Vehicle Occupancy Measurement

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12th April 2011

Vehicle Occupancy and it's relevance to ITS

- Relevance to ITS

Reducing congestion on UK roads

The need to change behaviour

“If we can increase car occupancy back up to where it was in the 60s the UK would save nearly 10 million tones of CO2 (15 per cent of current car emissions)”
- Source: Ali Clabburn, LiftShare.com

“Studies from the DfT show that a only 4% of motorists need to change their behaviour to get up to a 40% reduction in congestion”
- Source: Transport Minister – Dr. Stephen Ladyman, 20th February 2007

Road User Charging / Informed Personal Travel

Encouraging people to consider the use of alternative means of transport

Providing travellers with the right information to make decisions that would start to influence behaviour.
Vehicle Occupancy and its relevance to ITS

- Relevance to Informed Personal Travel and Related Government Programs.

Reducing congestion on UK roads

Is anyone going my way?

- Source: LiftShare.org

Average UK Car Occupancy

▲ 1% Car Occupancy = ▼ 1 Billion car miles.
### Comparing CO2 Emissions (Single occupant in car)

**CO2 Emissions**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Leave</th>
<th>Arrive</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldergrove</td>
<td>Edinburgh, Princes St...</td>
<td>12:59</td>
<td>19:00</td>
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<td>Bus, Train, Walk.</td>
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**CO2 emissions for your journey of 350.3 miles**

<table>
<thead>
<tr>
<th>Show table view</th>
<th>Distance Units</th>
<th>Miles</th>
</tr>
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<tbody>
<tr>
<td>Your journey</td>
<td>33.9 kg</td>
<td></td>
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</tbody>
</table>

For comparison if you did a journey of 350.3 miles by:

- **Small Car only**: 71.9 kg
- **Large Car only**: 145.1 kg
- **Train only**: 32.9 kg
- **Coach only**: 50.2 kg
- **Plane only**: 93.8 kg

Your journey would create 131.2 kg of CO2 less per traveller than travelling by large car.

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### Comparing CO2 Emissions (2 occupants in car)

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For comparison if you did a journey of 350.3 miles by:

- **Small Car only**: 36.0 kg
- **Large Car only**: 72.6 kg
- **Train only**: 33.9 kg
- **Coach only**: 50.2 kg
- **Plane only**: 93.8 kg

Your journey would create 38.7 kg of CO2 less per traveller than travelling by large car.
Comparing CO2 Emissions (4 occupants in car)

CO2 Emissions

Full Itinerary for Thu 22 May 08 leaving after 12:10

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CO2 emissions for your journey of 350.3 miles:

- Your journey: 33.9 kg
- Per comparison if you did a journey of 350.3 miles by:
  - Small Car only: 18.0 kg with 4 occupant(s)
  - Large Car only: 36.3 kg with 4 occupant(s)
  - Train only: 33.9 kg
  - Coach only: 50.2 kg
  - Plane only: 48.8 kg

Low Medium High v. High
0 kg of CO2 per traveller 146

Your journey would create 2.4 kg of CO2 less per traveller than travelling by large car.

OccuTek
Identification and Application of Vehicle Occupancy Levels
About OccuTek

“Identification and Application of Vehicle Occupancy Levels”

- Road User Charging
  - Enforced
  - Voluntary
- HOV / HOT lanes
  - UK: M1 / M25
  - North America

OccuTek provides a method for enabling the declaration and validation of vehicle occupancy, which

- Works anywhere and at anytime
- Without the need for roadside infrastructure

- OccuTek Applications
  - Road User Charging with high vehicle occupancy credits/discounts.
  - Adaptive Traffic Management based upon Occupancy.
  - intelligent-Emergency Call
  - Entitlement to parking privileges based on occupancy.
  - Recognition of registered disabled passengers to gain parking privileges.
  - Carbon footprint accounting for vehicles, drivers, and passengers.
  - Dynamic route planning for private ridesharing vehicles.
  - Occupancy credit trading.
  - Car pool management accounting.
The use of the mobile phone

- The mobile phone

“The mobile phone is the one asset which we take with us almost everywhere. When it’s with us, it’s generally on; and according to the MDA, there are currently 62 million operational mobile phones in the UK.”

Inherent Advantages:
- Scalability
- Cost effective
- Additional applications
- Customer Billing
- Use of existing, accepted platform - Public acceptance

How can we use such a device, which can reach a large demographic representation for applications such as HOV lane enforcement?

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Occupancy Validation

- Considering the vehicle journey as a series of sequential events

Identification of movement patterns towards vehicle when boarding, and relation to norm + previous actions.
Occupancy Validation

- Considering the vehicle journey as a series of sequential events

Identification movement patterns into the vehicle, and relation to the norm + previous actions.

Occupancy Validation

- Considering the vehicle journey as a series of sequential events

Movement of passengers out from the vehicle, and relation to norm + previous actions.
- Considering the vehicle journey as a series of sequential events

Post Journey movement of vehicle occupants and relation to norm and previous actions

- Occupancy validation (Graphical Example)

Identification of Genuine/ Fraudulent Occupancy Declaration, based upon OBU <-> MP, and MP <-> MP relative locations.