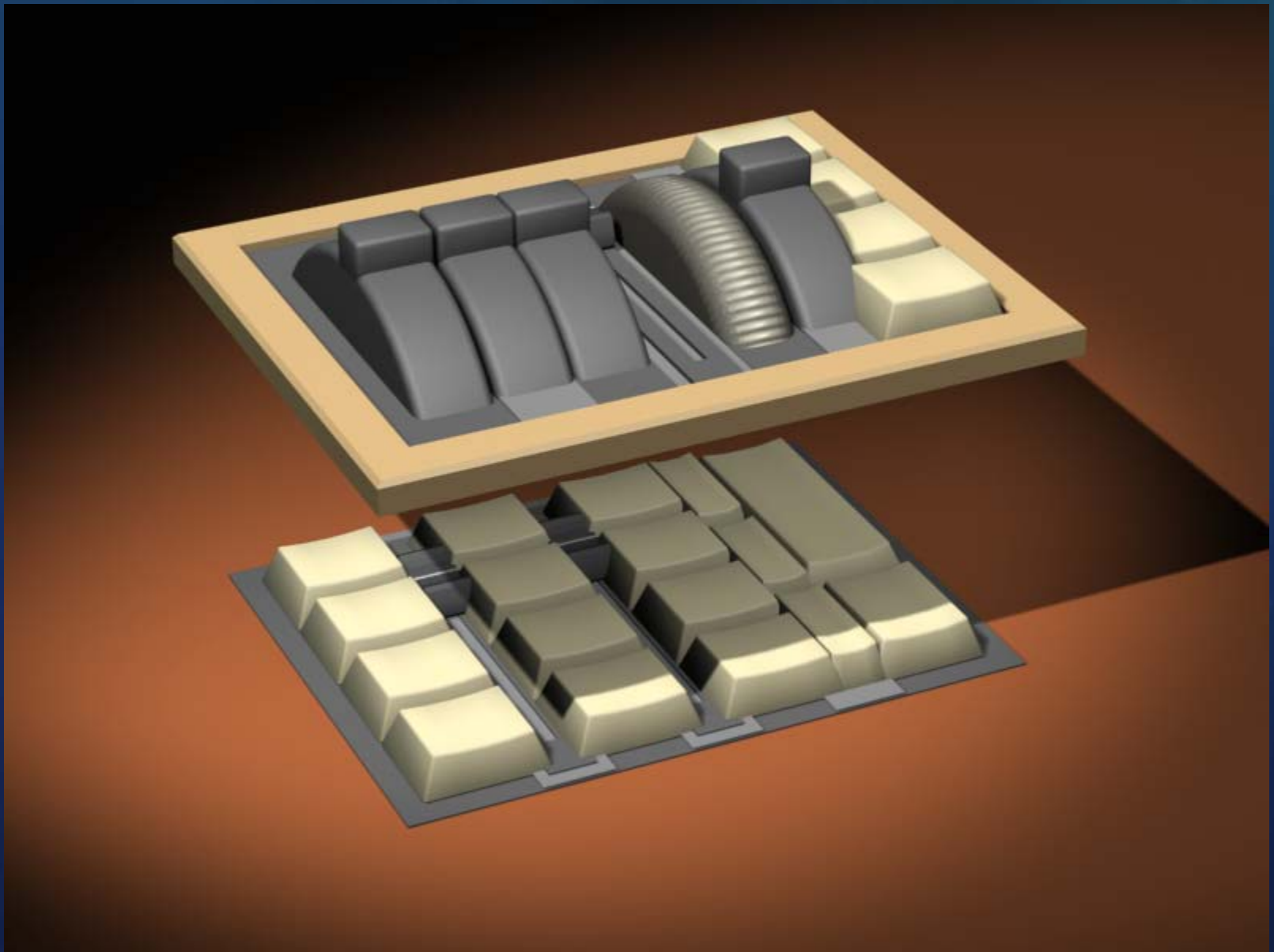


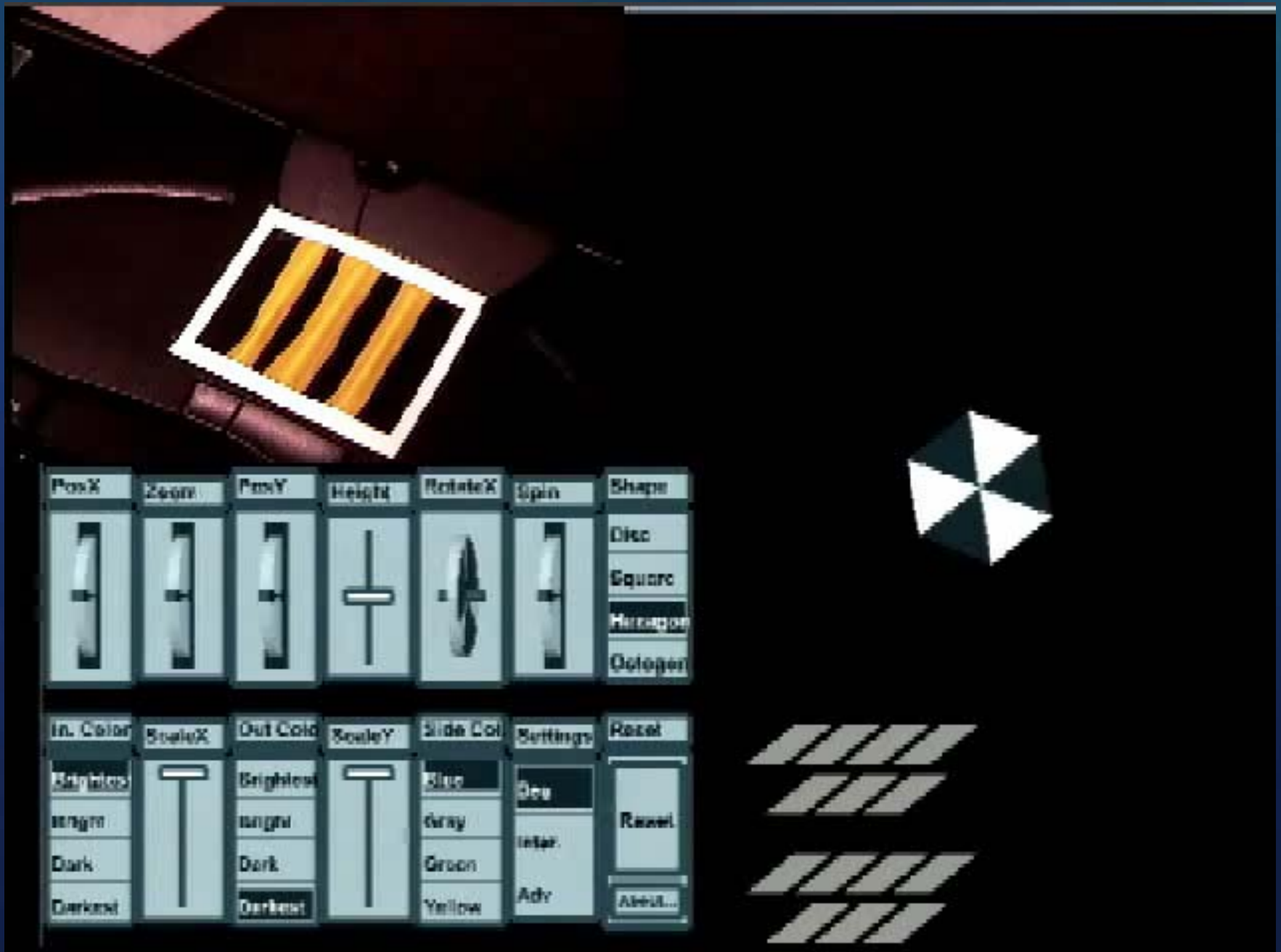
14 x 1D













Conclusions

- One hand
 - Four linear strips
 - + pressure
 - + multiple finger
- Direct control of 14 widgets



Possibilities...



with P5 VR glove

with Tablet PC