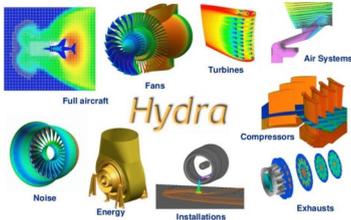


# What do we do at the Mathematical Institute?

Maths really is all around us, and the work we do here at the Department is used in many aspects of our lives —from banking, to medicine, cars, mobile technology and even the shape of our cereal!

Here are some examples of the types of research projects which your role is helping to support.



## NUMERICAL ANALYSIS

A code 'Hydra' developed by Mike Giles is used in the aerodynamic design of Rolls Royce vehicles.

## MATHEMATICAL AND COMPUTATIONAL FINANCE

Mike Giles has developed a technique to reduce the complexity and energy consumption of complex financial calculations which enable banks to quantify their risks and satisfy regulatory demands.

The Numerical Algorithms group then developed this technique into new software to support banks in exploiting this new approach.



## WOLFSON CENTRE FOR MATHEMATICAL BIOLOGY (WCMB)

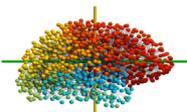
Mathematical models developed by Philip Maini predicted that cranial neural crest cells (similar to highly aggressive tumours) break away.

These models guided our collaborators in the medical field to find a chemical (DAN) where the model predicted it to be. They also found that DAN slowed down melanoma cells, so could be a potential cancer therapy.

### Brain modelling:

Alain Goriely's work looks at modelling disease progression on brain networks for Alzheimer's, Parkinson's and motor neurone disease.

This helped to better understand disease mechanisms and their effects on functions (e.g. memory), with the aim of identifying therapeutic treatments.



### Mobile phones

Mathematics by Chris Breward, Ian Griffiths and Peter Howell is now used to make the flexible glass sheets for Samsung and Huawei bendable smartphones.

## OXFORD CENTRE FOR INDUSTRIAL AND APPLIED MATHEMATICS (OCIAM)

### Glass manufacture

Mathematics can tell us what shape hole to pump glass through to make exotically shaped glass tubes and bottles. This technique can also be applied to making interestingly shaped food!



### Maths for your Morning

Ian Griffiths, Jim Oliver and the InFoMM Centre for Doctoral Training collaborated with Nestlé by using mathematical modelling techniques to inform the manufacture of breakfast cereals.



### Flight patterns

Research by Pete Grindrod looked into the mathematics of flight paths and whether there are patterns between the destinations that people book.

### Online threats:

Pete Grindrod's work has also analysed conversations between right wing extremist individuals to identify strategies to counter terrorism, grooming and radicalisation online.

## DATA SCIENCE

## Research with a global impact....

Mathematical models developed by Ian Griffiths predict when a water filter will expire. This research has been upscaled to schools and communities in India to ensure the provision of safe water and prevent arsenic poisoning, through providing filters with iron-rich laterite soil that removes arsenic.