

DAIMLER

Needs/Visions for Multilingual Speech Understanding in Cars

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Motivation

Cars are no longer self-sufficient, stand alone systems. Users want to be always online, using e.g.

- smartphone apps
- apps in the cloud (portals, car specific apps)



and they will handle the growing amount of car functionalities, e.g.

- driver assistant systems
- comfort functions



→ **Conversational speech dialog to handle all this in a natural way without learning too many commands.**

Examples

- How is the weather at my destination?
- Is there any cheap gas station on the route?
- What's that high red building over there / on my left?
- What's the speed limit here?
- Please, start the hot relaxing massage.
- Why does this red LED blink?
- Tell me the latest tweeds about Syria.



Example Use Case for GetHomeSafe

IVIS: Excuse me?
You are in the Provence, the highest mountain on the right is called Mont Ventoux. It is very famous among cyclist for its appearance in Tour de France.

Driver: What is its height?

IVIS: Mont Ventoux is 1,912 m high.

Driver: How many times did it appear in Tour de France?

IVIS: It appeared in the Tour eight times.

Driver: Is there a road going there?

IVIS: Yes, it is 30 km from here.

Driver: Ok – take us there.

IVIS: Confirm you want to set destination to Mont Ventoux.

Driver: Yes.

IVIS: Navigating to Mont Ventoux

Online Apps and Car Functionalities

1. Online Apps

- Each user has his personal selection of apps.
- App development is highly dynamic.
- Apps are provided out of different sources.

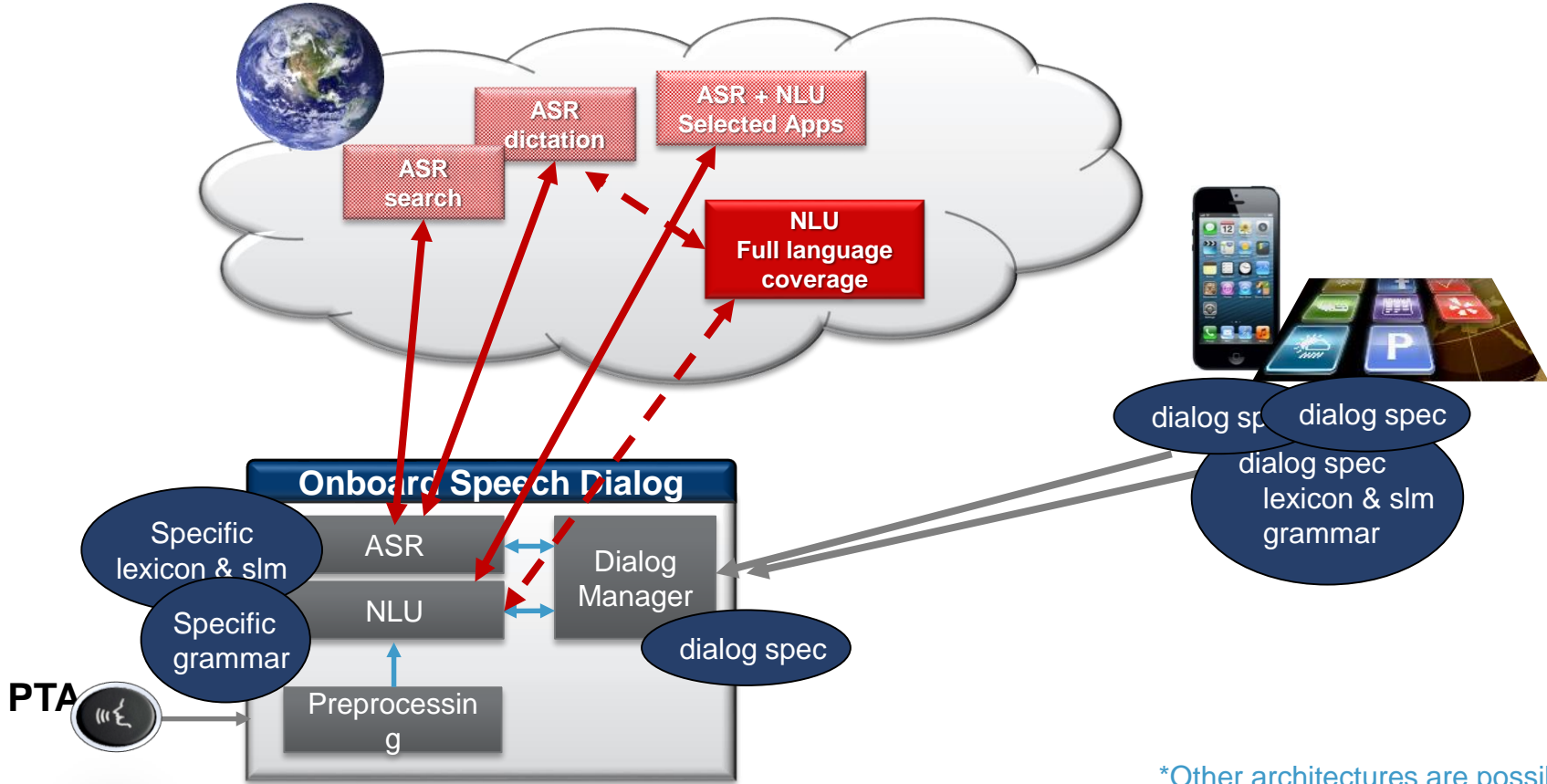
2. Car Functionalities

- Car functionalities are not changed during car life time.
- Car functionalities are provided by the car manufacturer.
- Can be handled on-board (no connection problems, much faster).

Integration of Online Apps and Car Functionalities

1. Traditional onboard speech and plug-in of online speech capabilities
e.g. Siri Integration in MB vehicles
 - Onboard and online speech dialogs strictly separated
 - Flexibility dependent on online provider (e.g. Apple)
2. Hybrid speech dialog for selected apps and car functions
e.g. Dragon Drive!
 - Onboard and online speech dialogs neatly integrated
 - Flexibility dependent on online provider (e.g. Nuance)
3. Dynamic Integration of all apps and car functions
 - Onboard and online speech dialogs neatly integrated

DAIMLER Hybrid Speech Dialog*



*Other architectures are possible

DAIMLER Dynamic Integration of Apps and Car Functions

NLU requirements - interpretation models:

- a language-independent common sense ontology including common knowledge categories (e.g. artists, points of interests, location names, vips ...)
- general multi-lingual grammars and lexica containing the knowledge needed for parsing sequences of words and mapping them to an interpretation based on this ontology – **available in the cloud**

Examples:

I am looking for music from Michael Jackson.

Ich suche Musik von Michael Jackson.

I am looking for a pizzeria in Munich.

object:[restaurant:pizzeria];location:[city:Munich]

action:search; object:[music, author Michael Jackson]

action:search; object:[music, author Michael Jackson]

action:search;

DAIMLER Dynamic Integration of Apps and Car Functions

NLU requirements – parsing capabilities:

- equivalent parsing mechanisms both onboard and in the cloud
- change dynamically the contents of selected knowledge categories (e.g. change an artist list)
- add temporary context-specific grammar rules (with their respective SLMs)
- restrict the context of interpretation to a set of specific grammar rules and SLMs in order to guarantee an expected dialog flow.

Conclusion

Speech integration of online apps and car functionalities should be

- neatly integrated
- very flexible to enable the users to add their own (speech capable) apps
- able to offer the user a real benefit with respect to smartphone speech integrations



NLU requirements to achieve this:

- a language-independent common sense ontology
- general multi-lingual grammars and lexica available in the cloud
- equivalent parsing mechanisms both onboard and in the cloud

