Hands-off detection warning time for B1-systems

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Following issues should be considered:

- Technology neutrality
- Steering input are difficult to measure/identify
  - on road segments in very good conditions
  - at low speeds
  - if drivers will have a relaxed attitude on holding the steering wheel

The balance for the detection:

1. „Hands-off-the steering wheel“ interpreted as „hands-on“
   => avoiding due to safety aspects
2. „Hands-on-the-steering-wheel“ interpreted as „hands-off“.
   => avoiding to attain a high acceptance of the systems
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Brown Line:
Summary of the detected “hands-on” situations by time sequence

\( V_{set} = 85 \text{ km/h} \)
highway with good surface and
low traffic situation
Tractor-trailer combination
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Brown Line: Summary of the detected “hands-on” situations by time sequence

\[ V_{set} = 35 \text{ km/h} \]
highway with good surface and high traffic situation (stop-and-go)
Tractor-trailer combination
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Positive „hands-on“ detection proportion of all routes

<table>
<thead>
<tr>
<th>Time span until the next detection</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All roads</td>
<td></td>
</tr>
<tr>
<td>ORK: Oval round course</td>
<td></td>
</tr>
<tr>
<td>(long, straight road in high quality)</td>
<td></td>
</tr>
<tr>
<td>DLK: Endurance course</td>
<td></td>
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<tr>
<td>(long, straight road with small part of curves, average quality)</td>
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</table>

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Proportion (%)

Time span until the next detection

ORK: Oval round course
(long, straight road in high quality)

DLK: Endurance course
(long, straight road with small part of curves, average quality)

positive „hands-on“ detection proportion on straight routes
Hands-off detection warning time for B1-systems

positive „hands-on“ detection proportion on curves

ORK: Oval round course (long, straight road in high quality)
DLK: Endurance course (long, straight road with small part of curves, average quality)
Summary of technical rationales:

- **110s at 35 km/h** gives the **same reliability** of the hands-off detection as **30s at 85km/h** (slides 3 & 4)

- The distribution of timespan between two positive hands-on detection is very much influenced by the profile of the road:
  - on a straight road: ~57% of measured timespan are below 10s
  - in curves: ~90% of measured timespan are below 10s

**Recommendation:**

- A detection time higher than 30s is recommended at lower speed, in order to avoid too frequent false warnings, leading to low driver acceptance, while preserving the same level of safety
Backup
Detailansicht Dauerlaufkurs Nord (DLK-Nord)

- Rundkurs mit einer Gesamtlänge von 13.4 km
- Unterbrechung in DLK-Nord (0.3 km Länge)
- DLK-Süd (14.4 km Länge) und EL2 (5.7 km Länge)
- verschiedene Steigungen

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