MRI Compatible Robotic Surgery

Surgical Intervention with Real-Time Monitoring

TITLE

System and Method for Robotic Surgical Intervention

INVENTORS

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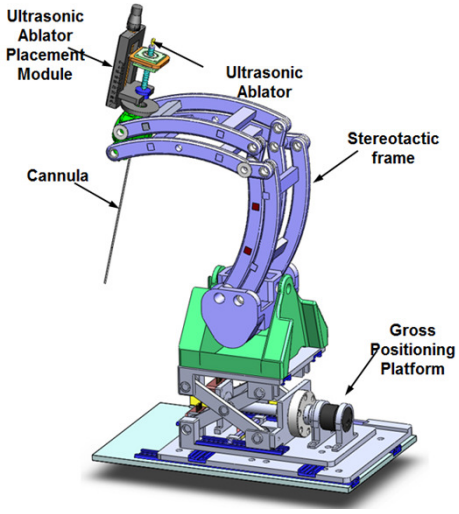

SUMMARY

- The system utilizes modular actuators, self tracking, and linkages constructed from hard image compatible plastics that are not ferromagnetic.
- A manipulator linkage targets electrode placement and allows the procedure to be performed based on interactively updated MRI images. Alternatively, the system may be used to perform the procedure based almost entirely on pre operative images.
- Precision controls enable registering and placing electrodes within the tissue under image guidance with half millimeter accuracy
- A centralized controller of the system contains a computing unit that can process sensor information from the actuated armature as well as generate driving signals to operate the armatures' actuators

BACKGROUND

Image-guided surgery (IGS) allows interventional procedures with greater precision and superior outcomes by integrating medical imaging with the surgical workflow. The combination of computer controlled precision movement and high resolution soft tissue imaging allows the surgeon to accomplish the procedural goals with minimized damage to surrounding tissue.

Stereotactic neural intervention is a commonly practiced surgical procedure today. There are many treatments and operations that require the accurate targeting of, and intervention with, a specific area of the brain which utilize stereotactic neural intervention. The accuracy of standard stereotactic insertion is limited by registration errors and brain movement during surgery.

Direct magnetic resonance Image (MRI) guidance would provide many benefits; most significantly, interventional MRI can be used for planning, real-time monitoring of tissue deformation, insertion, and placement confirmation. With real-time acquisition of high-resolution MR images during insertion, probe placement can be confirmed intraoperatively. MRI compatible systems have been developed, though they typically manually driven, bulky and/or inconvenient to use.

ADVANTAGES

- Real-time monitoring of delicate surgical processes
- Safe and reliable electrode placement assistant that overcomes the difficulties of working in a closed, high-field MRI
- Reduce procedure time, cost, and complications while improving effectiveness and availability
- Improve accuracy of biopsies via image guidance
- Perform accurate therapeutic procedures, such as deep brain stimulation

PATENT STATUS:

Pending:

12/873,152

LICENSING STATUS:

US only?

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