OXFORD
International
College
A NORD ANGLIA EDUCATION SCHOOL

OIC FUSION PROJECTS

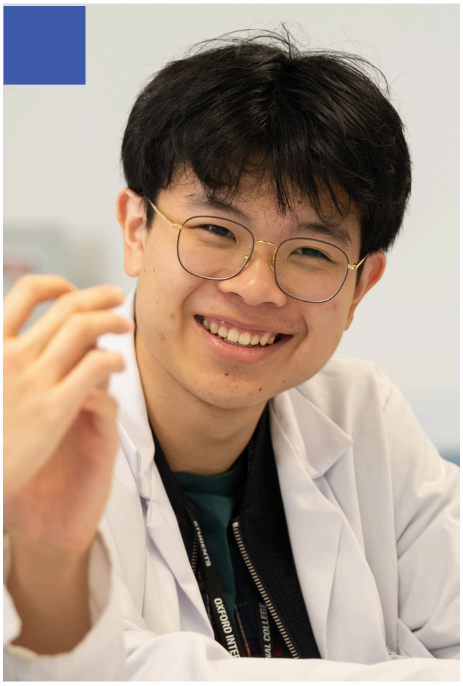
Design optimisation of dental implants using finite element methods (FEM) and Artificial Intelligence (AI)

Background

The dental implants have received much attention in recent years and have been used to treat patients with missing and bad teeth. Due to various factors including the age of the patients the functioning of the design of the implants is widely different. The shape of the dental implants is varied and have a significant impact on their performance while functioning. The incorrect and unsuitable shape increase the stress distribution around the implant, which not only effect the surrounding bones, but also causes mechanical fracture of the implants. This research aims to investigate the effectiveness of the five different types of implants using the combination of the FEM and power of AI in design stage. Under certain vertical load (e.g., 90N) the distribution of the stress and deformation on the bones will be investigated and the best possible design would be determined.

At A Glance:

- 4-5 months Project Timescale
- Suitable for year 11 to 13 with particular interest in biomechanics and engineering design
- Required software: CAD package, FEA package and Python for AI part
- Project is associated with American Society of Mechanical Engineers (ASME)



OIC FUSION PROJECTS

Characterisation of hydrogen gas properties in different pressure and temperature in various media.

Background

Hydrogen (H2) offers a clean alternative to fossil fuels, supporting the UK's net-zero targets. Large-scale storage will require subsurface porous media such as disused North Sea oil and gas fields or underground caverns. Accurate prediction of thermodynamic and transport properties of H2 mixtures with gases like N2 and CO2 iS critical for efficient storage system design. Existing characterisation methods are computationally intensive and often lack accuracy. This project develops user-friendly machine learning models, trained on experimental data, to determine these properties more reliably. Implemented in Python and benchmarked against equation-of-state methods, the models will be integrated into reservoir simulators (e.g., Eclipse-300) to improve predictions for hydrogen storage systems.

At A Glance:

- 6-8 months Project Timescale
- Suitable for year 12 to 13 with particular interest interest in energy transition, chemistry, thermodynamics and fluid mechanics
- Required software: Python
- Project is academic research project with potential to be funded by the net zero initiative UKRI.