

Project Reference: **CTE_BBRC_Harput_001_25_26**

About the Project

This is an exciting PhD opportunity within the College of Technology and Environment (CTE) at London South Bank University (LSBU). The successful candidate will receive a tuition fee waiver beginning in September 2025 for 4 years, including the write-up year.

Project Title

Combining Ultrasound and Microwaves for Blood-Brain-Barrier Opening and Targeted Drug Delivery

Project Overview

Aim: To develop a novel drug delivery technology that can open the blood-brain-barrier (BBB) by activating nanodroplets with a combination of ultrasound and microwaves. A prototype will be developed to characterise therapeutic nanodroplets using ultrasound and microwaves in preclinical settings.

Background: Brain cancer is one of the deadliest types affecting over 88,000 adults and children in the UK with an expected 5-year-survival-rate <15%. BBB protects the brain against hostile molecules, bacteria and viruses, but also prohibits the delivery of cancer drugs. The proposed technology can open the BBB on demand for drug delivery only at desired locations inside the brain.

PhD project will focus on characterization of novel therapeutic nanodroplets using ultrasound and microwaves. PhD student will work closely with the Prof M Thanou's research team at King's College London, who are developing the nanodroplets.

Project Objectives:

- Construct an experimental measurement setup to perform ultrasonic and microwave measurements with nanodroplets.
- Process experimental data (signal processing and statistical analysis) to evaluate the therapeutic efficacy under different conditions
- Develop an imaging method to monitor nanodroplets activation using the existing ultrasound and microwave imaging equipment.

PhD Outcomes:

- understand ultrasound and microwave imaging;
- develop experimental skills using high-frame rate ultrasound and microwave systems;
- gain experience in signal and image processing techniques;
- present the findings of the project in international conferences;
- perform high-quality research and publish it as journal articles.

Who Are We Looking For?

- Open to any UK or international candidates. Starting in September 2025.
- The candidate must meet the minimum entry requirements for our PhD programme by clicking the '[Apply](#)' link.
- Previous research experience in electronic engineering, data/signal processing and/or instrumentation is essential.
- A keen interest in biomedical sciences and healthcare technologies is highly desirable.

- Knowledge and experience in ultrasound imaging, microwave technology, signal processing, statistics, and/or programming would be advantageous.

Selection Criteria:

- Academic Qualifications - You should normally have at least a 2.1 honours degree from a UK University or an equivalent qualification in engineering, computer science, etc.
- Research and Analytical Skills – Ability to research subjects using libraries, the internet, and other information resources, ability to conduct comprehensive literature reviews, experience in qualitative and quantitative data collection and analysis, strong research design and methodology skills, ability to independently collaborate with stakeholders, and excellent academic writing and communication skills.
- Professional Skills - Project management and organisational skills, ability to work independently and as part of a team, problem-solving and critical thinking skills, and adaptability and willingness to learn new skills.
- Software and Modelling Experience - Experience developing and utilising spreadsheet-based models (e.g., Microsoft Excel) to an advanced level. Experience with other software packages relevant to the discipline would be an advantage.
- Communication Skills—The candidate should be highly motivated, able to collaborate, have good visual, oral, and written communication skills, and communicate the work's outcomes to commercial, industrial, and scientific audiences.
- Teamwork and Collaboration - Ability to work with industrial and academic supervisors.
- Language Proficiency - Overseas applicants must have a minimum English language IELTS score of 6.5, with at least 5.5 in any of the components.
- Understanding of Equality and Diversity - Able to demonstrate an understanding of equality and diversity and their practical applications.
- Visa and Legal Requirements - Non-EU/EEA nationals may need to apply to the Foreign and Commonwealth Office (FCO) for clearance from the Academic Technology Approval Scheme (ATAS).

Training & Development Opportunities

Doctoral students at London South Bank University ([LSBU](#)), through the London Doctoral College ([LDC](#)), benefit from a rich and structured training environment designed to support academic excellence and professional development. All PhD candidates are offered a comprehensive programme of workshops and seminars covering essential research skills, including research design, data analysis, academic writing, ethics, and project management. These sessions aim to support students through every stage of their doctoral journey—from literature review and methodology to thesis completion and viva preparation. Postgraduate researchers can access advanced, discipline-specific training aligned with their research focus. LSBU's doctoral training environment is designed to build deep expertise in a chosen research area and the broader skills necessary for successful careers in research, industry, and beyond.

About the College

The College of Technology and Environment (CTE) at London South Bank University (LSBU) is a newly formed academic college, launched in January following the university's recent reorganisation. Led by Executive Dean Professor Chris Harty, CTE brings together four schools: Architecture & Planning, Construction, Property & Surveying, Engineering & Design, and Computer Science & Digital Technologies. The college fosters a collaborative and interdisciplinary environment, addressing the complex challenges of the built and digital environments. CTE strongly emphasises research, with doctoral students playing a key role in shaping and contributing to the college's research agenda. CTE prepares students to become future leaders through innovation, industry partnerships, and a commitment to sustainability. With a focus on real-world impact and academic excellence, the college is set to drive forward LSBU's vision of delivering applied knowledge that transforms lives and

communities locally and globally. The university has five centres, and any academic staff and students in the college can join. These research centres are described below.

About the Bioscience and Bioengineering (BB) Research Centre

The [Bioscience and Bioengineering Research Centre](#) advances understanding of health and disease through biological research and innovative technologies. Our interdisciplinary team focuses on improving diagnostics, treatments, and patient management across healthcare settings. Areas of expertise include cancer biology, bioinformatics, pharmacokinetics/pharmacodynamics, microwave and ultrasound sensing, and image analysis. We also explore human biomechanics and the mechanical properties of muscle and tendon in both healthy and diseased states. By integrating science and engineering, we strive to translate cutting-edge research into real-world healthcare improvements that benefit patients and practitioners alike.

Contact Person

Before applying, please contact the main supervisor, **Sevan Harput**, an Associate Professor in Electrical and Electronic Engineering at the College of Technology and Environment.

email: harputs@lsbu.ac.uk

url: <https://sevanharput.github.io/>

In your email, include:

- Details of your current level of study and academic background.
- A summary of any relevant experience.
- A brief paragraph about your motivation for pursuing this PhD project.

Fee Waiver

The fee waiver is available for 4 years (48 months), including the writing-up year, examination period, and submission of the corrected thesis.

How to apply

Applications should be submitted via the programme page using one of the links below:

<https://www.lsbu.ac.uk/study/course-finder/general-engineering-phd>

<https://www.lsbu.ac.uk/study/course-finder/electronic-electrical-engineering-phd>

You should upload the problem statement, qualifications, CV, and other relevant documentation to the application portal. Remember to state the correct reference number and the appropriate supervisor.