DC11: Learned adaptive encoder-decoder architecture for advanced fluorescence imaging.

Project Description: The project will be within the SMART-FLUO theme of the doctoral training network. The overall aim will be to develop a system to perform multispectral fluorescence imaging, absorption and scattering using endoscopes and structured light illumination. The system will enable quantitative fluorescence endoscopy imaging, making multidimensional fluorescence measurements repeatable and interpretable in real-time through an endoscope. The system aims to provide the physician with a fast-imaging tool to be used during guided-surgery with exogenous contrast agents. The DC will (1) investigate whether learned CNN based decoders can be combined with an experimental encoder system based on spatial light patterns; (2) develop an architecture for generating an optimal encoding adapted to experimental data; (3) test the developed architectures on experimental systems developed at POLIMI and IRCAD.

Expected Results: a novel network architecture that is capable of generating an optimal encoder for any given experimental conditions together with a CNN based decoder. Demonstration of fast real-time adaptive image acquisition using the developed architecture. Simultaneous development of fast reconstruction using this network architecture. Work will be performed jointly with DC4 and DC5.

Requirements

- Master's degree in Mathematics, Physics, Computer Science, Electrical Engineering or a related discipline, with a strong background in mathematics.
- Good programming skills.
- Proven research talent/experience is preferrable
- Good academic writing and presentation skills are preferrable
- Ability to work in multidisciplinary teams is preferrable

Host Insititution: UCL (London, UK)
Supervisor: Prof. Simon Arridge

Estimated gross allowance: TBD

PhD awarding institution: UCL

Secondment 1	**Secondment 2**	**Secondment 3**
Partner: DATRIX Supervisor: Dr. Matteo Bergozio	Partner: POLIMI Supervisor: Prof. Cosimo D'Andrea	Partner: IRCAD Supervisor: Dr. Michele Diana

Planned Starting Date: 01/09/2023 **Application Deadline:** 15/05/2023

Contact: s.arridge@cs.ucl.ac.uk

**Doctoral Candidates funded through the UKRI Horizon Europe Guarantee Funding Scheme are not considered MSCA fellows and are not permitted to refer to themselves as such.*

Funded by the European Union (GA 101072354). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.
UK participants are funded by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee grant number EP/X030733/1).