DC 2: Photon transport modelling and image reconstruction algorithms for multispectral DOT.

Project Description: Diffuse optical tomography (DOT) is an imaging modality where the optical properties of the target are estimated from boundary measurements of visible or near-infrared light. The image reconstruction problem in DOT is an ill-posed problem that needs to be approached in the framework of inverse problems. Solving this problem requires modelling of light transport and applying methods of numerical optimisation for image reconstruction. The objectives and research activities of the DC include development of light transport modelling algorithms and image reconstruction methods for multispectral DOT, implementation of the algorithms for the multispectral diffuse DOT system based on structured illuminations, and evaluation of the developed methodologies. The DC will collaborate with DC1 and DC3 on the development of the smart DOT system.

Expected Results: implementation of software for simulating light transport in multispectral diffuse optical tomography system based on structured illumination and compress sensing. Implementation of image reconstruction algorithms for adaptive diffuse optical tomography system that maximise the information content. Performance assessment and validation of the system with dedicated phantoms mimicking the optical properties of biological tissues (work performed jointly with DC1 during secondment 3).

Requirements

- Master's degree (or equivalent) in relevant fields (e.g. applied mathematics, scientific computing, computational physics).
- Strong background on inverse problems and/or scientific computing.
- Good programming skills on some commonly used programming languages (e.g. Matlab, Python, C/C++).
- Strong interest in research with experience on light transport modelling is viewed as a benefit.
- Ability to work both independently and as part of a team.
- English fluency* (both written and oral). English fluency can be demonstrated by providing evidence of any of the following: PTE (academic) – >=62; TOEFL (iBT) – >= 92; IELTS (academic); C1 Advanced – >= C; C2 proficiency – >= Level C1.

**Exceptions for native speakers and applicants having completed a prior cycle of studies in English apply. Click here to learn more about your specific requirements!*

Host Institution: UEF (Kuopio, Finland)
Supervisor: Prof. Tanja Tarvainen

Estimated gross allowance: 43,200 €/year

PhD awarding institution: UEF

Secondement 1	**Secondment 2**	**Secondment 3**
Partner: CNR Supervisor: Dr. Andrea Farina	Partner: DATRIX Supervisor: Dr. Matteo Bergonzio	Partner: CNR Supervisor: Dr. Andrea Farina

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

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