

Building an MR Compatible Joystick

Overview:

Aim of the thesis is to construct a joystick ready to use inside a Magnetic Resonance Imaging (MRI) scanner. The device will be used in conjunction with our interactive real-time MRI sequence.

MRI scanners pose a highly difficult environment for technical devices: First of all, the strong magnetic field strength (3 Tesla, or about 60,000 times earth's magnetic field at our scanner) rules out the use of ferromagnetic parts. Furthermore, the scanner acts as a strong radio transmitter (output power: 29.8 kW), while also being an extremely sensitive receiver. Last but not least, medical device regulations have to be respected.

The background of this project is interventional MRI, in which MRI is used to control a medical intervention such as heart catheterization. Heart catheterization is a medical procedure in which a small tube is guided into the heart through a peripheral vein or artery. It is used in a number of diagnostic and therapeutic methods such as heart pressure measurements, heart biopsies and deployment of stents. Interactive real-time Magnetic Resonance Imaging is a promising alternative to the traditional fluoroscopic (X-Ray) guidance.

Specific Tasks:

- Literature review
- Implement MR compatibility tests
- Design, build and test a joystick
- Documentation and illustration of the results

Recommended Knowledge:

- Basic electrical engineering
- Microcontroller programming
- Radiofrequency technology
- Git



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