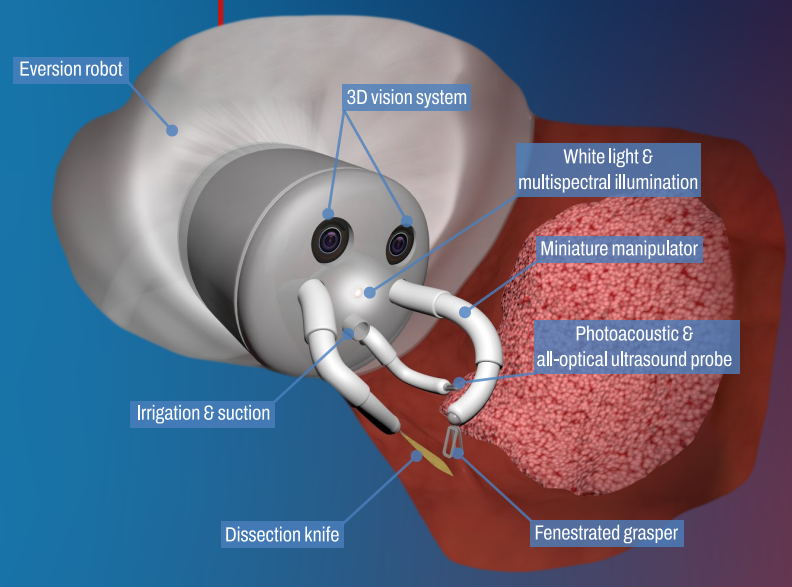
The Project

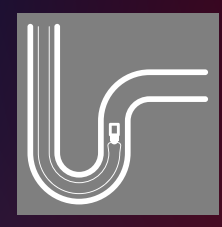
EndoTheranostics will usher in a new era for screening and treatment of **colorectal cancer (CRC)** through the development of a soft tip-growing or eversion robot with a sleeve-like structure. The robot will be able to extend deep into the colon while perceiving the environment through multimodal imaging and sensing. It will also act as a conduit to transfer miniaturized instruments to the remote site within the colon for diagnosis and therapy (**theranostics**).

The Synergy

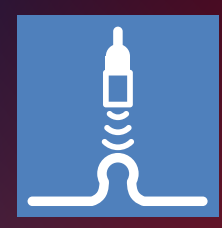
The unique technical and clinical challenges will be tackled by the **Principal Investigators**, each bringing complementary skills, backed by their groups with wide expertise and exceptional facilities. The **synergy** and added value of the extended team will lead to breakthroughs not possible by means of independent research. The outcomes of the project will revolutionise the theranostics of CRC, impacting the quality of life of millions of individuals.



The Challenges

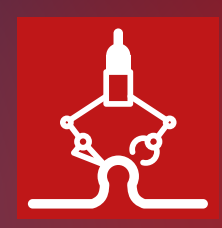


Endoluminal Navigation — Design of frictionless, shape-conforming robot integrating sensor and microsurgical tools with embodied AI for navigation and controlled real-time adaptation in constrictive and dynamic environments



In-situ Hystopathology — Intelligent and multimodal sensing including wide-field multispectral imaging, photoacoustic endomicroscopy and all-optical ultrasound imaging for in-vivo in-situ detection and characterisation of tissue properties

Supervised Autonomy — Human–machine cooperation with perceptional feedback for model-based and data-driven control of endoluminal navigation and microsurgical tasks in tight/soft environments



Microrobotic Surgery — Microsurgical robot with bimanual tissue manipulation based on a unique no-energy miniaturised continuum arm design for high-precision sub-mm oncologically-safe excision of polyps in the deforming colon

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ENDOTHERANOSTICS

Multi-sensor Eversion Robot Towards Intelligent Endoscopic Diagnosis and Therapy

ENDO THERANOSTICS

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