# Computer Science GTA Project

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| **First Supervisor** | Dr Cong Minh Tran |
| **School/Department** | School of Computing and Mathematical Sciences |
| **Email**  | csepgr@le.ac.uk  |

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| **Second Supervisor** | Kaul Himanshu |
| **School/Department** | School of Engineering  |
| **Email**  | himanshu.kaul@leicester.ac.uk  |

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| **Additional Supervisor** |  |

**Section 2 – *Project Information***

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| **Project Title** | Digital twin of the lung using voice Biomarker: Revolutionising Respiratory Disease Detection. |
| **Project Highlights:** | 1. | Pioneering a novel voice user interface, leveraging advanced AI and signal processing to analyze real-time breathing trajectories for early respiratory disease detection. |
| 2. | Developing robust telephony-optimized signal processing pipelines and personalized AI models to extract critical voice biomarkers from low-fidelity audio |
| 3. | Building a fully automated, scalable platform for remote, equitable health screening, integrating conversational AI, longitudinal data analysis, and secure data management |
| **Project Summary**  |
| Potential students will be leveraging cutting-edge AI and signal processing to address critical health inequities. This PhD project offers an exciting opportunity to contribute to Voice biomarker, a groundbreaking initiative aiming to transform early respiratory disease identification using digital twin of the lung.Respiratory diseases pose a significant global health burden, with current diagnostic methods often inaccessible or expensive, particularly for digitally and socioeconomically disadvantaged groups. Voice Biomarker proposes a novel, low-cost, and universally accessible solution: an automated voice user interface delivered via a free phone call.As a PhD student, you will delve into the fascinating intersection of lung physiology, acoustics, artificial intelligence, and system. Your work will involve:* Developing a literature review on phono-acoustic tool designed to elicit subtle voice features indicative of airflow limitation, even after brief exertion.
* Engineering a robust signal processing pipeline to extract key voice markers from low-fidelity telephone audio, overcoming the challenges of network distortions.
* Building personalised edge computing using AI models that utilise longitudinal voice data and integrate with clinical risk assessments for highly accurate early detection.

Contributing to the development of the Voice Biomarker platform, a fully automated, user-friendly system that empowers individuals to monitor their respiratory health from home.This interdisciplinary project will equip you with expertise in voice biomarker discovery, advanced AI/ML techniques, and real-world health technology deployment. You will work within a supportive team, collaborating with experts in lung physiology, speech therapy, and computer science, with access to world-leading patient cohorts and high-performance computing resources. Your research will have a direct, tangible impact on patient outcomes, reduce pressure on healthcare systems, and address health inequities in respiratory medicine. |