

Using ForceForm as a Pressure Sensitive Touch Surface



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Motivation

Touch surfaces are commonly flat, hard and unable to be physically altered. Only visual information can be changed, via Software. ForceForm moves beyond flat touch surfaces, towards ones that provide tangibility and haptic feedback.

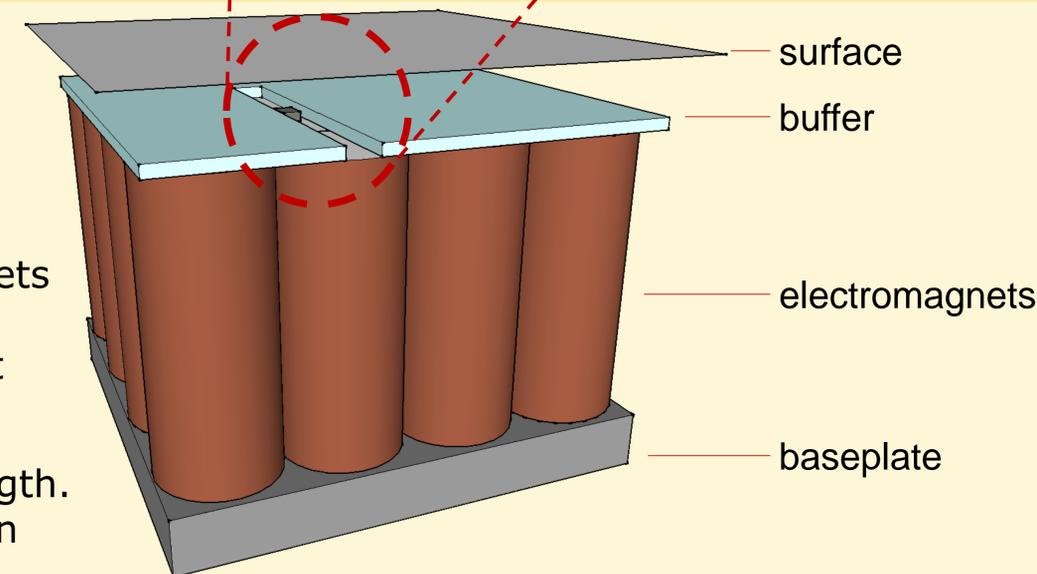
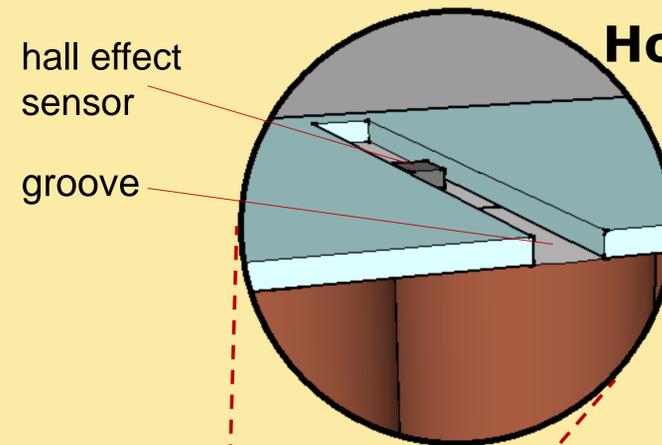
Why is pressure sensitivity useful?

Different interaction techniques can be achieved on touch surfaces when we know how much pressure a user is exerting. For example, in a drawing program, a user may push down harder to achieve a more opaque drawing colour, or to change line width.

What is ForceForm?

ForceForm is a dynamically deformable interactive surface comprising a latex membrane augmented with permanent magnets suspended above a grid of computer controlled electromagnets. The electromagnets can repel or attract the surface, deforming it

A Perspex **buffer** separates the surface magnets from the electromagnets. A steel **baseplate** improves the magnetic strength. A *Cyclotouch* T-series touch overlay tracks a user's finger position

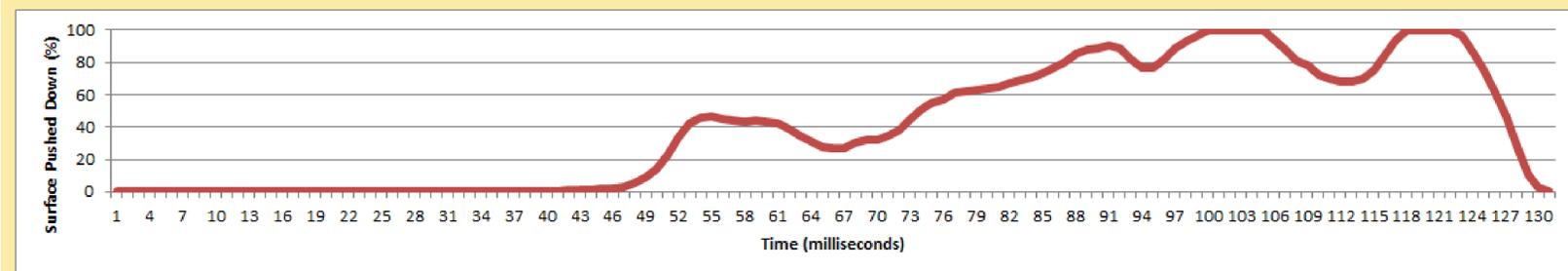


How can ForceForm be pressure sensitive?

Since we have a latex surface with embedded permanent magnets and we have electromagnets underneath, we can use a **hall effect sensor** to measure changes in the magnetic fields as a user presses on the surface. From these values, we can dynamically determine how much the user is pressing down on the surface. We can take around 5 readings per millisecond with the hall effect sensor, so we can get very fine pressure information



A groove was cut into the Perspex buffer and the hall effect sensor was fitted, flush with the buffer



The diagram shows a user's behaviour while applying pressure to the surface

What applications are we interested in?

We are interested in using pressure to ascertain how people are interacting with ForceForm while we use it as a skin-like interface for palpation training. For example, if we can gather data on how a doctor feels the surface while looking for lumps, then we can use that data to teach a novice user how they should feel the surface