Doctoral Candidate 7 - Trustworthy AI for DL-based reconstruction of multi-parametric qMRI

Host Institution	Technische Universität München, Germany
PhD enrolment	Technische Universität München, Germany
Primary Supervisor	Prof. Dr. Daniel Rueckert, Chair for AI in Healthcare and Medicine
Subject area	Robust and trustworthy DL, verification of DL approaches, DL-based image reconstruction

About this doctoral project and your tasks

The project will address the development of trustworthy DL approaches for the reconstruction of multi-parametric qMRI with a focus on **robust and reliable/safe AI approaches**. To ensure robustness, the project will explore **adversarial data augmentation** techniques which exploit prior knowledge about the types of variations that are likely to occur in practice. To ensure reliability and safety, we will employ and adapt **verification techniques** for neural networks that provide guarantees for performance given certain input variations. These verification techniques will also be used to identify edge cases which can then be automatically added to the training.

Your tasks will include:
- Carrying out independent PhD research on the topic proposed
- Publishing your high-quality research in international journals and conference proceedings
- Collaborating with IQ-BRAIN project partners as well as local experts for your project
- Engaging with and further supporting the research and (limited) teaching activities in the lab

Foreseen secondments

For this project, we foresee secondments to:

- Dr. Thanh Vân Phan (3 months) at **Icometrix** (Belgium)
- Prof. Stefan Klein (3 months) at **Erasmus MC** (The Netherlands)
- Prof. Matthan Caan (3 months) at **Amsterdam UMC** (The Netherlands)

About the host institution and research group

The **Lab for AI in Medicine** at TU Munich develops artificial intelligence (AI) and machine learning (ML) techniques to improve medicine for patients and healthcare professionals. Our aim is to address some of the key challenges in healthcare and medicine using AI. Our current research focus is on **AI and ML methods for biomedical imaging** including the development of innovative algorithms for biomedical image acquisition, image analysis and image interpretation – especially in the areas of image reconstruction, registration, segmentation, tracking and modelling. We are also developing AI and ML methods for **extracting clinically useful information from biomedical images** – especially for computer-assisted diagnosis and prognosis. Additionally, we are developing trustworthy AI methods that are **explainable, transparent and privacy preserving**.

About the offer

- The selected candidate will be employed by TUM for **36 months** on the MSCA-DN project.
- Doctoral candidates are offered a **competitive remuneration** based on the MSCA allowances and the regulations of the host institution. TUM has received the following EU-grant to recruit a Doctoral Candidate (DC): monthly Living Allowance € 3.342; monthly Mobility Allowance € 600; and monthly Family Allowance € 660 (only if applicable). Please note that the final monthly, gross salary will result from deducting (from the mentioned amounts) all compulsory national labour taxes (social security, etc.) to be borne by the employer. Moreover, funding is available for technical and personal skills training and participation in international research events.
- **Expected start date**: between April and September 2025. We encourage last-year master students who will graduate by this time to already apply.

More information is available in the general information document for IQ-BRAIN positions.

Specific profile and requirements

- Your profile aligns with the **general requirements and eligibility criteria** of the IQ-BRAIN project.
- You have a master's degree in **computer science, mathematics, engineering, physics, or related field** (or will have by the time of your appointment).
- Background in **medical image analysis and/or magnetic resonance imaging (MRI)** is appreciated.

More information

For additional information about the research project, contact:

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