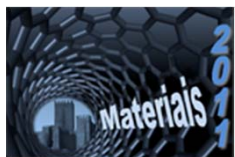


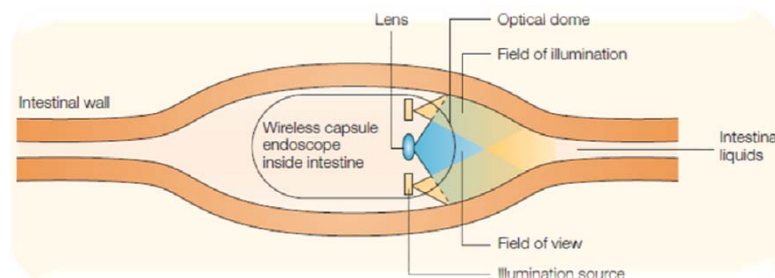
Outline

1. Introduction
2. Motivation
3. Magnetic platform
4. Results
5. Future work
6. Conclusions
7. Acknowledgments

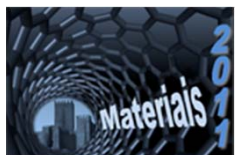
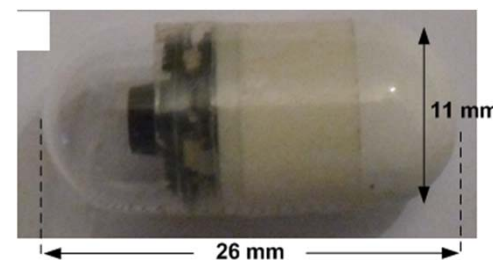


1. Introduction

- The endoscopic capsule (EC) was 1st presented on 2000 at Nature, “Wireless Capsule Endoscopy”, Vol. 405, pp. 417.
- The EC is essentially a tiny biomedical device with a camera that take a picture every 2s during its course through the digestive tract after being swallowed.
- This device allows to visualize the human digestive system without risk of infection or causing discomfort to the patient.

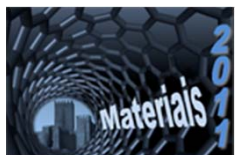


W. Qureshi, Nature Rev. Drug Disc., 3 (2004), pp. 447-480.



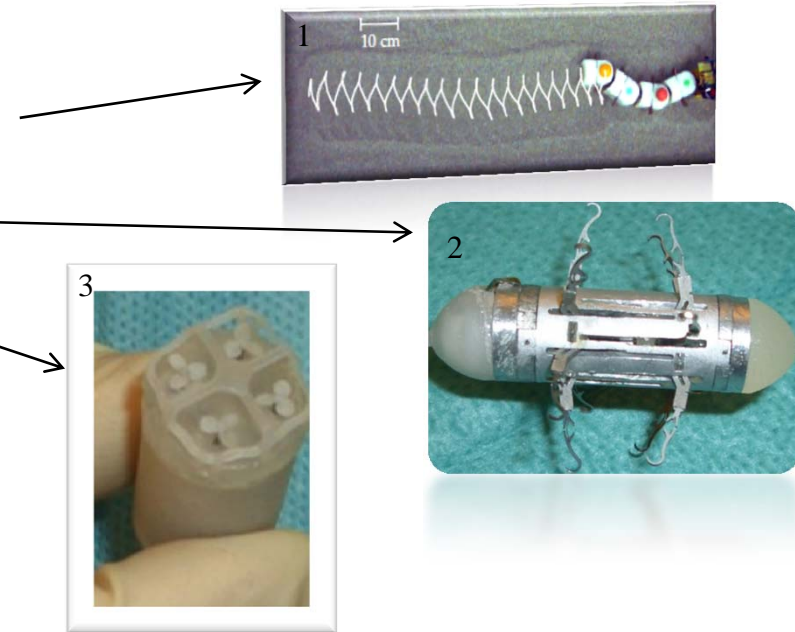
1. Introduction

- The endoscopic capsule exam:
 - Installation of a belt and antennas on patient.
 - Patient swallowed the EC.
 - Images are transmitted to the digital recorded system on the belt (8 hours).
 - The images are analyze by the technician.

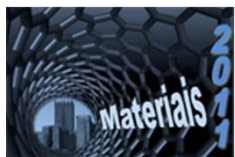


2. Motivation

- The locomotion of the EC is natural movement of peristalsis.
- Other approaches:
 - Pedundulatory locomotion;
 - Legged locomotion;
 - Submersible capsule;
 - Vibration approach;
 - Magnetic locomotion.



1- M. Sfakiotakis, D.P. Tsakiris, Pedundulatory robotic locomotion: Centipede and polychaete modes in unstructured substrates, in: Proc. IEEE Int. Conf. on Robotics and Biomimetics (ROBIO'08), 2008, pp. 651–658.
2- P. Valdastrì, R. J. Webster III, C. Quaglia, M. Quirini, A. Menciassi, and P. Dario. A New Mechanism for Meso-Scale Legged Locomotion in Compliant Tubular Environments. IEEE Transactions on Robotics, 2009, pp. 1047-1057.
3- R. Carta, G. Tortora, J. Thoné, B. Lenaerts, P. Valdastrì, A. Menciassi, P. Dario and R. Puers, “Weless powering for a self-propelled and steerable endoscopic capsule for stomach inspection”, Biosensors and Bioelectronics, Vol. 25, pp. 845-851.



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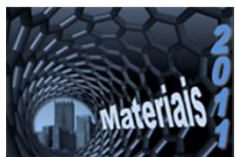
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Micro/Nanotechnologies and Biomedical Applications Group

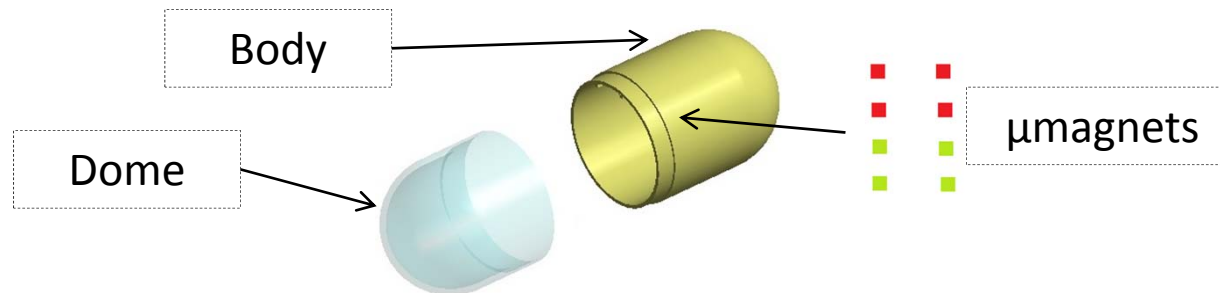
2. Motivation

- Magnetic approach:
 - Without mechanical parts;
 - It is not limited through the batteries;
 - Without vibration that causes effects on capsule vision;
 - Without the risk of perforation of the tissue;
- Objectives:
 - Remote control of the EC;
 - To maintain the standard sizes of the capsule (26mm x 11mm);
 - To build a magnetic platform for locomotion the EC.



5. Future work

- Micro magnetic materials
 - Placement of μ magnets in the EC and not use only a IPM for better accuracy in the EC control and steering.



- In-vivo animal experiences.

6. Conclusions

- It was possible to control the locomotion of the capsule (speed, to stop and rotation) on the desire positions and stationary position.
- The EC vision system and the wireless communications are not affected by the magnetic platform.
- The standard sizes of the capsule was maintained (27mm x 11mm).

