Report of 3rd meeting of QRTV informal group

(Focusing on 1st day: Tuesday, July 13 2010 at MEGAWEB)

Opening

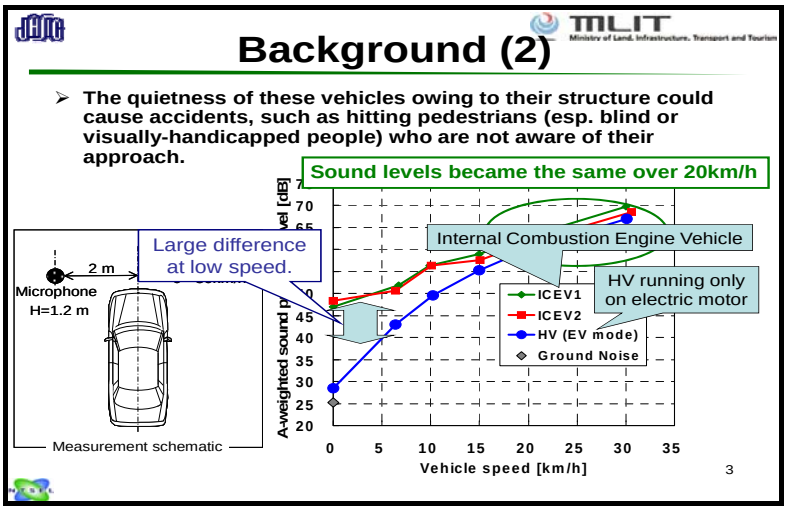
Welcome and Opening Remarks by Mr. Shima, Director, Engineering Planning Division, Ministry of Land, Infrastructure, Transportation and Tourism (MLIT)

Ｐａｒｔ１　Concept for the Japanese Guideline

1) Japanese Activities on AVAS for HEVs and EVs, (Concept of the Japanese Guideline Developed by Study Committee) by Professor Minoru Kamata, Institute of Gerontology, University of Tokyo, Chairman of Study Committee

2)Detailed Review: "Guidelines for Measure Against Quietness Problem of HVs"

Presented by Mr. Takeshi Korenori, Deputy Director, Ministry of Land, Infrastructure, Transportation and Tourism (MLIT)



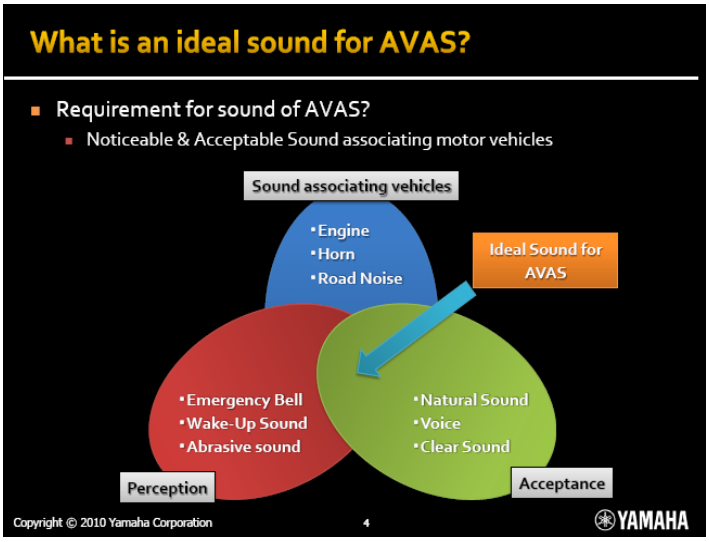
Summary of Q&A and comments

The committee focused the priority of this guideline on the visually-impaired who have the most risk. Measures other than sound are not realistic for them. However, AVAS simply adds the sound as a means of communication between the vehicle and pedestrians and this does not solve all the problem. There were pros and cons for generating the sound at stable state or idle state, and we concluded to generate the sound only when the vehicle starts running as urgent short-term measure.

The committee reached this conclusion because the majority of visually-impaired said that they noticed highest danger when the vehicle started moving. Measures for such vehicles were urgently needed, so we did not have enough time to elaborate the detailed characteristics of sound such as frequency or patterns. The guideline only requires that the sound should be a continuous sound reminding of an approaching vehicle. The study of sound characteristics will be the future task. If certain technological evolutions are available, other solutions than sound based solutions would be assessed and probably adopted. The use of sound by the Guideline is short term strategy (1 – 2 years ahead).

Part2　Sound characteristics　&　ＡＶＡＳ spec.

1)“Ideal Sound for AVAS” - Presented by Yamaha Company (Mr. Iwamoto)

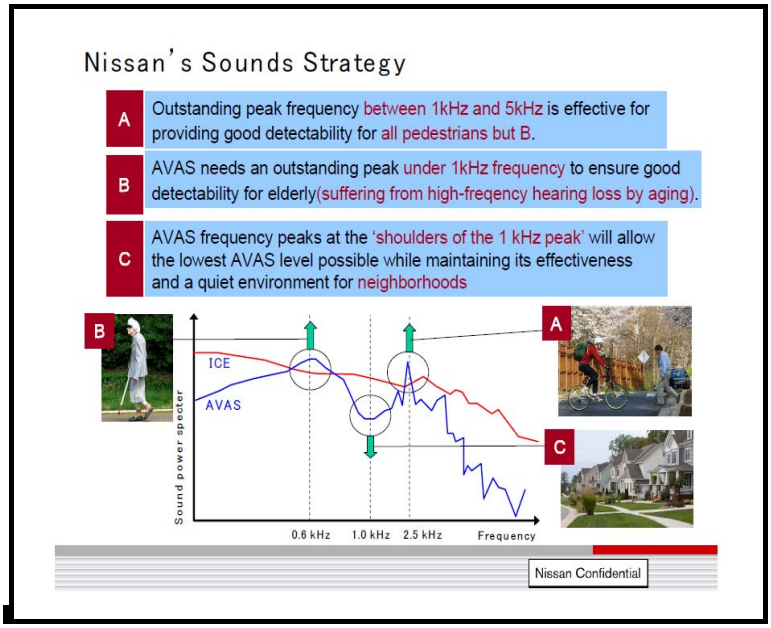


The expert of acoustics made a presentation.

The ideal sound should address the following things: association sound, vehicle acceptance, and perception, however, the acceptance and perception are trade-offs.　To address all these concerns, the use of advance psychoacoustic knowledge such as fluctuation is useful.

2)Presentations by Nissan, Mitsubishi and Toyota

2.1 “Development of Nissan AVAS” – Presented by Mr. Tabata, Nissan Motor Co., Ltd.



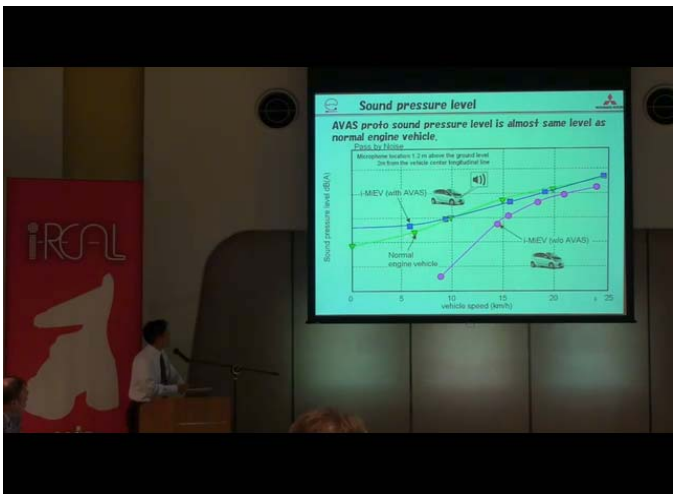
The sound was considered taking account of the following points;

-Environment for neighborhood community to maintain a quiet environment

-The range of frequency of better detectability against ambient noise

-Human frequency response for all ages

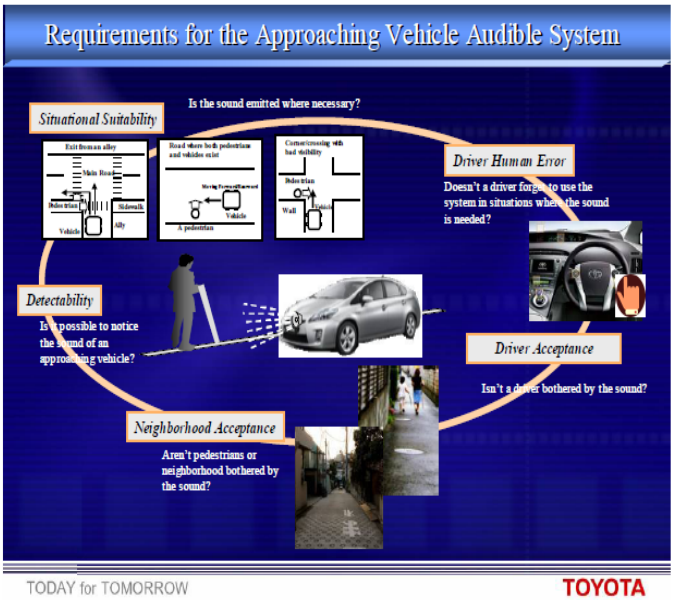
2.2 “Approach Vehicle Audible System (AVAS) Proto for i-Miev” – Presented by Mr. Asada, Mitsubishi Motors Corporation



The sound was considered taking account of the following points;

-Sound frequency for all ages

2.3 “Toyota Approaching Vehicle Audible System” – Presented by Mr. Matsuo, Toyota Motor Corporation



The sound was considered taking account of the following points;

-Continuous harmony tone balanced in a range between high and low-middle tone.

-Not a feeling of strangeness for the drivers or to the environment

Part3 Practical demonstration

Based on the Japanese guideline for the HEV vehicles etc., Japan demonstrated what the guideline stipulated and its effect by running such vehicles with AVAS system. The points are;

-how the Japanese auto manufacturers are tackling with the guideline
-sound at reverse mode
-the sound not allowed by the guideline (such as melodious sound)
-recognition of the sound at succession mode with ICE vehicle
-adequacy of the range of speed required to generated sound

These five vehicles below were demonstrated:

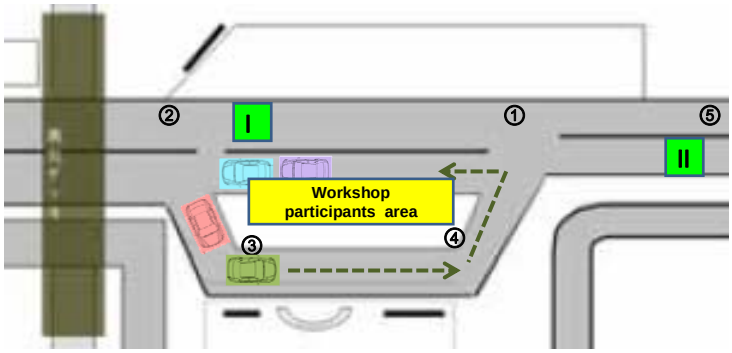
Hybrid vehicle (Prius by Toyota), Electric vehicle (i-MiEV by Mitsubishi), EV test vehicle (by Nissan), vehicle with melodious sound (i-MiEV by Mitsubishi), ICE vehicle (Corolla by Toyota)

These driving patterns were demonstrated.

1. Low-speed running at less than 10km/h drive mode *--no sound generated*
(ICE vehicle, Prius, i-MiEV, EV test vehicle, vehicle installed with melodious sound)
2. Low-speed running – Creeping mode *–sound generated* (1st try)
(ICE vehicle, vehicle installed with melodious sound, vehicles with sound based on the guideline: Prius, i-MiEV, EV test vehicle)
3. Low-speed running – Creeping mode *–sound generated* (2nd try)
4. Vehicle stop and startup mode (sound generated) *–sound generated*
(ICE vehicle, vehicles with sound based on the guideline: Prius, i-MiEV, EV test vehicle)
5. Low-speed running in succession mode around 10km/h *–sound generated*
(ICE vehicle, vehicle installed with melodious sound, vehicles with sound based on the guideline: Prius, i-MiEV, EV test vehicle)
6. Drive in reverse mode –Creeping mode *–sound generated*
(ICE vehicle, vehicles with sound based on the guideline: Prius, i-MiEV, EV test vehicle)
7. Medium speed running mode –around 20km/h *--no sound generated*
(ICE vehicle, vehicles with sound based on the guideline: Prius, i-MiEV, EV test vehicle)
8. Slowdown running mode *–sound generated*
9 Other pattern of driving mode upon request



②Low -speed running :Creeping mode (sound generated) 【1st try】



Prius (Toyota HV)
i-MiEV (Mitsubishi EV)
Test vehicle (Nissan EV)
Melody-carried vehicle

【Driving 】
・To drive in the direction of arrow in the order of melody-carried vehicle, Prius, i-MiEV, EV test vehicle, one at a time.
・To wait at the stand-by area I for next run after driving.
・To start driving after making sure that the previous vehicle has come to a halt at the stand-by area.

Findings

At very low speed under constant speed conditions without acceleration and at high background noise (60dB(A)), it was difficult to detect all vehicles (ICE, EV/ HEV). It shows the difficulty concerning the trade off between environment, safety and acceptance.

The question was raised how often occurs such condition in real traffic. [very low speed under constant speed conditions without acceleration or deceleration.]

After additional running mode, acceleration and deceleration, which were requested by participants, the AVAS sounds were recognized vehicle movements. These sample sounds are changed their pitch (frequency) according to vehicle speed.
In conditions with low speed and acceleration (or deceleration) with high background noise, a pedestrian would have been alerted by the change of pitch.

This situation is important, it seems to be representative of a real situation where a pedestrian cross a road. The detection was possible also by high background noise in safety critical phases. The AVAS-systems played their roll because the EV/HEV vehicles were similar to ICE-vehicles in term of detection.

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