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Target audience:

Purpose:



All imaging was performed on a Siemens Tim Trio 3T MRI scanner (Siemens Medical Solutions, Erlangen, Germany). A miniature magnetic field sensor used in this study has two sets of three orthogonal coils (Robin Medical, Inc, Baltimore, USA) that detect magnetic field change and report on the position and orientation of the sensor with a sampling rate of 40 Hz (Fig 1).

Figure 1: *Position tracking sensor*

Figure 2: Schematic of the software architecture for real-time tracking and navigation.

Figure 1 consists of two panels. Panel (a) is a 3D schematic of a tapered microfluidic device. It shows a cylindrical body with horizontal ridges, tapering to a point. Two rectangular chambers are located on the side of the tapered section, each containing a black and white checkerboard pattern. Panel (b) shows two grayscale images of the device. The left image shows the tapered tip with the checkerboard patterns. The right image shows the device with a curved, hook-like tip, also featuring the checkerboard patterns.

Discussion and Conclusion:

References: ^[1] Ho, McMillan, Simard, Gullapalli, Desai. IEEE Trans Robot, 2011, ^[2] Siemens Image Calculation Environment (ICE) manual (VB17).