Researchers at the University of Central Florida have designed a haptic training device that medical students can use to better distinguish between normal and abnormal lumps in the body. By providing the sensation of touch and the ability to vary the size and stiffness of simulated tumors or tissues, the UCF Tactile Display Apparatus mimics lumps and growths that are similar to those found in actual patients. Thus, it offers a more realistic method for learning and practicing palpation techniques. Besides providing the near-real sensation of touch similar to human palpation, the UCF tactile display unit can also integrate with a telemedicine system, enabling physicians to receive similar sensations of palpation from remotely located patients.

Tissue palpation is an essential skill that physicians use for the early detection and diagnosis of diseases. With proper palpation techniques, a physician can detect if a tumor is benign or malignant as well as its stage of growth. Though current haptic training technologies provide tactile sensations, they lack the UCF invention’s added ability to maintain the shape of a particular mass while varying its stiffness. The capability is important for palpation training since a nodule with a particular shape can be malignant or benign depending on its stiffness, texture and size. Therefore, a student can learn to distinguish a normal lump from an affected lump, even if both lumps have the same dimensions.

**Technical Details**

The UCF design consists of phantom soft tissue, a display nodule and a control chamber and uses granular jamming technology and pneumatic actuation to allow customization of the nodule’s shape, size, and stiffness. The nodule lies inside the phantom tissue and is customizable to a certain stiffness to mimic a particular type of lump or mass. The nodule consists of two hollow hemispheres joined together to create a chamber. Each hemisphere contains granules, and each has a different thickness, material or a combination of both. The nodule’s shape and stiffness rely on the amount of air pressure applied to the chamber. Therefore, as the level of air pressure increases, the granules compress together, and the inward deflection of the bottom hemisphere pushes the granules against the top hemisphere to achieve a required stiffness. The thickness and material combinations of the hemispheres enable the top half of the nodule to vary in stiffness without changing its shape. In addition to stiffness control, the design also allows for depth control by raising and lowering the nodule inside the soft tissue phantom.

**Partnering Opportunity**

The research team is looking for partners to develop the technology further for commercialization.

**Stage of Development**

Prototype available.

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Benefits

- Provides realistic palpation simulations of different types of tumors and tissues
- Easily customizable in nodule shape, size, stiffness and depth without opening the control box
- Can be integrated with telemedicine systems to emulate palpation with the sensation of touch

Applications

- Medical device training and simulation systems
- Telemedicine

Technology #34063

- US Patent Pending

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