UNIVERSITY OF BIRMINGHAM | Business with Birmingham

Radar Communication, Microwave and Devices

Our world-leading research in Electronic, Electrical and Systems Engineering at the University of Birmingham addresses key challenges, problems and opportunities currently facing our civilisation in power, communications, transport, defence and energy.

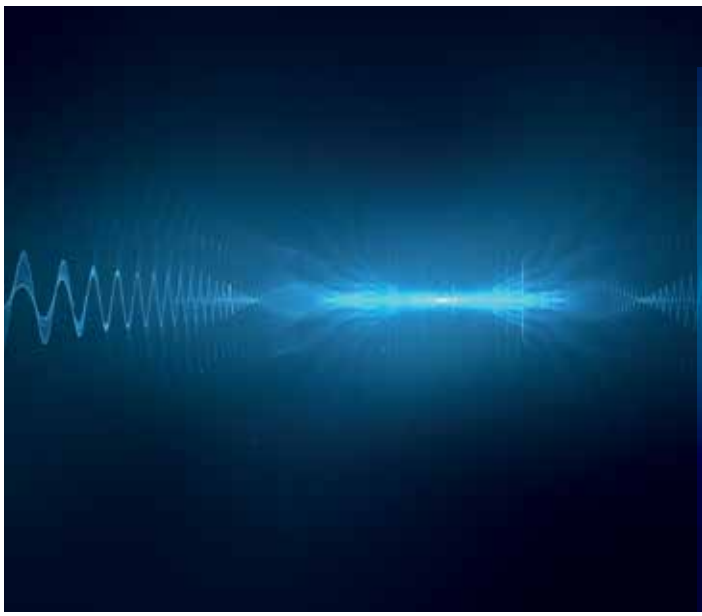
Our Microwave Integrated Systems Laboratory (MISL) is a group dedicated to researching and driving innovation in radar remote sensing. It is the largest and strongest radar group in the UK. The group focuses on the integration of novel microwave hardware/signal processing techniques into cutting-edge radar sensors.

Our expertise

- Automotive radar for autonomous driving
- Cognitive/bio-inspired radar
- Passive radar
- Low-THz radar systems
- Synthetic Aperture Radar (SAR)
- Bi-/Multi-static radar
- Antennas

Success and impact

- Our Electronic, Electrical and Systems Engineering has a total annual research grant income of over £4 million, from a wide range of sources including the European Union, UK research councils, UK government agencies, charities and industry, both in the UK and internationally.
- In recognition of his significant contribution to radar research, Professor Mikhail Cherniakov, Founder and Head of the Microwave Integrated System Laboratory (MISL), was awarded Christian Hülsmeyer Award at the 2017 International Radar Symposium.
- Professor Chris Baker, Chair of the Intelligent Sensor Systems at the University of Birmingham, led the government research teams responsible for the development of the Sentinel and MSTAR systems in service with the UK Army and Air Force. He also works closely with Aveillant Ltd, a Thales company; not only around technical support and strategy, but also providing advice and consultancy helping to solve engineering problems.



'SELF-DRIVING IS AN INEVITABILITY FOR THE AUTOMOTIVE INDUSTRY AND ENSURING THAT OUR AUTONOMOUS OFFERING IS THE MOST ENJOYABLE, CAPABLE AND SAFE IS WHAT DRIVES US TO EXPLORE THE BOUNDARIES OF INNOVATION. CORTEX GIVES US THE OPPORTUNITY TO WORK WITH SOME FANTASTIC PARTNERS, INCLUDING THE UNIVERSITY OF BIRMINGHAM AND MYRTLE AI. THEIR EXPERTISE WILL HELP US REALISE THIS VISION IN THE NEAR FUTURE.'
- CHRIS HOLMES, CONNECTED AND AUTONOMOUS VEHICLE RESEARCH MANAGER AT JAGUAR LAND ROVER

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Key projects

Pervasive low-TeraHz and Video Sensing for Car Autonomy and Driver Assistance (PATHCAD): The scope of the PATHCAD project is the provision of all-weather sensing for driver assistance and ultimately autonomous vehicle operation, through the fusion of 3D low-THz radar and video imagery. The project is part of the £11 million 'Towards Autonomy Smart and Connected Control' (TASCC) programme; it is jointly funded by the Engineering and Physical Sciences Research Council (EPSRC) and Jaguar Land Rover, and is made up of five consortia.

CORTEX project: In a unique collaboration with Jaguar Land Rover (JLR), our world-leading radar and sensing experts are working to deliver a £3.7 million project to make all-terrain, all-weather self-driving sports utility vehicles (SUVs) a reality. Birmingham researchers based in the University's Microwave Integrated Systems Laboratory will be developing a '5D' technique combining real-time acoustic, video, radar, light detection and distance sensing (LiDAR) data. Access to this combined data improves the awareness of the environment the car is in. When combined with machine learning, this will enable the self-driving car to behave in an increasingly sophisticated way, allowing it to handle any weather condition on any terrain.

Synthetic Aperture Radar: This is one of the longest standing projects at the Microwave Integrated Systems Laboratory (MISL), with significant support from the UK MoD and EPSRC, and with collaborators from both the industry and academia. The MISL has pioneered a brand new radar imaging technology. We are using navigation satellite (eg, GPS, GLONASS, Galileo etc) signals that naturally bounce off the Earth's surface to generate radar images of a scene. Radar imaging is performed by means of Synthetic Aperture Radar and the hardware required to record these signals is identical to a standard GPS receiver used for navigation. So, by developing the appropriate signal processing algorithms, we have the equivalent of converting a TomTom device into an imaging radar.

Galileo-based passive radar system for maritime surveillance: This project brings forward a passive bistatic radar (PBR) based on Galileo transmissions for maritime surveillance. The exploitation of existing transmissions for PBR applications is becoming increasingly attractive due to their low costs, covert operation and reduced environmental pollution. Galileo is particularly suited for the proposed task since it comprises a satellite constellation, ensuring that any point on Earth is permanently illuminated by a number of satellites. This feature potentially enables surveillance both in coastal areas and the open sea. In this project, a ground-based receiver is considered for coastal monitoring while the receiver is placed on mobile platforms to assure open sea surveillance.

MILLIBAN: Millimetre-wave Antennas and Components for Future Mobile Broadband Networks: Building on our recent developments with low-loss reconfigurable metasurfaces, we are researching new enabling technologies for 5G systems, which will deliver analogue and reconfigurable beam-steering antenna designs that operate with low-losses in the millimetre-wave band.

Getting in touch:

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