



Steerable Laser Interstitial Thermotherapy Robot

Tech ID: 34101 / UC Case 2024-715-0

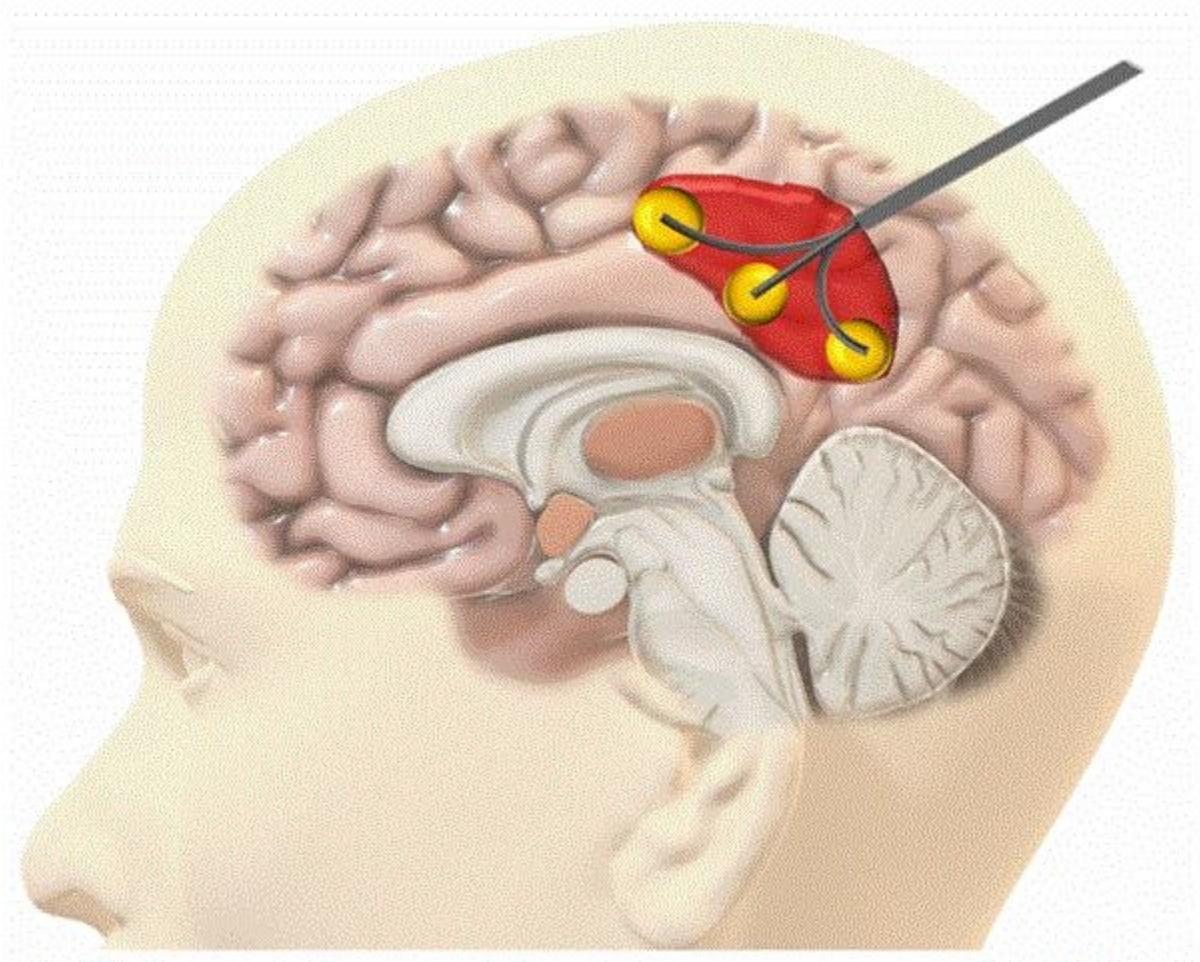
FULL DESCRIPTION

Background

Minimally invasive, neurosurgical procedures require exceptional precision and adaptability to navigate the brain while avoiding critical structures. Existing approaches face challenges such as controlling flexible instruments within soft tissue environments and achieving accurate steering along complex trajectories.

Technology

UCR faculty Jun Sheng and his team, have developed a steerable, laser ablation therapy robot for minimally invasive neurosurgery which incorporates a telescopic, tendon-driven, flexible tube system along with nonmagnetic actuators. The robot also includes an optical fiber that is coupled to a laser generator for targeted thermal ablation.



Conceptual illustration of multi-site ablation within a large, brain tumor using a robotic, steerable, laser ablation probe.

CONTACT

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OTHER INFORMATION

KEYWORDS

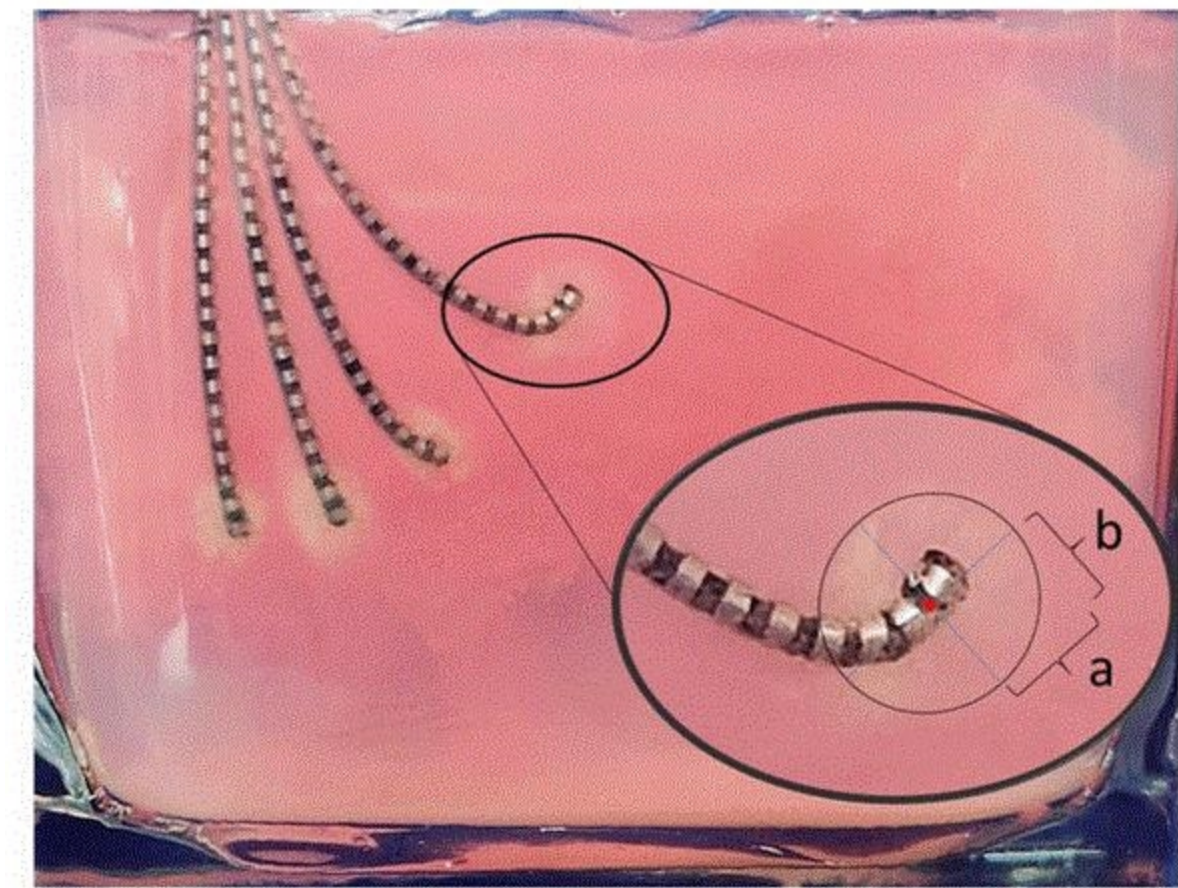
steerable robot, laser interstitial
thermal therapy, LITT, brain tumor,
laser ablation, MRI guided steerable
robot, glioblastoma

CATEGORIZED AS

- [Medical](#)
- [Devices](#)
- [Engineering](#)
- [Robotics and Automation](#)

RELATED CASES

2024-715-0



Multi-site laser ablation in agar, generating oval heating zones around the probe tip at different configurations of the probe.

FEATURES/BENEFITS

- Precision steerability - features a tendon-driven, telescoping tubing system that allows controlled bending and navigation along curved trajectories.
- Multi-plane ablation capability - enables coordinated, rotational and linear movements to access multiple ablation sites offering enhanced treatment flexibility.
- Real-time temperature monitoring - the ability to integrate fiber Bragg grating sensors, photothermal nanoparticles and a flexible saline cooling system provides for precise and real-time thermal feedback.
- MRI compatibility - the use of nonmagnetic actuators ensure safe operation within MRI environments.

SUGGESTED USES

- MRI guided deep, brain tumor ablation
- Targeted, spinal metastasis laser ablation
- Endoscopic ENT tumor resection

INVENTOR INFORMATION

- Please visit [Jun's group website](#) to learn more about their research at UCR.
- Please review [all inventions by Jun and his team](#) at UCR.
- Please read [recent news coverage](#) of Jun at UCR

RELATED MATERIALS

- [Towards a Robotically Steerable Laser Ablation Probe](#)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20250107861	04/03/2025	2024-715

Additional Patent Pending

RELATED TECHNOLOGIES

- [Shape Memory Alloy Enabled Robotic Modular Mass Debrider](#)

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