QuantumArray™

Cost-effective Mass Production of SQUIDS MRI Technology

"Scaling Superconductivity for the Future of Imaging."

Technology

QuantumArray™ introduces an automated, cost-effective manufacturing process for fabricating nano- and micro-scale high-temperature Superconducting Quantum Interference Devices (SQUIDs). The invention leverages a femtosecond laser-based fabrication method integrated with computer-aided automation to produce precise micro- and nano-constriction structures. Unlike traditional methods that are costly, complex, and time-intensive, QuantumArray™ enables pre-programmed, high-precision mass production of superconductors with uniform interfaces and barriers. This results in enhanced reproducibility, improved signal-to-noise ratios, and stronger overall SQUID performance - laying the foundation for scalable, next-generation superconducting devices.

Market need

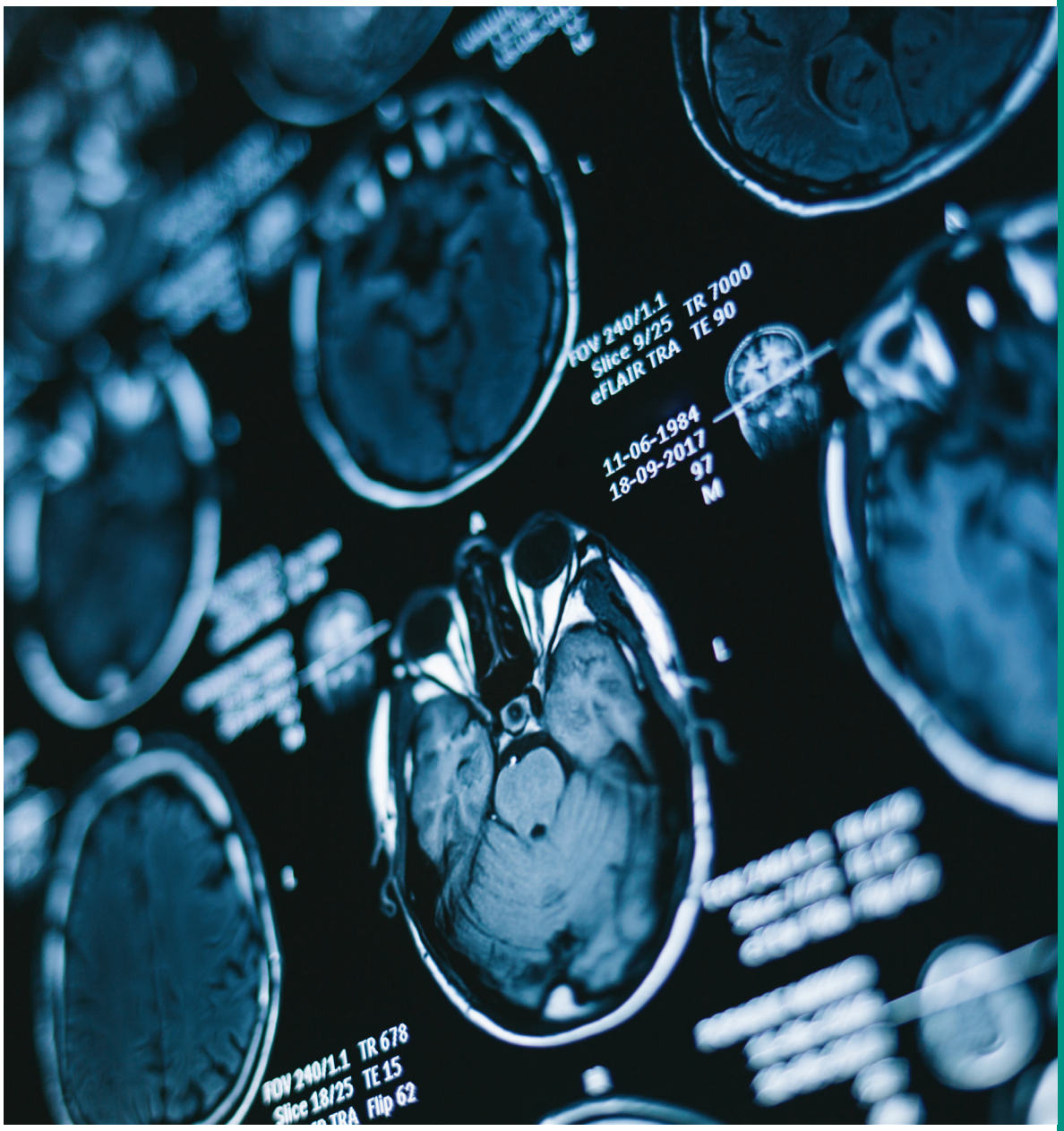
While thin-film Josephson circuits are now widely producible, the mass production of high-quality SQUIDs remains a major technological bottleneck due to the intricate fabrication process required for reliable high-temperature superconductors. Current methods are limited by high costs, manual precision demands, and low reproducibility, which hinder commercial-scale deployment in MRI systems, quantum sensors, and superconducting electronics. QuantumArray™ directly addresses these challenges by automating the fabrication process, delivering a repeatable, precise, and economically viable method for large-scale SQUID manufacturing.

Features

- Uses computer-aided programming for consistent, reproducible SQUID manufacturing.
- Enables ultra-precise micro- and nano-structuring of superconducting materials.
- Supports advanced SQUID designs using durable superconducting materials.
- Ensures structural integrity and high device performance.
- Produces SQUIDs with superior signal-to-noise ratios for accurate magnetic field detection.

Benefits

- Significantly lowers production expenses through automation and scalability.
- Enables reliable mass production of SQUIDs with minimal manual intervention.
- Produces stronger, more sensitive, and stable superconducting devices.
- Bridges the gap between laboratory prototypes and large-scale industrial production.
- Can be reprogrammed for different device geometries and applications.



Industry

Biotechnology

Potential Applications

- Enables affordable, high-resolution magnetic resonance imaging systems, especially in resource-limited healthcare environments.
- Provides scalable superconducting elements for qubit development and magnetic field measurement.
- Used in ultra-sensitive magnetometers for mineral, oil, and natural resource exploration.
- Supports detection of weak magnetic signatures for surveillance or submarine detection.
- Facilitates precision magnetic field measurements in nanoscale material characterization.
- Used for identifying flaws in metallic structures through magnetic imaging.
- Integration into satellite instruments for detecting cosmic magnetic phenomena.

Creators

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Stage of Development

Prototype

Intellectual Property

Patent protection

Desired Relationship

Co-development partner, Investors