

Guidelines for Speech Input and Audible Output in a Driver Vehicle Interface

RATIONALE

This SAE *Information Report* is provided to establish a set of high-level guidelines for systems with speech input and audible output as a means of controlling select vehicle features and functions. This *Information Report* addresses the appropriate application of speech input and audible output systems, their general operation and other aspects of these systems. While not a comprehensive guideline, this *Information Report* helps to establish general guidance to promote consistency in user experiences and expectations for operation of these systems.

TABLE OF CONTENTS

1.	SCOPE	2
1.1	Purpose	2
2.	REFERENCES	2
2.1	Applicable Documents	2
3.	DEFINITIONS	2
4.	GUIDANCE ON WHEN TO IMPLEMENT SPEECH INPUT AND AUDIBLE OUTPUT	3
4.1	Appropriate Implementation of Speech Input and Audible Output Systems	3
4.2	Inappropriate Implementation of Speech Input and Audible Output System	4
4.3	Speech Input Should Not Be Applied to the Following Vehicle Controls or Features	4
5.	DIALOGUE STRUCTURE GUIDANCE	4
5.1	Dialogue Structure Elements	4
5.2	Recognition Guidance	5
5.3	Dialogue Structure Recommendations	5
6.	GUIDANCE FOR HANDLING ERRORS	8
6.1	Descriptions and Guidance for Specific Errors	8
7.	SYSTEM FEEDBACK GUIDANCE	9
8.	USER ASSISTANCE GUIDANCE	10
9.	NOTES	10
9.1	Marginal Indicia	10

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Documents

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1. SCOPE

The scope of this document is a technology-neutral approach to speech input and audible output system guidelines applicable for OEM and aftermarket systems in light vehicles. These may be stand-alone interfaces or the speech aspects of multi-modal interfaces. This document does not apply to speech input and audible output systems used to interact with automation or automated driving systems in vehicles that are equipped with such systems while they are in use (ref. J3016:JAN2014).

1.1 Purpose

To provide speech input and audible output guidelines for system designers and integrators developing these systems intended for use by the driver while the vehicle is in motion.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J3016 Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems

2.1.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

Statement of Principles, Criteria and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication Systems (Alliance of Automobile Manufacturers, 2006)

3. DEFINITIONS

3.1 BARGE-IN

Process that allows or enables a user to speak over an audible system prompt in order to utter the next entry, without having to exercise a mechanical interaction with a control.

NOTE: This is distinguished from mechanical interruption, such as by pressing a button to interrupt a dialogue.

3.2 DIALOGUE

Verbal interaction sequence between the user and the system consisting of what the user says and how the system responds, including the specific phrasing, the format of auditory feedback, the timing and the control logic.

3.3 ENDPOINTING

Process by which a system automatically determines the beginning and end of a human speech utterance.

3.4 MULTI-MODAL INTERFACE

Means of controlling a function or feature that combines voice and other interface modalities (often, visual-manual interfaces) and may alternate between them during a task.

NOTE: Other modalities such as gestures and haptics may also be part of a multi-modal interface.



3.5 TASK

Sequence of control operations (i.e., specific method) leading to a goal at which the driver will normally persist until the goal is reached.

3.6 TIMEOUT

System-defined amount of elapsed time without user speech entry, after which the user is prompted that the system is again ready to receive input.

NOTE: Timeouts are usually followed by a re-prompt, unless multiple timeouts occur successively.

EXAMPLE: A system has a maximum time of X seconds to wait for speech input, at which point the system times out and closes the 'listening window'. It then indicates to the user that no input was received. Timeouts are usually followed by a reprompt, unless multiple timeouts occur successively.

3.7 UNIVERSAL COMMANDS

Verbal commands that can be uttered at any time and will be recognized and acted upon by the system in question, regardless of the sub-system or function in use, or the present location within a menu hierarchy.

3.8 VISUAL-MANUAL INTERFACE

Means of interacting with a function or device using manual control(s) and visual feedback.

NOTE: There may or may not be system feedback, and if provided, the feedback could be voice, audible (tone or other sounds), a visual display, haptic, or observable completion of a driver-requested action.

3.9 VOICE USER INTERFACE

Means of interacting with a function or device using speech input and audible output.

NOTE: There may or may not be system feedback, and if provided, the feedback could be voice, audible (tone or other sounds), a visual display, haptic, or observable completion of a driver-requested action.

4. GUIDANCE ON WHEN TO IMPLEMENT SPEECH INPUT AND AUDIBLE OUTPUT

Speech input should not be used for every function within the vehicle. The addition of each command impacts the recognition rate of the other commands. Drivers also tend to use a subset of commands regularly, and otherwise do not continue to explore the system and learn new commands. A voice interface should be provided when supporting data indicate that driver performance would be better than otherwise expected for an alternative interface, such as a visual manual interface.

4.1 Appropriate Implementation of Speech Input and Audible Output Systems

Speech input should be considered for implementation when the visual manual implementation might otherwise be overly complex. Examples of uses for speech input include, but are not limited to the following, and should not be considered mutually exclusive with respect to other means of control:

- Functions that a driver will perform regularly while driving.
- Functions that are complex and cannot be performed more efficiently with traditional controls.
- Functions that are readily understandable to the driver (e.g., phone "dialing" by name).
- Functions where the speech input and audible output adds value to the system (e.g., long list searches).