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High-Res Portable MRI Scanner

Application

- **Application drivers:** To improve utility of magnetic resonance technology for central nervous system and soft tissue imaging;
- **Size of market:** Thousands of hospitals, millions of people worldwide;
- **Unmet bio/medical need:** Easy portability and assembly units at sites of need will improve availability and the overall safety of magnetic resonance imaging .

Research Needs

Scientific/technological problems and barriers:

- Magnet stability;
- Sufficient field strength and homogeneity;
- Gradient and RF coil power supply/ control electronics;
- Temperature stability / cooling mechanisms;
- Data reconstruction and storage.

Advantages

Impact if successful: Reduce costs and safety risks of MRI maintenance, increase availability to healthcare sites and to wider population of patients

Advantages: Full body 3T MRI scanners currently require ~50-100L of liquid helium for cooling per month. The installation room needs to be well-shielded and separate from the control electronics. Portable MRI system will be smaller in size, require less electric power, shielding, and cooling.

Metric(s) of Progress

3 year goal:

- Theoretical design assessment of a strong (~1.5-3T), yet low-maintenance portable magnet ;

5 year goal:

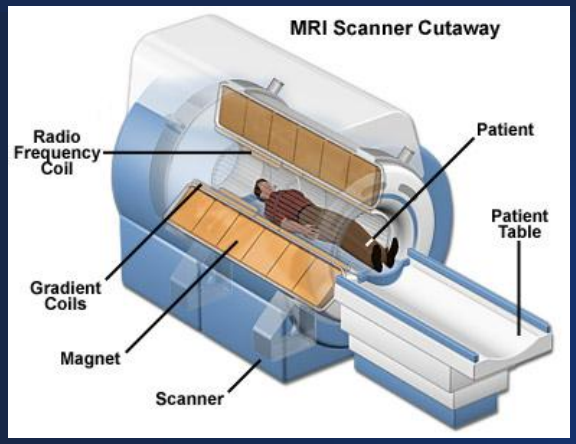
- Construction of the magnet, scanner assembly;

10 year goal:

- Performance optimization and competitiveness with stationary clinical MRI units.

Resource requirements: **Annual cost :** ~$1-2M/year**; People:** 4-6 Faculty **; Time:** Near term goals ~ 3 yrs., Long term goals ~ 10 yrs.**; Facilities:** Primarily physics and engineering teams with access to MRI equipment components and clinical test cites.

Project Comparison



Parameters	Stationary 3T (Siemens/GE)	Transportable (MagneVu)	Helmet projection
Magnet type	Superconducting	Permanent	To Design
Field Strength	1.5-3T	0.2T	~2T
Dimensions	>2x2m	~0.5x0.5m	<0.5x0.5m
Magnet mass	12 tonnes	50kg	10kg
Spatial res	0.1-0.5mm	0.5-1mm	0.1-1mm
Scan duration	<5min	<5min	<5min
Energy requirements	380-480V	110V	110V or less

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