Application of MEMS Magnetic Sensors for MedTech Innovation

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In recent days, the advances of MEMS technology enble mass production and commerciallization of ultra-small and low-power MEMS magnetic sensor with ultra-high sensitivity of a few uT. Besides explosive growth in smart phone applications, those ultra-sensitive MEMS magnetic sensors are believed extrodenery important for medical technology innovations due to inherent characteristics of the magnetic field to human body.

Towards real time imaging of human organs during medical surgeries for organ excision or tumor care, i.e. laparoscopic hepatectomy, we have been engaed in developing a high-resolution location tracking system by using artificial magnetic field and 3D MEMS magnetic sensor nodes for years. In this talk, fundamental principle of the system will be prsented and demonstrated. Our preliminary results indicated that location reolution of a few mm can be achived when multi-pairs of electrical magnetics were applied to create a unique magnetic field, in which both DC and AC signals were combined for noise cancellation as well as for rotation recognition. Our experimental results also suggested that mapping of the whole magnetic filed, as an extension of simulation, may greatly improve positioning accuracy. Besides stability and repeatibility, many other specifications of the system were investigated and discussed in details.

In addition, a few other examples of using MEMS magnetic sensors will be given and discussed herein. Related works on integration and assembly of ultra-compact wireless implantable sensor nodes for animal monitoring as well as its wireless power supply system will be introduced too for better understanding technical issues for practical application of above technologies in MedTech Innovations.