

Higher Accuracy Image-Guidance in Surgery

Summary

Vanderbilt engineers have designed and built a device that improves the accuracy of image-guidance systems (IGS) during surgery. The device creates a custom, non-slip fit over the head and provides a rigid platform for attaching optical tracking markers to the patient, which is a critical component of image-guided neurosurgical procedures. The device can be used to improve the accuracy of IGS in other areas of the anatomy as well.

Addressed Need

During image-guided neurosurgery, an optical marker is attached to the patient's head in order to track the position and orientation of the head in real time. This information is then used to align the patient with a pre-operative scan of the head, which the surgeon uses for guidance during the procedure. As such, it is critical that the optical marker remain rigidly attached to the head during the procedure. Unfortunately, existing headbands that affix the optical markers to the patient permit accidental movement of the marker during surgery. When the marker moves relative to the head, tracking error is introduced into the IGS and the surgeon can no longer trust the navigational aid. The present technology virtually eliminates relative motion and the resulting tracking error, and also obviates the need for bone-attached mounts that require surgical emplacement.

Technology Description

The device is composed of a pliable structure that conforms to the patient's head and is then rigidly secured using a technique known as granular

jamming. This creates a slip-resistant connection with the head and a rigid structure for the optical marker to attach to. Once the device is secured to the patient's head, the IGS is used to register the position and orientation of the head with the preoperative scan of the anatomy.

Technology Features

- ◇ Results in higher IGS accuracy than standard optical marker attachment methods
- ◇ Easy to mount onto the patient without the need for bone attachment
- ◇ Using granular jamming, the device creates a slip-free, rigid, and stable connection between the head and the optical marker
- ◇ Compatible w/ existing IGS

Technology And Intellectual Property Status

- ◇ Prototype built and tested for accuracy
- ◇ Two patent applications have been filed
- ◇ Video of [technology in action](#)



Figure 1: The device creates a rigid, non-slip connection between the patient and an optical tracking marker for use in image-guided surgery.

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