Multi-Component System And Method For Robot-Assisted Manipulation Of Bone And Soft Tissues.

Tech ID: 27533 / UC Case 2015-900-0

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- SooHoo, Nelson

OTHER INFORMATION

KEYWORDS

Robot-assisted manipulation, orthopedic surgery, bone, soft tissue, motion signals, mirror

CATEGORIZED AS

- **Medical**
  - Devices
- **Engineering**
  - Robotics and Automation

RELATED CASES

2015-900-0

SUMMARY

UCLA researchers have developed a multi-component system and method for performing robot-assisted manipulation of bone and soft tissues for orthopedic surgical procedures.

BACKGROUND

In orthopedic surgery, common types of procedures include fixation of bone and soft tissues as well as reconstruction of degenerated or damaged bone and soft-tissues. Currently, surgical manipulation of these bones and soft tissues is accomplished with the application of manual force either directly on tissue or through devices that transmit forces to the tissue including pins, screws, bolts, straps, and clamps.

These methods of performing orthopedic surgery have several disadvantages:

- Manual force is limited by the strength and endurance of the surgeon and surgical assistants, which limits both the magnitude of manipulation and duration of holding manipulated bone and soft tissue in specific positions.
- Manual manipulation has limited precision based on the ability of the surgeon and surgical assistants to position bone and soft tissue precisely with manual forces.
- Reliance on manual manipulation exposes the surgeon and surgical assistants to increased radiation exposure when intra-operative fluoroscopy is used to confirm position during manipulation of bone.

These disadvantages result in the need for improved systems and methods for manipulation of bone and soft tissue that improves strength, endurance and precision while decreasing radiation exposure to the surgeon and surgical assistants.

INNOVATION

A surgical system is provided that includes a drive and control component for one or more robotic arms that couple to sterile end-effectors composing of pins, screws, clamps or rods for transferring motion signals. Pins or bolts can be fixated in bone and can be used as end-effectors or combined with rods to create an end-effector assembly.

Each end-effector assembly is grasped by a robot arm, which is converted partially by a sterile drape to shield the arm from the sterile field. The hand controls can then be used to communicate motion signals that are mirrored by the robotic arm to manipulate the bone and soft tissues through end-effector assembly.

Motion signals from the drive and control component can be input by the operator using hand controls that correspond to each of the robotic arms. Motion signals may also be input through pre-determined algorithms.

APPLICATIONS

Principal application of this invention is to assist surgeon to manipulate bone and soft tissue in orthopedic surgical procedures. This invention can potentially be used in other surgical procedures where bone or soft tissue manipulation is required.

ADVANTAGES

- Compared to manual manipulation, this system will allow more precise manipulation with improved strength and endurance.
- This invention will also decrease the radiation exposure to the surgeon and surgical assistants.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,191,569	12/07/2021	2015-900

UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095

https://tdg.ucla.edu

Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu