

QuSpin Technology Takes Brain Scanning to the Next Level

February 27, 2025

Neurological disorders such as epilepsy, cerebral palsy, and other conditions related to brain activity present significant challenges for diagnosis and treatment. Research and diagnosis tools, such as functional magnetic resonance imaging (fMRI) and superconducting quantum interference devices (SQUIDs) are often uncomfortable and impractical, particularly for vulnerable populations like infants and children. SQUIDs, which use superconducting loops cooled to cryogenic temperatures, are ideal for measuring brain activity but are also prohibitively expensive to acquire and maintain as well as difficult to connect comfortably to the human brain.

QuSpin Inc., a woman-owned small business based in Louisville, Colorado, is solving these issues with its cutting-edge atomic magnetic field sensing technology for functional brain imaging. QuSpin's devices address all three problems associated with other functional brain activity sensing tools—they are less expensive, operate at room temperature, and are compact enough to be wearable. The QuSpin team, led by Dr. Vishal Shah, the company's Chief Scientist, developed a small, wearable optically pumped magnetometer (OPM) magnetoencephalography (MEG) system, capable of detecting the faint magnetic fields generated by neural activity, without relying on cryogenic cooling. As explained by Dr. Shah, "this technology provides real-time, high-resolution insights into brain function while maintaining a comfortable, patient-friendly design, enabling more naturalistic studies and paving the way for earlier diagnoses and personalized treatments."

Under the guidance of QuSpin's President, Ms. Shweta Choudhury Shah, and Dr. Shah, the company has expertly navigated the NIH funding path. QuSpin

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QuSpin

331 S 104th St #130, Louisville,
CO 80027

State-District

CO-2

Technology

Medical Device

Primary Institute

Mental Health
(NIMH)

Secondary Institute

NHLBI, NICHD

Project Details from NIH RePORTER

QuSpin

Contact

Vishal Shah
vshah@quspin.com

<https://quspin.com/>

began applying for Small Business Innovation Research (SBIR) Phase I grants in

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2012 and is now in the final stages of the SBIR Commercialization Accelerator Program. By securing Phase I funding from the National Institute of Mental Health, QuSpin first produced compact, ultra-sensitive vector magnetometers about the size of small LEGO™ bricks. The technology then progressed through sequential SBIR phases, culminating in the creation of their wearable MEG system designed for high-performance functional brain imaging.

Recognized as a breakthrough technology, QuSpin's wearable OPM MEG system is set to revolutionize brain imaging, offering significant promise for investigating a wide range of neurological conditions and providing more personalized treatments. In collaboration with Cerca Magnetics, these next-generation scanners are now being deployed at premier neuroscience institutions worldwide, including The Hospital for Sick Children (SickKids) in Toronto, Princeton University, the University of Zurich, and Boys Town National Research Hospital in Nebraska.

SBIR funding played a pivotal role in QuSpin's transition from an idea to a production-ready device, now poised to enter the medical device market for various neurological disorders. The company systematically overcame each hurdle in full alignment with the SBIR program's vision. As Dr. Shah explains, "We have strived to stay true to the NIH and SBIR mission by stimulating technological innovation and helping improve health and well-being." QuSpin's commitment to research and development ensures they remain at the forefront of technological advancements. This company's success story exemplifies the potential of NIH's Small Business funding program to support innovative technologies that address critical public health issues.

