

## **ORI delivers pioneering research with Navtech**

*Case study - Oxford Robotics Institute, University of Oxford*

*World-leading research group, ORI, collaborates with Navtech to prove the capability of radar as an autonomous vehicle sensor. Able to operate in all-  
weathers and environments, it performs reliably whatever the conditions.*



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**Safety is everything.**

# The Challenge

*Delivering on the potential of radar*

The Oxford Robotics Institute (ORI) is a world-leading robotics research group. Pioneers in autonomous vehicle research, they were among the first to run an autonomous car over 10 years ago, before many thought it possible.

Today reliable automation in adverse conditions is a major challenge for autonomous vehicles, with traditional autonomous car sensors often unable to operate reliably in low visibility.

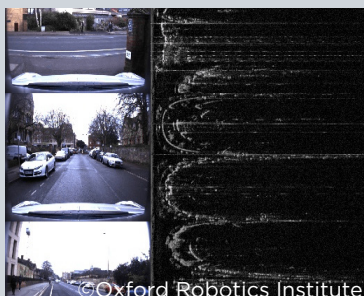
In response, ORI is dedicating a programme of work to research, what they see to be, the huge potential of radar as an enabling technology for automation and autonomy, with its all-weather sensing and ability to see beyond limits of human capability.

The Navtech radar sensor detects reliably in rain, fog, dust and dirt and in all light conditions from complete darkness to strong sunlight, overcoming the limitations of other technologies like Lidar and cameras. It provides a 360°, long-range, data rich-picture of its surroundings, like no other single sensor can.

However, the interpretation of imaging radar for autonomous vehicles is challenging. While image processing has seen years of investment, radar image processing has been largely overlooked. This is the challenge ORI is taking up in its cutting-edge research, in collaboration with Navtech.



ORI used the Navtech radar sensor, with its rugged design, as the key sensor for their all-weather platform, built to run autonomously outdoors and unmanned for days at a time.



ORI thoroughly tested the Navtech radar sensor against traditional autonomous vehicle sensors in the Oxford Radar RobotCar Dataset proving its reliable performance.



ORI tested the performance of the Navtech radar sensor in some of the harshest conditions on the planet. The sensor was proven to work to -20°C and across rough terrain.

# The Solution

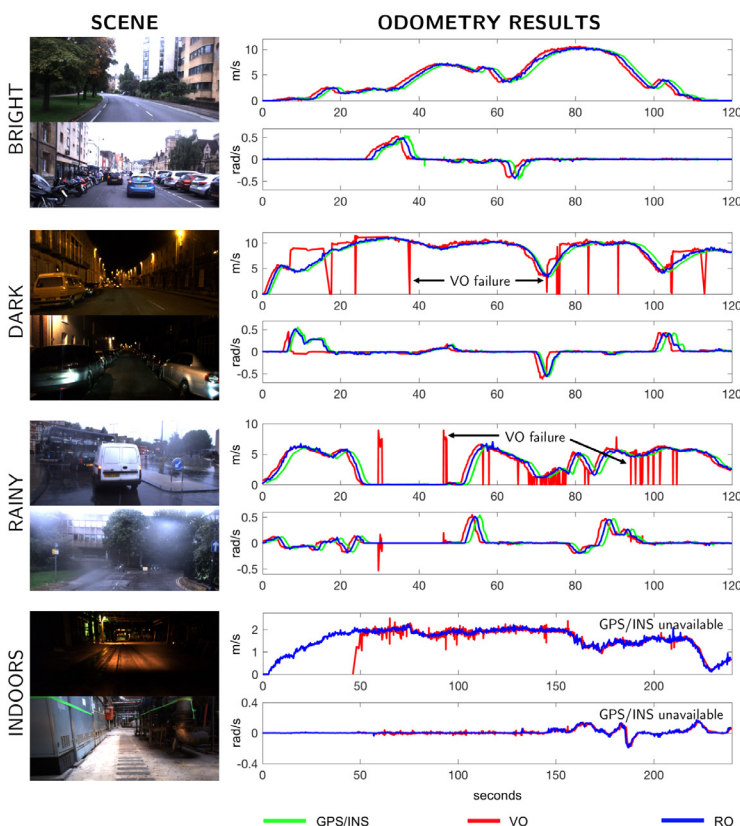
*Innovation through collaboration*

ORI chose the Navtech radar sensor as their key enabling technology to take forward their research. The partnership brings together our high resolution, 360°, long-range radar technology with ORI's impressive robotics research expertise.

The research collaboration has proven the Navtech radar delivers reliable data in all weather and lighting conditions when used as an autonomous vehicle sensor. Current research focuses on pushing the limits of localisation and perception - building the foundations of tomorrow's autonomous systems.

Research has included taking the radar to Iceland to test it in sub-zero temperatures and across rough terrain. As well as testing the radar's operation against other autonomous vehicles sensors in the Oxford Radar RobotCar Dataset project.

This unique data set, incorporating different combinations of weather, traffic and light levels, demonstrates the unrivalled availability of radar, where the performance of other technologies is significantly degraded. The dataset is available on ORI's website.



Sarah H. Cen and Paul Newman, Oxford Robotics Institute



"We are delighted to be working so closely with Navtech Radar - it speaks to the strength of the tech industry in Oxfordshire and the UK."

"The partnering will accelerate the art of the possible in what machines can do with radar."

**Professor Paul Newman,  
Director ORI**



## Summary

In conclusion, ORI's pioneering research with the Navtech sensor shows radar can be used in demanding environments - on land and at sea - delivering the performance necessary to replace other technologies in challenging conditions.

As autonomous vehicles are used in more applications where human operation is either undesirable or unsafe due to the environment, radar can provide the sensing data

to provide reliable, safe operation. The application of this technology offers exciting opportunities.

Indeed, we are already seeing an increasing trend in industries such as mines, yard management and ports looking to transform their operations through advances in automation. We work with a number of industrial partners to support them to use radar technology and develop solutions to meet their challenges, using

our experience of designing and manufacturing radar-based solutions and enabling industrial automation since 1999.

Visit our website to find out more about our work and for updates on our collaboration with ORI and their groundbreaking autonomous vehicle research.

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