

# Breakthrough in Optics Enables Vehicle Occupancy Monitoring To Ease Jams

July 28 2004

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Infra-red cameras that automatically count people in cars could soon be a feature on the UK's motorways, making it easier to enforce priority lanes for car sharing to ease congestion and cut journey times.

The unique patented technology to detect human faces in moving cars without distracting drivers was developed by Laser Optical Engineering (LOE), a spin out company from Loughborough University. Together with commercial, research and civic partners, it has developed a prototype camera system with Department for Transport and Engineering and Physical Sciences Research Council funds.

The need for such a system arose following the launch in 1998 by Leeds City Council of Britain's first priority lane for car sharing. Whilst fines deter lone drivers from using the special lane on the busy A647, the scheme is costly, with the Council paying the police to enforce it.

“We needed to use infra-red to detect faces yet the heat resistant coatings on car windows simply absorb the infra-red wavelengths. Only a highly sophisticated - and vastly expensive - infra-red camera could overcome this challenge,” explains Dr John Tyrer, Director of LOE. He continues, “Our important breakthrough came when we found a tiny gap in the infra-red spectrum in which light is absorbed by human skin of any colour but reflected by hair, clothing and upholstery. This means that dummies, large objects and dogs – anything in a fast moving car that could be detected in error by a conventional camera – are easily rejected.”

Whilst the infra-red camera works well in bright sunlight, dull days and night time pose a challenge. However combining the optical technology with a bespoke image recognition system means that human faces are still distinguishable. “We developed a unique mathematical formula for instant image recognition to enable an automatic and accurate count of faces in a moving car for the very first time. We can even apply a size filter to the camera to make sure a hand held up where a passenger’s face should be is not counted,” adds Dr Tyrer.

The prototype for the high occupancy vehicle monitoring system (HOVMON) has been successfully tested on the A647 in Leeds. Its commercial prospects look promising, with high occupancy vehicle (HOV) lanes in operation throughout America currently relying on police enforcement. “Whilst we have focused to date on the automatic enforcement of high occupancy vehicle lanes, it is clear that this novel technology could also be used at border crossings, or to monitor cars going in and out of high security areas and shopping centre car parks,” Dr Tyrer concludes.

The project partners are Golden River Traffic, Leeds City Council, Photonics Consultancy and the University of Sussex.

Source: [Loughborough University](#)

Citation: Breakthrough in Optics Enables Vehicle Occupancy Monitoring To Ease Jams (2004, July 28) retrieved 24 April 2024 from <https://phys.org/news/2004-07-breakthrough-optics-enables-vehicle-occupancy.html>

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