Blind Spot Information Systems

VRU-Proxy March 2018
General Comments

- Scope of BSIS:
  - Right Side, Front, Left
  - Pedestrians, Cyclists
  - Lateral Distance is too high

- HMI:
  - Information vs. Warning
  - Timing of Information

- Scope of Regulation
  - Trucks vs. Trucks and Buses
  - Component Solution
Existing Solution Alert Data
Cyclists and Pedestrians, Double Information Layer

West Coast Metro Area
- Right - Information: 52%
- Front - Information: 37%
- Left - Information: 8%
- Right - Warning: 1%
- Left - Warning: 1%

East Coast Metro Area
- Front - Information: 46%
- Right - Information: 43%
- Left - Information: 9%
- Front - Warning: 1%
- Right - Warning: 0%
Existing Solution Alert Data

More Warnings on the Left side vs. Right, Front

West Coast Metro Area

- Left - Warning: 53%
- Front - Warning: 25%
- Right - Warning: 22%

East Coast Metro Area

- Left - Warning: 45%
- Front - Warning: 49%
- Right - Warning: 6%
Existing Solution Information Data
Warning vs Information – Left Side, Right Side
(including pedestrians)

Pedestrians are identified by existing solutions currently on the road
Initial Information
Trajectory Based Information was over 2 times more prevalent on the Driver’s side.

- Driver - Information: 41%
- Driver - Warning: 11%
- Passenger - Information: 44%
- Passenger - Warning: 4%

TRUCKS - AUSTRIA
Real Life Scenarios
Right Side traffic, Lateral Distance, Traffic Lights, Multi-agent Scenarios
Real-Life Scenarios
Right Side traffic, Lateral Distance, Traffic Lights, Multi-agent Scenarios
HMI
Long Vehicle Specifications

• More Information
• Multi-talking Driver
• More Blind Spots
Dynamic Tests

- Comment 1: Adding a layer of warning with indication of imminent collision based on trajectory:
  - On straight movement the TTC needs to be no more than 1 sec
  - On turnings movement the TTC needs to be 2.5 sec.
    - Ttc needs to be calculate in all the distance of the vehicle

- Comment 2: Need to define a clear zone where to receive the alert with min and max point.

Static Tests

- Add scenario with a lateral distance of less than 1 m.

General Comments

- Front Sensing, Right Sensing, Pedestrians.
Component Approach

Vs. Passenger vehicles – Higher Casualties

Source: European Environment agency, European Consortium for Modelling of Air Pollution and Climate Strategies
Adding a Warning Layer

- Driving Side Blind Spot
- Adding a layer of warning with indication of imminent collision based on trajectory:
  - The system should issue a warning when geometric position of bicycle is 1.5 m and not more than
  - When the vector of the lateral position go closer we need to give a different warnings. On straight scenario the TTC need to be least of 1 sec
  - On turnings scenario the TTC need to be 2.5 sec.
  - The ttc need to be calculate in all the distance of the vehicle
AV Normative Safety
RSS and Other Requirements

Standard Requirements
- Stopping at Red Light
- Maximum Speed Limit
- Lane Prioritization
- Stopping at a Stop Sign

Principal Requirements
- Keeping a Safe Distance
- Right of Way is Given, not Taken
- Avoid an Accident..

Laws of Traffic
Human Judges

Experience, Expert Opinions...

Laws of Traffic
AVs

RSS
• RSS is a defined set of actions that an Autonomous Vehicle, sharing it’s driving space with other, Human and Automated Vehicles, will be allowed to be performed.

• The model is designed to ensure the AV will never cause accident, and will properly respond to mistakes of other drivers, ensuring safety, while driving in an assertive, human-like manner.
RSS – Model Elements

• **The Proper Driving Patterns** – The set of actions allowed to be performed by the car, designed at avoiding dangerous situations.

• **Proper Response to dangerous situations** - The Proper Response is a set of actions that the car must take in order to avoid a collision, when found in a dangerous situation.

• **Responsibility Time** the time in which the Dangerous Situation was triggered.

• **Minimal evasive effort** – According to the model, a car/ an agent is to make an effort to evade a potential collision, even if the agent wasn’t the one who caused it.

• **Dangerous Situation**- According to the model, a situation is dangerous if *both* the longitudinal and lateral distances between two cars are non-safe, and the model defines such distances.
General comments

- Driving Side Blind Spot
- Adding a layer of warning with indication of imminent collision based on trajectory:
  - Lateral ttc (red) / geometry position (yellow)
  - Don't take into consideration the length of the vehicle
  - Need to define a clear zone where to receive the alert with min and max point. Suggestions:
    - Geometric Zone according to the position
    - And Lateral ttc not depend on the geometric.
  - The system should issue a warning when geometric position of bicycle is 1.5 m and not more than
  - When the vector of the lateral position go closer we need to give a different warnings. On straight scenario the TTC need to be least of 1 sec
    - On turnings scenario the TTC need to be 2.5 sec.
  - The ttc need to be calculate in all the distance of the vehicle