

论文

数字式超声内窥成像系统

陈晓冬,李明,周浩,温世杰,郁道银

(天津大学 a.精密仪器与光电子工程学院|b.光电信息技术科学教育部重点实验室,天津 300072)

摘要:

介绍了一种采用前置微型电机的新型推拉式超声内窥镜的研制方法.在该内窥系统中,采用FPGA实现成像处理功能,运用编码激励技术以提高系统的信噪比和探测深度,使用了微型前置探头取代了目前商用超声内镜中所采用的钢丝连接以驱动换能器进行旋转扫描.该仪器在300 h的连续工作测试中能够正常运行.相较模拟成像系统,数字系统将模数转换置于信号处理的最前端,从而能够保留回声的更多信息.这使得编码激励、数字式正交解调系统获得更高的成像质量.将电机前置于探头附近,能够较外部导线牵引旋转方式获得更大的旋转稳定性、更高的超声图像质量和更长的使用寿命.

关键词: 超声内窥镜 微型电机 编码激励 数字成像系统

A Digital Ultrasonic Endoscope System for Medical Imaging

CHEN Xiao-dong,LI Ming,ZHOU Hao,WEN Shi-jie,YU Dao-yin

(a.College of Precision Instrument |and |Opto-electronics Engineering|b.Key Laboratory of Opto-electronics Information and Technical Science,Ministry of Education,TianjinUniversity,Tianjin 300072,China)

Abstract:

The development of a novel push-type ultrasonic endoscope is described in which probe rotation is accomplished by a small motor situated near the transducer. A digital FPGA-based ultrasound imaging system is implemented which uses coded excitation to increase the SNR and penetration depth,with probe rotation accomplished by a small motor situated near the transducer replacing the external motor and the long steel wire used in other ultrasonic endoscopes. The apparatus is tested continuously for 300 hours with no obvious problems. The coded excitation,digital quadrature demodulation imaging system can obtain ultrasonic images of higher quality and more information of the echo is preserved compared with the analog imaging system,because the analog digital conversion is moved to the first step of the signal processing.The digital imaging system possesses a higher SNR resulting in a sharp image. Locating the motor near the probe improves the consistency of rotational speed in comparison with external guide-wire rotation,and increases the image quality and life-span of these devices.

Keywords: Ultrasonic endoscope Micro motor Coded excitation Digital imaging system

收稿日期 2009-04-29 修回日期 2009-06-22 网络版发布日期 2010-04-25

DOI: 10.3788/gzxb20103904.0744

基金项目:

通讯作者: 陈晓冬

作者简介:

参考文献:

- [1]ZHANG Mei,WANG Zhao-qi.Design of an objective lens for womb electronic endoscope with high definition,non-blind spot and thinner outer diameter[J].Acta Photonica Sinica,2008,37(2): 328-331.
- [2]BUTANI M S.Endoscopic ultrasonography[J].Endoscopy,2002,34(11): 888-895.
- [3]FUSAROLI P,VALLAR R,TOGLIANI T,et al.Scientific publications in endoscopic ultrasonography: A 20-year global survey of the literature[J].Endoscopy,2002,34(6): 451-456.
- [4]MORIMICHI F,KENICHIRO H,HIROSHI N.Endoscopic ultrasonography of the esophagus[J].World Journal of Surgery,2000,24(2): 216-226.

扩展功能

本文信息

- ▶ Supporting info
- ▶ [PDF\(1458KB\)](#)
- ▶ [HTML](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [引用本文](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

本文关键词相关文章

- ▶ [超声内窥镜](#)
- ▶ [微型电机](#)
- ▶ [编码激励](#)
- ▶ [数字成像系统](#)

本文作者相关文章

- ▶ [陈晓冬](#)
- ▶ [李明](#)
- ▶ [周浩](#)
- ▶ [温世杰](#)
- ▶ [郁道银](#)

[5]UEHA S,TOMIKAWA Y.Ultrastors: theory and application[M].Oxford: Clarendon Press,1993: 5-7.

[6]MORITA T,KUROSAWA M,HIGUCHI T.A Cylinder micro-ultrasonic motor (stator transducer size: 1.4 mm in diameter and 5.0 mm long)[J].Ultrasonics,2000,38(1-8): 33-36.

[7]DONG Shu-xiang,LIM S P,LEE R H,et al.Piezoelectric ultrasonic micromotor with 1.5 mm diameter [J]. IEEE Transactions on Ultrasonics,Ferroelectrics and Frequency Control,2003,50(4): 361-367.

[8]ZHOU Tie-ying,ZHANG Kai,CHEN Yu,et al.A cylindrical rod ultrasonic motor with 1mm diameter and its application in endoscopic OCT[J].Chinese Science Bulletin,2005,50(8): 826-830.

[9]CHIAO R Y,HAO X.Coded excitation for diagnostic ultrasound:A system developer's perspective [J]. IEEE Transactions on Ultrasonics,Ferroelectrics and Frequency Control,2005,52(2): 160-170.

[10]CHEN Xiao-dong,ZHOU Hao,WEN Shi-jie.et al.Increasing average power in medical ultrasonic endoscope imaging system by coded excitation[C].SPIE,2009,7156: 71562H.

[11]ZHOU Tie-ying,ZHANG Kai,WANG Huan.Study on piezoelectric cylinder micro ultrasonic motor with 1mm diameter[J].Acta Acustica,2004,29(3): 258-261.

[12]YU Dao-yin,ZHOU Tie-ying,XUE Ping,et al.Micro medical-ultrasonic endoscopic OCT probe: Japan,JP203508[P],2008.

[13]SONG Z Q,WANG Q,DU X L,et al.A high speed digital ultrasonic flaw detector based on PC and USB [C].2007 IEEE Instrumentation and Measurement Technology Conference Proceedings,2007: 1-4.

[14]CHEN Xiao-dong,WEN Shi-jie,YU Dao-yin.Revolving ultrasonic probe for medical endoscope imaging system based on USB2.0[J].Journal of Biomedical Engineering,2008,25(5): 1048-1052.

本刊中的类似文章

文章评论 (请注意: 本站实行文责自负, 请不要发表与学术无关的内容! 评论内容不代表本站观点.)

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text" value="7859"/>
反馈内容	<input type="text"/>		