MRI CONTROLLED MILLI-ROBOT HAMMER FOR TISSUE PENETRATION

Summary

Unique medical apparatus and method that utilizes magnetic fields from magnetic resonance imaging machines (MRIs) to control the motion of a milli-robot hammer within the human body. The milli-robot hammer consists of a hollow capsule with a ferrous ball inside, a spring on the posterior end, and a hard surface on the anterior end. By using an MRI to alternate the magnetic gradient direction, the ferrous ball moves back and forth, bouncing off the spring and hitting the hard surface on the anterior end repeatedly. The repeated motion of the ferrous ball creates a large pulsed force that helps the milli-robot penetrate tissue to reach regions deep within the human body. In addition, the tip of the capsule has retractable barbs that assist in the penetration of tissue.

Competitive Advantages

- Capable of pushing through vessel walls, blockages, and tissue due to unique hammer propulsion system
- Able to accomplish untethered navigation through the human body
- Can be used with MRI equipment commonly found in clinical settings or any magnetic manipulator
- Limits the amount of damage caused to bodily tissues

Problem Addressed

- Reducing the risk of damage and scarring caused by conventional surgical techniques
- Utilizing equipment common in clinical settings to control milli-robot motion through the human body
- Designing a method for pushing milli-robots through tissue when the magnetic field from MRIs alone is insufficient

Applications

- Therapy aid for paralysis patients
- Perform minimally invasive surgeries
- Deliver drug therapy to targeted region
- Place implants such as stents
- Conduct biopsies

Patents

- PCT/US2018/025551

Publications


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