

PhD Scholarship in

Development and characterization of a microwave system for imaging and heat treatment

This PhD project, joint between LSBU and the industrial partner UBT Srl, Italy (<https://www.ubt-tech.com/en/>), aims to investigate (analytically and theoretically), design and characterize (via simulation and/or experimentally) a system which could be used for both diagnostic imaging and heat treatment. The system could be versatile, allowing different applications, including the brain. Dedicated microwave image reconstruction techniques from multiple antenna beams will be studied and the mathematical formulation derived. Next, a microwave beamforming method to focus the wideband electromagnetic power will be formulated and validated in phantoms. The effects of antenna array structure and the number of required antennas will be analysed. The techniques in beam focusing over a millimetre space will be used for system optimisation, evaluating the local increase of temperature.

The outcomes of this project for the PhD candidate are listed below:

- Construction of anthropomorphic phantoms mimicking tissues' dielectric properties,
- Gain knowledge and experience in 2D and 3D microwave image reconstruction techniques, including morphologic imaging,
- Formulate (analytically and theoretically) a microwave beamforming method to focus the wideband electromagnetic power,
- Design and characterize a system which could be used for both diagnostic imaging and heat treatment,
- Perform system validation via simulation/experimental measurements, assessing imaging resolution and local increase of temperature,
- Gain multidisciplinary experience from turning research outcomes into medical devices,
- Present the findings of the project in international conferences,
- Perform high-quality research and publish it as journal articles.

Supervisory Team: The successful applicant will be working at LSBU with Prof Mohammad Ghavami (<https://www.lsbu.ac.uk/about-us/people/people-finder/prof-mohammad-ghavami>) and Prof Sandra Dudley (<https://www.lsbu.ac.uk/about-us/people/people-finder/dr-sandra-dudley>), who will act as academic supervisors, and with Dr Gianluigi Tiberi and Dr Navid Ghavami, who will act as industrial supervisors (<https://www.ubt-tech.com/en/about-us/>). As a PhD student, the successful applicant will join The Bioengineering Research Centre (<https://www.lsbu.ac.uk/research/centres-groups/the-centre-for-bioengineering>), and will work alongside a range of new and experienced PhD students in a vibrant, collaborative, multidisciplinary and international environment.

Requirements: Applicants must be of outstanding academic merit and should have (or be expected to gain) either a first class or an upper second-class Honours degree (or the international equivalent), or an MSc/MRes with distinction. Enthusiastic and self-motivated candidates from all countries with a background in either Biomedical Engineering, Electrical Engineering, Biology, Physics, or a related discipline are encouraged to apply. A good knowledge of Matlab and experience in RF/microwave hardware use and development would be advantageous.

This PhD is a School of Engineering Bursary covering fees and a £18k stipend per annum for three years. As part of the candidate's academic development, the bursary agreement includes that the successful PhD candidate engages in 4 hours per week student contact time, comprising lab class assistance and extracurricular activity development. If you have any informal query, please email the supervision team directly. We encourage applications from underrepresented groups.

Enquiries should be directed to Prof Ghavami (ghavamim@lsbu.ac.uk) or Dr Tiberi (tiberig@lsbu.ac.uk). Please send a copy of your CV with a covering letter directly to Prof Ghavami before applying.