Touch Sensitive Foam Surfaces

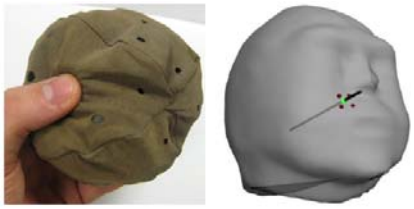
Researchers at The University of South Australia's Wearable Computer Lab (WCL) have developed a "digital foam" material that recognizes and responds to touch. The foam material is highly flexible and can accurately detect multiple simultaneous deformations in its surface. Multiple applications for Digital Foam are anticipated, from human-computer interfaces for mobile devices and home entertainment games controllers, to medical mannequins used for training surgeons and doctors.

Technology Overview

Surface modeling and geometry capture are used in a range of fields including Augmented Reality (AR), Virtual Reality (VR), computer graphics, medical imaging, visualization systems, and artistic fields. To support these systems, a variety of different input devices and techniques have been developed to assist the modeling process. Clay and similar materials have been used for sculpting real models for many years. Familiarity with sculpting lead the team to investigate how a similar input device could be constructed for a computer. The team identified some of the natural modeling techniques used when sculpting, such as multi-handed and multi-finger input. To support similar clay-like modeling techniques they conceptualized a user interface made of conductive foam since it naturally supports sculpting operations.

The invention presents a novel and unique technology called, Digital Foam. The technology enables the capture of the shape and size of a piece of foam. With this information the team can wrap the foam around hard surface substrates and then capture very precise touch-based gestures and movements with various degrees of pressure. These capabilities have led to the creation of a number of prototype devices, including a virtual-modeling clay environment for digital sculpturing.

Whilst the technology is at an early stage, it demonstrably shows great accuracy, control and manipulation of devices, via soft, touchable controls and has potentially numerous applications. An opportunity exists to become involved in the ongoing development of the technology as it moves closer to the market.



Benefits

The technology has a number of unique advantages:

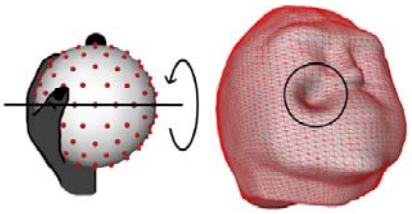
- No cameras are required to detect deformation in the surface of the material, broadening potential applications and significantly lowering the cost.
- The foam surface can detect multi-touch points (whole hands as well as fingers or stylus) along with the pressure applied at each point.
- The level of accuracy can be controlled and adapted according to the specific application for the technology – from highly sensitive/accurate (0.5mm) or 2mm or higher applications requiring less accurate measurement.
- Being a foam and highly flexible, it enables the foam to be "wrapped around" different shaped objects and substrates. Additionally is exceedingly light in weight, making it suitable for weight specific or used in confined spaces as soft controls – such as in a car or aeroplane.
- The technology blends readily available, off-the-shelf components with low-cost technology the team has developed, significantly lowering the cost against competing technology.

Market/Applications

The technology is ideally suited to applications where a highly flexible, potential soft material can be used as a means to control or respond to single or multiple touches.

Some of the candidates for this technology include:

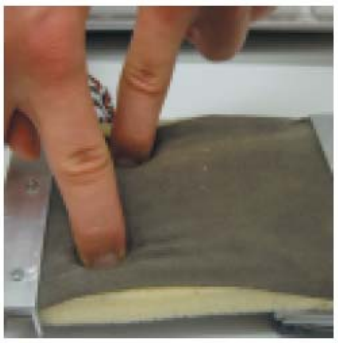
- Medical mannequins for training of medical doctors and surgeons.
- Music input/device for capturing writing music
- Mobile device input-surface – turning the casing of the device into the controller.
- Game console/handset/foot-set input device
- Digital clay for facial reconstruction and media/entertainment special effects workshops.
- Sports training, for hand grip, position and pressure study of any racket/golf/cricket/baseball grips.
- "Soft controls" replacing hard-knobs or switches in confirmed spaces, or places where there is a danger of physical impact – such as automotive controls.

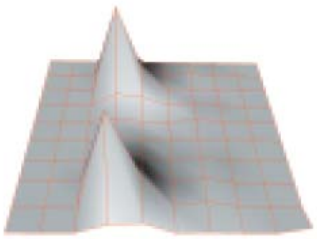


IP Position

A patent application has been filed covering the design of Digital Foam and specifically the sensors integrated with the material and the algorithms and means of detecting the location and pressure applied to the digitally touched surface area.

Prior art patent searching has so far not revealed a conductive material with the flexibility and cost advantages that Digital Foam provides.





Investment Opportunities

ITEK would welcome the opportunity to discuss how this technology can be exploited by companies looking to explore the use of this technology in specific markets or applications. A range of intellectual property and commercialisation pathways are possible given the current phase of the technologies development.

Wearable Computer Laboratory

The Wearable Computer Laboratory of the University of South Australia performs research in a number of areas, mostly wearable computers, Augmented Reality (AR), and Virtual Reality (VR). Over the years the Lab has developed a number of ground breaking research projects. In 1998 it began the Tinmith mobile augmented reality project, which has now developed into a 3D modelling system that a user can take outdoors to create and interact with virtual objects and physical buildings. The same hardware platform was then used to implement an outdoor gaming environment allowing gamers to fight virtual monsters set in the real/physical world.

Research into truly wearable applications remains a major focus of the team and includes embedding electronic devices into textiles and clothing. Today the Lab is very active in a number of areas of research covering AR, VR, 3D, and UI areas.

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