Dr Danail Stoyanov

Research Fellow

Dr Danail Stoyanov is a Senior Lecturer and leader of the Surgical Robot Vision Group at University College London. From 2009 to 2014, he held a Royal Academy of Engineering Research Fellowship, which enabled him to develop his research in medical robotics and computer-assisted surgery.

ROYAL
ACADEMY OF
ENGINEERING

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RESEARCH

As a Research Fellow, Dr Stoyanov brought together his interests and expertise in surgical vision and computational imaging. This resulted in several breakthroughs relating to the use of computer vision and robotics in minimally invasive surgery (MIS). MIS has become increasingly popular in operating rooms as it reduces patient trauma, recovery times and healthcare costs.

The use of robotics in surgery has the added benefit of increased dexterity, allowing for more efficient procedures at a micro-scale. Dr Stoyanov has been among the first to develop a set of core computer vision algorithms that facilitate real-time imaging and augmented reality overlays that enhance the use of robotics in surgery.

Additionally, Dr Stoyanov's research group developed computational techniques that can be used to calculate and interpret information gathered from images captured in vivo during surgery. This has been developed further since his Fellowship, and his group now looks at how this information can be used to evaluate and analyse surgical performances in order to inform training and learning.

IMPACT

The long-term funding offered by the Fellowship provided Dr Stoyanov with the security to pursue an ambitious programme of research. As a direct result, he was able to establish a successful research group by the end of his award. This group now includes nine PhD students and three postdoctoral researchers, and continues to grow.

Having used the Fellowship to develop his track record, Dr Stoyanov has been able to leverage significant funding from the European Commission and organisations such as the Engineering and Physical Sciences Research Council and the Wellcome Trust. This has enabled him to extend the research programme into new areas.

The Surgical Robot Vision Group is currently investigating how its research could apply to surgical procedures for a broad range of conditions including prostate, liver and pancreatic cancers, and fetal surgery. In the coming years, it hopes to further identify ways to exploit the synergy between computer imaging and machine learning, and apply this to fundamental surgical problems.

PROFESSIONAL DEVELOPMENT

Research Fellowships restrict teaching and administrative duties, providing researchers with the freedom to concentrate on their research. Dr Stoyanov credits the Fellowship as having given him a stable platform to develop a successful research group.

"From an early stage, I identified the Research Fellowship as being an ideal way for me to become an independent researcher," explains Dr Stoyanov. "The Royal Academy of Engineering was incredibly supportive and I also benefited from its Research Forum."

RESEARCH FELLOWSHIPS

Royal Academy of Engineering Research Fellowships are designed to promote excellence in any field of engineering. The scheme provides support for high-quality engineers and encourages them to develop successful academic research careers. Research Fellows receive funding for five years and are mentored by a Fellow of the Academy.