

# Measuring the sky

EPSRC

JAGUAR LAND-ROVER

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## 1. Industry problem

Different ambient lighting conditions affect how the interior of a car is perceived:

- Differences between colours
- Distracting reflections from reflective surfaces
- Washout and reduced readability of displays

The challenge for the automotive industry is to standardise the daylight illumination for performing assessments and to make measurements controlled, repeatable and comparable to real daylight situations.

Washout & reduced readability

Veiling glare & reflections

Colour perception in different light

Video photometer

Captured sky image

False colour image

Recording display reflections

## 3. Sky capture

In this research, the sky capture will be performed with the use of a pro-metric PM-1600 CCD video photometer with an 8mm fisheye lens. This type of camera captures sky luminance and colour data and also provides an image of the sky to allow classification of sky type.

The reflections on an in-vehicle display will be measured simultaneously to show the influence of the recorded sky on display readability.

## 2. Research

This part of the research involves capturing photometric images of the sky to map its distribution of luminance (perceived brightness). The aim is to show the impact of light from the sky on in-vehicle display reflections and to define the worst case daylight scenarios with respect to display readability.

As well as the luminance data from this study, other characteristics of the sky will be recorded with a view to designing artificial daylight to perform in-vehicle assessments.

Brightness iso-plot

Colour co-ordinates

Daylight spectrum

Colour temperature

Daily sunpath (June to December)

## 4. When & where?

The characteristics of daylight, such as brightness and colour, are highly variable and are dependent on the position of the sun and atmospheric conditions. These conditions vary with location (latitude, altitude & atmospheric conditions) and time (day & season).

This research aims to define the worst case lighting scenarios that a vehicle will encounter. To do this it is important to capture skies and display reflections from different global locations at different times of the year.

Sunpath solar noon @ Poles

Sunpath solar noon @ mid latitudes

Sunpath solar noon @ Equator

Vehicle interior assessment facility

Artificial sky

## 5. Use of data

### Sky luminance & display reflections

- Determine worst case lighting levels to perform in-vehicle assessments.
- Determine the influence of the sky on display readability.
- Design a lighting scheme for performing in-vehicle assessments.
- Verification of lighting scheme.

### Characteristics of daylight

- This data will be used in the specification and testing of artificial lighting to recreate daylight.

Lighting scheme distribution

