Endoscope Localization Using Transmission Ultrasonography

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Technology description

Unmet Need

Colonoscopies are one of the most frequently performed procedures in the United States, with over 14 million colonoscopies performed in the US each year. Colonoscopies can screen for colon cancer by identifying polyps, strictures, diverticulae, and other abnormalities. Accurate localization of the colonoscope tip is essential to pinpointing the location of the abnormalities, which guides the surgical approach and operative planning. Current localization technology relies on expensive electromagnetic (EM) scope guides which emit EM waves that may harm patients with implantable cardiac devices and pose a hazard to fetal development in pregnant women. Furthermore, mislocalization of the colonoscope is common, potentially delivering inaccurate information of the abnormality?s location. This causes significant localization error, with up to a 30-40% discrepancy between the reported abnormality position and the true surgical site. Hence, there is an unmet need for a colonoscopy localization device that improves localization accuracy, is more cost-effective, and is safe for use in patients with cardiac implants and pregnant women.

Technology Overview

Transmission ultrasonography is a safer and lower-cost solution that relies on ultrasonic waves, rather than EM waves, so it is not harmful to patients with implantable cardiac devices or those who might be pregnant. The device incorporates a transducer that determines the location of the colonoscope tip based on the time it takes for emitted ultrasonic waves to reflect off of surrounding tissue. There are two possible configurations to integrate the ultrasound transducer into the tip of a colonoscope. One configuration is to pass an ultrasound transducer through the channel of the colonoscope until it reaches the tip, where it emits and receives ultrasonic waves from all directions. Alternatively, the transducer can take the form of an external overlay that covers the scope tip and is self-contained and battery-powered. Additionally, multiple skin surface markers are used to detect the ultrasound signal emitted by the transducer, allowing geometric triangulation of the tip location. The processed location and image information would be displayed to the surgeon in a simplified graphical depiction interface.

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