



## Thesis Project Form

**Title (tentative):** Endoscopic target tracking in virtual colonoscopy

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### Description

#### Motivation and application domain

Colonoscopy is the routine procedure used for colorectal cancer screening and prevention. In clinical practice, clinicians mark a potential tumor with ink. The project's long-term goal is to find an alternative at tattooing by using virtual colonoscopy.

#### General objectives and main activities

The main objective of this work is to find an alternative to tattooing for endoscopic marking of colon polyps and tumors prior to surgery. Electromagnetic tracking is already available in several commercial colonoscopy systems (e.g., Pentax ScopePilot and Olympus ScopeGuide) although these systems have not been integrated with virtual colonoscopy to enable virtual marking of anomalies. An open-source electromagnetic tracking system, Anser EMT is considered as a feasible marking alternative without the requirement for line-of-sight as usually required with traditional tattooing. The 3D Slicer visualization environment will be used with Anser EMT to provide a realtime virtual representation of a colonoscope within a phantom colon model: a 3D volume will be initially created from the colon CT image and a semi-automatic segmentation in ITKSnap. The physical phantom polyp locations will be marked up using fiducial markers. A tip-tracked colonoscope with a 5DoF sensor inserted through the instrument channel will be tracked within the lumen of colon model.

#### Training Objectives (technical/analytical tools, experimental methodologies)

Study and understanding of the state-of-the-art in virtual colonoscopy and electromagnetic tracking. Develop skills in image processing, use of the above packages, use of electromagnetic sensors.

**Place(s) where the thesis work will be carried out:** University College Cork (Ireland)

### Additional information

**Pre-requisite abilities/skills:** Good English knowledge (verified through skype meeting)

**Maximum number of students:** 1

**Financial support/scholarship:** ERASMUS