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Measuring movement and location in enclosed spaces using 3-axis anisotropic magneto resistive sensor array

Alexander James Weir
Heriot-Watt University, UK

Understanding the physiology of body systems through *in-vivo* distance and positional measurement in narrow enclosed spaces presents several major obstacles. When the distance to be measured is hidden from view and located in a position that is constantly changing, the methods required for delivery of accurate and stable measurement are extremely challenging. Overcoming these challenges is particularly important for the study of the gastro-esophageal junction (GEJ) where failure of its function is associated with reflux disease, hiatus hernia and cancer. Previous studies of the movement of the GEJ have been performed using different techniques, including Hall effect sensor arrays, however these systems lack accuracy of measurement in three dimensions. A new technique using a 3-axis anisotropic magneto resistive (AMR) device is reported which significantly improves accuracy. The 3-axis detection capability of these devices makes them more accurate and reliable in comparison to previous approaches. An AMR sensor array has been developed to provide continuous real-time monitoring of the position of the GEJ for the study of the pathology of the upper gastrointestinal (GI) tract. A technical review is provided of the AMR sensor array for the measurement of mm distances to provide positional information in-vivo. The device is used to measure distance along a string of sensors relative to a small magnet that is endoscopically clipped on to the SCJ. The probe consists of an array of 32 sensors mounted on a flexible printed circuit board within a silicone tube and provides a total measurement distance of 217 mm.

Biography

Alexander James Weir received the Bachelor Engineering degree in Electronic and Electrical Engineering from Heriot-Watt University, Edinburgh, UK, in 1997. He has over twelve years of experience in telecommunications design and has worked for companies including British Aerospace, Cadence and Thales Electronic Solutions. In the past four years he has focused on medical technology and is currently Head of Software Engineering at the Medical Device Unit, NHS Greater Glasgow and Clyde (NHS GG&C). He is currently undertaking an Engineering Doctorate in collaboration with NHS GG&C and Heriot-Watt University, where his research interests include signal processing and its application to the Doppler ultrasound.

alexander.weir@nhs.net