

## PROJECT DETAILS

Project Title:

**Multimodal Explainable AI for Obstructive Sleep Apnoea Risk Stratification Using Awake 3D Craniofacial Imaging.**

Project Summary:

Obstructive Sleep Apnoea (OSA) remains substantially underdiagnosed due to reliance on overnight polysomnography. This PhD will develop a next-generation, multimodal, explainable AI framework to predict moderate-to-severe OSA using awake 3D craniofacial imaging combined with demographic and clinical risk factors. Moving beyond prior landmark-based approaches, the project will investigate transformer-based 3D point-cloud learning, self-supervised pretraining on large facial datasets, and multimodal fusion architectures. Key contributions include robust external validation, uncertainty quantification, fairness auditing across sex and BMI groups, and interpretable anatomical feature attribution. The outcome will be a validated, scalable pre-screening framework to support triaging decisions in primary care without requiring sleep studies.

Preferred Applicant Skillset:

Strong background in statistics, machine learning, computer vision, biomedical engineering, or computer science. Experience in Python and deep learning frameworks such as PyTorch and TensorFlow is required. Familiarity with 3D data (point clouds, meshes), transformers, multimodal learning, or medical AI desirable. Understanding of model validation, bias analysis, and reproducible research practices preferred. The candidate should demonstrate mathematical maturity, capacity for methodological innovation, and interest in translational health AI. Prior exposure to medical imaging or clinical datasets will be advantageous, but not mandatory.

Internship Opportunity:

Yes. Placement with a sleep clinic or digital health partner to translate the developed model into a deployable GP-facing decision-support prototype will be available.

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