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Dr. John Szymanski MIET, MIEEE, MIInstP, CPhys

Senior Lecturer

Email: john.szymanski@york.ac.uk

Homepage: <http://www-users.york.ac.uk/~jes1/index.htm>

Tel: +44 (0)1904 32 2354

Fax: +44 (0)1904 32 2335

Research Area: [Communications and Signal Processing Group](#) » [Audio Lab](#)

Areas of Expertise: Signal Processing: Audio, Signal Processing: Image



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Research

The unifying theme of all of my interdisciplinary research effort has been working with "inverse problems" - broadly, applications where instead of being able to measure the properties of a

system directly, it is only possible to gather data which is not only indirect but also potentially blurred, noisy, incomplete and/or irregularly sampled. The inversion of such data to provide physical insights typically requires the use of intensive computational techniques in order to implement models of physical processes and to allow the introduction of physical constraints and information into some form of process of optimisation, data fitting, pattern recognition or parameter estimation.

One of my primary research areas is audio signal separation - a process which requires integrating information regarding the physics of the individual sound sources with signal processing and optimization techniques that provide parametric information regarding the time-varying properties of the various audio sources within a piece of sound.

Another current research area is the construction of gigapixel-scale images, assembled by creating a mosaic from hundreds of smaller close-range and multi-viewpoint images. Application areas include the construction of virtual and immersive

environments and some specific tasks, such as heritage and architectural recording or condition monitoring, have particularly stringent requirements - the image mosaic must not just appear to be seamless to the casual viewer, but must also exhibit a consistently high metric accuracy.

I also have long-standing interests in archaeological prospection - in particular the modelling and processing of data arising from shallow geophysical survey techniques such as resistive tomography, magnetometry and ground-probing radar.

See <http://www-users.york.ac.uk/~jes1/> for full details.

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