

Sensor Technologies

Future requirements will be driven by the advent of Unmanned Air Vehicles (UAVs) and Networked Enabled Capability (NEC), as well as the need for combating terrorism and for greater affordability. Advanced sensors will be required for navigation and pilotage to enable UAVs to operate in the same airspace as manned aircraft. Global information networks will allow sensors to be networked, which when coupled with novel data fusion algorithms, will provide a capability that is greater than the sum of the parts. Sensors to enhance safety and security will be needed to combat terrorism, with emphasis on preventing an attack being initiated. Affordability will push the need for common technology across platforms, perhaps sourced from adjacent markets, with advances required in underlying technologies such as high performance analogue-to-digital converters and semiconductor materials, as well as developing low cost, environmentally friendly manufacturing techniques.

Research projects will be aligned to these future requirements and can be grouped together under the following technology themes:

- Sensors to enhance pilotage and navigation
- Sensors to enhance safety and security
- Sensor fusion and networking
- Supporting/underpinning sensor technologies

- Consecutive EPSRC Platform grants for Industrial Process Tomography (2001 and 2005)
- Major £1.27 million project funded by EPSRC in fast fibre-based Terahertz imaging
- Umbrella agreement with Rapiscan Systems involving two key programmes on baggage and personnel screening

Research areas

Sensor technology research at the University of Manchester is highly interdisciplinary and involves input from several Schools within the Faculty of Engineering and Physical Sciences.

Relevant aerospace research projects currently include:

- Non-contact ultrasonic non-destructive testing and evaluation of aerospace materials and structures
- Electromagnetic testing of carbon fibre reinforced plastic
- Imaging in poor visibility conditions such as haze, fog and rain
- Vision chips with integrated sensing/processing for UAVs
- Optic fibre mapping of structural deflection on large surface areas
- High speed chemical species imaging for combustion and chemical specific trace concentration measurement
- THz tomography to map major species concentrations and temperature field distributions in high-pressure flames
- Multi-sensory information processing in modelling and recognition of instabilities
- Neural networks for diagnosis and early detection of fault or failure of (sensory) systems
- High speed X-ray tomography to improve throughput of baggage inspection
- Advanced electromagnetic and multi-sensor systems for passenger screening
- Solution of inverse problems for sensor systems

Research facilities

- Extensive range of mathematical and software modelling systems for finite element analysis of many physical systems
- Fully equipped research laboratories with the latest instrumentation
- Advanced tomographic instrumentation and systems
- Vision, imaging and image processing systems
- High speed laser systems
- Laser ultrasonics research facility

Relevant postgraduate study

MSc in Sensors and Electronic Instrumentation

Manchester has a long pedigree in offering postgraduate teaching aimed at the design of advanced sensor systems. The MSc course in Sensors and Electronic Instrumentation provides a broad knowledge and a multi-disciplinary approach.

Research degrees

Research degrees are offered across the broad spectrum of sensor technologies, from fundamental theory and innovative technology, through different sensing modalities, to leading-edge applications. Few universities in the world are able to offer the same breadth of expertise.

Academic staff



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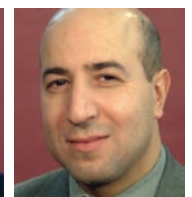
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