

# Endoscope Capsule using Ultrasound Technology / TROY

## the objective of the project

To develop an Ultrasound Capsule to be used as a first line exam for investigation of diseases in the gastrointestinal tract:

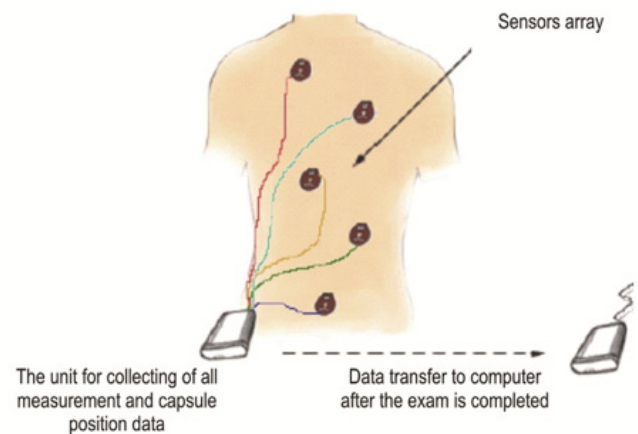
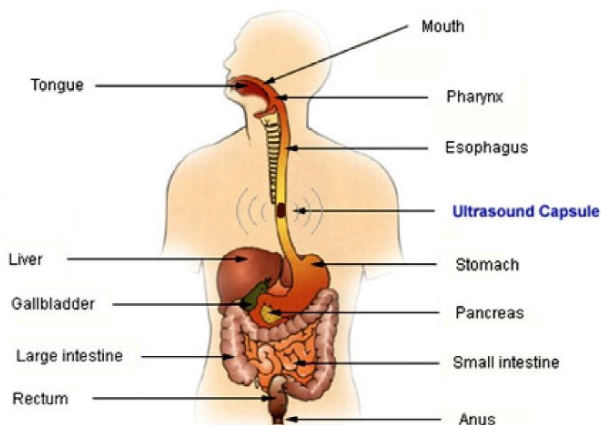
The Ultrasound Endoscope Capsule is swallowed by the patient;

The capsule travels throughout the gastrointestinal tract by natural peristalsis movements, transmitting the ultrasound data;

Ultrasound data is collected using a sensor array taped to the patient and connected to the hard drive;

After the exam, the data are downloaded to PC, which reconstructs a 3D image of the digestive tract.

Capsule's parameters: diameter 11mm; length 26mm; weight <4 g.

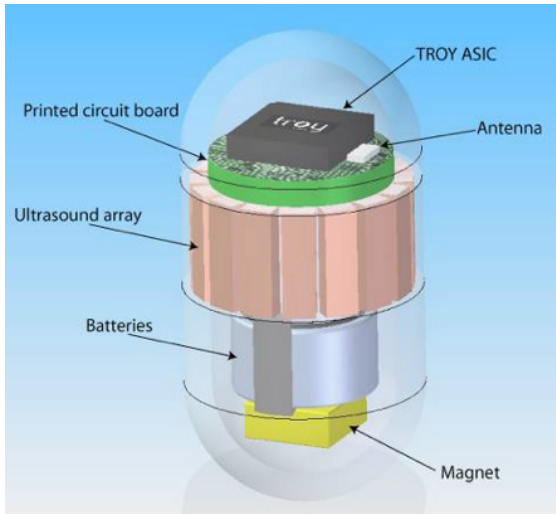


The structure of human gastrointestinal tract

The principle of Ultrasonic Endoscope Capsule operation

## ultrasound institute

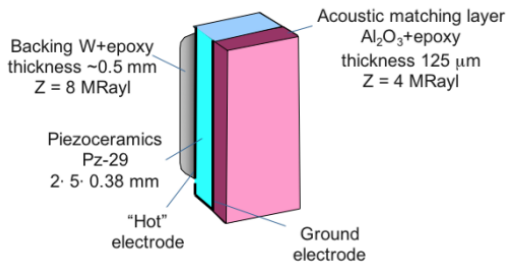
developed an ultrasonic probe ( $D < 10\text{mm}$ ,  $l < 6\text{mm}$ ) to be inserted inside the capsule. The probe is sending and receiving signals in 360 degrees, obtaining in this way the information needed for the software to generate a 2D image of gastrointestinal tract. The third dimension of the images are provided due to movement of the capsule inside the tract.



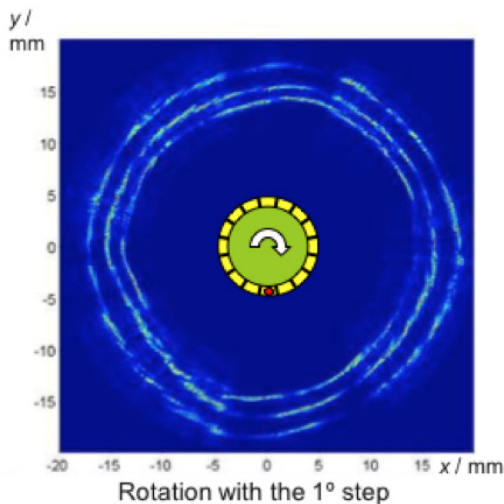
Design of Ultrasonic Endoscope Capsule



32 element ultrasonic transducers array



The structure of the 5MHz single array element



The polar B-scan of the bowel phantom

## project partners

IAITI (Portugal), SC IPA SA (Romania), Dunvegan (UK), AGT (Italy), Artica (Spain), Labor (Italy), Ultrasound institute of KTU (Lithuania), UMF ClujNapoca (Romania). The project is coordinated and managed by IAITI (Portugal).

## related publications

1. E. Jasiūnienė, R. Kažys, L. Mažeika. Simulations of ultrasonic fields of radial ultrasonic array. *Ultragarsas*. 2007. Vol 62. No. 2. P. 44-50.
2. L. Mažeika, M. Gresevičius. The fast technique for calculation of ultrasonic field of rectangular transducer. *Ultragarsas*. 2008. Vol 63. No 4. P. 52-56.
3. M. Gresevičius, E. Jasiūnienė, L. Mažeika. Comparison of simulations of ultrasonic fields of rectangular transducer. *Ultragarsas*. 2009. Vol. 64. No. 4. P. 22-27.
4. E. Jasiūnienė, R. Kažys, L. Mažeika. Simulations of ultrasonic fields of radial ultrasonic array, to be used in a small size capsule // *Acta Electrotehnica: 1st International Conference on Advancements of Medicine and Health Care through Technology*, September 27-29, 2007, Cluj-Napoca, Romania. Cluj-Napoca: Mediamira Science publisher. ISSN 1841-3323. 2007. Vol. 48. No. 4. p. 155-160. [0,333].