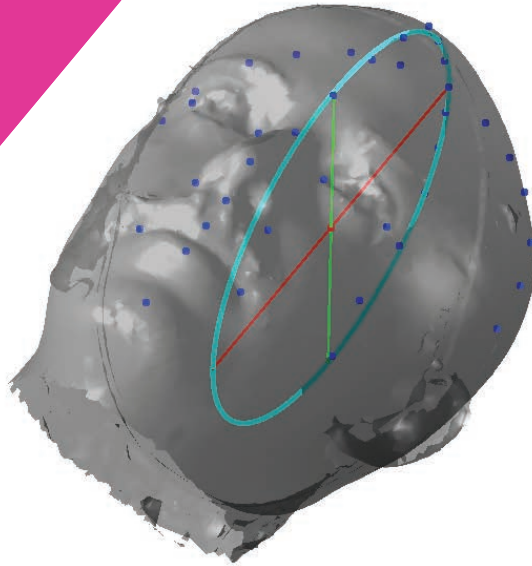


Dr Nick Pears

Leverhulme Trust Senior
Research Fellow



The Leverhulme Trust



Dr Nick Pears, a Senior Lecturer in Computer Science at the University of York, held a Leverhulme Trust Senior Research Fellowship from 2013 to 2014 to develop sophisticated 3D face and head models that can assist craniofacial surgery.



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“My Leverhulme Trust Senior Research Fellowship has allowed me to develop the first statistical model of human face and full cranium shape variation, thus supporting craniofacial surgeons in planning operations and assessing their outcomes.”

RESEARCH

As a senior lecturer with a full teaching load and various administrative responsibilities, Dr Pears had identified that a Leverhulme Trust Senior Research Fellowship could provide the dedicated research time needed to change direction. “The Fellowship has allowed my skills in 3D shape analysis, previously applied in the biometric security domain, to move into the world of medical image analysis, which I find very rewarding because of its impact,” he explains.

As a result, Dr Pears and his research group were able to develop the first 3D morphable model of the full human head including the face and full cranium. Using statistical and computational techniques, Dr Pears has created a software suite that can both generate models and make comparisons between these models and new (e.g. patient) head shapes. The accuracy levels established by these models make them a useful planning and outcome assessment aid for facial and cranial reconstruction surgery.

IMPACT

Research generated during the Fellowship provided the momentum for a key collaboration with Alder Hey Children’s Hospital in Liverpool. “The models we have developed have already been used there to successfully assess the outcome of two different types of operation for craniosynostosis patients – a skull problem that causes shape abnormalities and problems associated with increased intracranial pressure,” Dr Pears explains. Furthermore, to increase the impact of the research in statistical shape modelling, datasets arising from this

collaboration will be made available to the wider research community.

In the future, Dr Pears hopes to improve accuracy by building models that can highlight asymmetrical aspects of faces and crania. He also hopes to develop models for clusters of different types of face shapes and see if these are related to age, gender and ethnicity demographics. Such improvements could potentially increase clinicians’ capacity to both plan craniofacial surgery and assess outcomes.

CAREER DEVELOPMENT

The model building software developed through this research has already started to generate significant publications and research grant applications. Dr Pears and his clinical collaborator also recently presented this work at the International Society of Craniofacial Surgery.

“The Fellowship has changed the direction of my research,” says Dr Pears, “I now work on the material started in the Fellowship almost exclusively and there is a lot to be done to complete the project over the next few years.”

LEVERHULME TRUST SENIOR RESEARCH FELLOWSHIPS

Royal Academy of Engineering Leverhulme Trust Senior Research Fellowships allow academics to concentrate on full-time research by covering the salary costs of a replacement academic who takes over the awardee’s teaching and administrative duties for up to one year.