



Porté par l'Université de Toulouse

POSTDOC PROPOSAL IN ARTIFICIAL INTELLIGENCE

Automatic speech recognition for an in-car voice assistant

Advisor (s): Thomas PELLEGRINI - thomas.pellegrini@irit.fr

<https://www.irit.fr/~Thomas.Pellegrini/>

Net salary: according to experience

Duration: 24 months

Location: Computer Science Research Institute of Toulouse (IRIT), Toulouse, France,
<https://www.irit.fr/en/>

DESCRIPTION

This PostDoc position is proposed in the framework of the Audio Mobility 2030 (AM2030) project, which started in April 2023. AM2030 aims at enabling car manufacturers to have their own in-car audio application, regardless of the operating system. They will be able to deploy a global audio experience and offer the best content and proactive services to drivers. It is positioned as a true road companion that will help consumers adopt eco-responsible behaviors: vehicle self-diagnosis and maintenance reports, advice on driving and the use of on-board equipment.

Project partners: ETX Studio (Lead), Continental Automotive FRANCE SAS, **Université Fédérale de Toulouse Midi -Pyrénées - ANITI**, École Polytechnique de Paris

ANITI's role in the project is related to working on human-computer interactions, in particular on natural language understanding. The role of the hired PostDoc researcher will be to work more specifically on automatic speech (ASR, Speech-To-Text) in a noisy environment (the interior of a car). Two lines of research are envisaged: 1) adapting state-of-the-art open-source ASR models and self-supervised speech representation models (Wav2Vec2) to the noisy context of vehicles (presence of music/radio in the background, engine noise, wind noise, rain, etc.), 2) working on the language models that constrain end2end systems. Depending on the candidate research profile, one of these research lines will be chosen, This research will be conducted in connection with the two other aspects treated by ANITI: 1) the study of the conversational structures between the driver and the assistant and their semantic interpretation, 2) the detection of emotions and states of mind based on speech and transcription cues.

The hired PostDoc will be based at the Computer Science Research Institute of Toulouse (IRIT, <https://www.irit.fr/en/>), located in the campus of the Toulouse III Paul Sabatier University. They will be integrated in the Samova team, composed of about twenty permanent staff, PhD students and PostDocs whose research is related to various aspects of AI applied to speech and audio processing (<https://www.irit.fr/SAMOVA/site/>).

References



ANITI - ARTIFICIAL & NATURAL INTELLIGENCE TOULOUSE INSTITUTE
<https://aniti.univ-toulouse.fr/>

Baevski, A., Zhou, H., Mohamed, A., and Auli, M. wav2vec 2.0: A framework for self-supervised learning of speech representations. arXiv preprint arXiv:2006.11477, 2020

Radford, A., Kim, J. W., Xu, T., Brockman, G., McLeavey, C., & Sutskever, I. (2022). Robust speech recognition via large-scale weak supervision. *arXiv preprint arXiv:2212.04356*.

L. Gelin, M. Daniel, J. Piquier, T. Pellegrini, 2021. End-to-end acoustic modelling for phone recognition of young readers. *Speech Communication*, 134, pp. 71-84.

REQUIRED SKILLS

Applicants should have a PhD in machine learning, ideally in speech/natural language processing. Good programming and English communication skills are also required.

APPLICATION PROCEDURE

Formal applications should include detailed cv, a motivation letter and reference letters.
Samples of published research by the candidate will be a plus.
> applications should be sent by email to: advisor email
More information: <https://aniti.univ-toulouse.fr/>

CONVERSATIONAL SENTIMENT ANALYSIS FOR AN IN-CAR VOICE ASSISTANT

ADVISOR (S): FARAH BENAMARA (FARAH.BENAMARA@IRIT.FR)

[HTTPS://WWW.IRIT.FR/~FARAH.BENAMARA/](https://www.irit.fr/~FARAH.BENAMARA/)

NET SALARY: ACCORDING TO EXPERIENCE

Duration: 24 months

Location: Computer Science Research Institute of Toulouse (IRIT), Toulouse, France,
<https://www.irit.fr/en/>

DESCRIPTION

This PostDoc position is proposed in the framework of the Audio Mobility 2030 (AM2030) project, which started in April 2023. AM2030 aims at enabling car manufacturers to have their own in-car audio application, regardless of the operating system. They will be able to deploy a global audio experience and offer the best content and proactive services to drivers. It is positioned as a true road companion that will help consumers adopt eco-responsible behaviors: vehicle self-diagnosis and maintenance reports, advice on driving and the use of on-board equipment.

Project partners: ETX Studio (Lead), Continental Automotive FRANCE SAS, **Université Fédérale de Toulouse Midi -Pyrénées - ANITI**, École Polytechnique de Paris

ANITI's role in the project is related to working on human-computer interactions, in particular on natural language understanding. The role of the hired PostDoc researcher will be to develop a Conversational Sentiment Analysis system that will be able to detect the polarity and emotion of speakers based on an ongoing interaction. Two main tasks are planned:

1. Analysis of the discursive structure of the conversation to identify speaker's needs/goals/preferences.
2. Exploit this structure as well as past conversations to build the subjective profile of the speaker via the detection of the conveyed sentiments (positive vs. negative) as well as the emotional states of the speaker. Potential malevolent dialogues (e.g. aggressivity) will also be detected.
3. Inject this subjective profile to the recommender system to increase its performances.

The hired PostDoc will be based at the Computer Science Research Institute of Toulouse (IRIT, <https://www.irit.fr/en/>), located in the campus of the Toulouse III Paul Sabatier University. They will be integrated in the Melodi team, composed of about 30 permanent staff, PhD students and PostDocs whose research is related to various aspects of AI applied to text and dialogue processing (<https://www.irit.fr/departement/intelligence-artificielle/equipe-melodi/>).

References

Patricia Chiril, Endang Wahyu Pamungkas, Farah Benamara, Véronique Moriceau, Viviana Patti: Emotionally Informed Hate Speech Detection: A Multi-target Perspective. *Cogn. Comput.* 14(1): 322-352 (2022)

Farah Benamara, Maite Taboada, Yvette Yannick Mathieu. Evaluative Language Beyond Bags of Words: Linguistic Insights and Computational Applications. *Comput. Linguistics* 43(1): 201-264 (2017)

Farah Benamara, Nicholas Asher, Yvette Yannick Mathieu, Vladimir Popescu, Baptiste Chardon: Evaluation in Discourse: a Corpus-Based Study. *Dialogue Discourse* 7(1): 1-49 (2016)

REQUIRED SKILLS

Applicants should have a PhD in machine learning, ideally in speech/natural language processing. Good programming and English communication skills are also required.

APPLICATION PROCEDURE

Formal applications should include detailed cv, a motivation letter and reference letters. Samples of published research by the candidate will be a plus.

Constraint and preference acquisition for an interactive driver assistant

Advisor (s): Christian Bessiere – bessiere@lirmm.fr

<https://www.lirmm.fr/~bessiere/Site/Home.html>

Emmanuel Hebrard – hebrard@laas.fr

<https://homepages.laas.fr/ehebrard/>

Location: Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier – [LIRMM](#)

Net salary: according to experience

Duration: 24 months

DESCRIPTION

A postdoc position is offered within the CORAM project Audiomobility 2030, which is centered around a plan to develop an interactive assistant for drivers that will interact via voice and also visuals to help instruct and entertain passengers and driver during a car trip.

The research will be focused on acquiring a constraint model of the driver's preferences integrating the symbolic constraints gleaned from the conversational interactions provided by another component of Audio Mobility 2030, the conversational assistant.

Project partners: ETX Studio (Lead), Continental Automotive FRANCE SAS, **Université Fédérale de Toulouse Midi -Pyrénées** - ANITI, École Polytechnique de Paris

The post doc will be based at [LIRMM](#), Montpellier, France.¹

The goal of this postdoc is to design a method to acquire a constraint model representing implicit information about the driver's (and passengers') preferences.

This acquisition process will be based on what we know about driver/passengers (identity, preferences, history), as well as the context (alone/accompanied, weather, short/long trip, work/holiday...).

The proposed method may be based on prior work on the topic of constraint acquisition [Bessiere et al. 2017]. Modeling this information by a constraint network allows the system to validate the

¹ Part of the work can be done at [LAAS-CNRS](#), Toulouse, France, depending on the recruitee's wishes.

coherence of the knowledge base, to determine the most appropriate questions whose answers will remove the remaining ambiguities, and of course, to compute the assistant's actions that are the most likely to satisfy the driver/passengers. For instance, consider the following interaction:

Assistant: "Would you want to listen to the game?"

Driver : "No, I don't like sports."

Such a dialog would lead to add an important constraint on the driver's preferences. Had the answer been less informative, e.g., a simple "No.", the follow-up question would then be useful to refine the model:

Assistant : "Would you ever want to get sport-related content?"

An important topic concerns the queries to ask to the driver and their impact on the convergence of the method. The goal is to maximise the information gain in order to provide useful recommendations with as few queries as possible.

References

Christian Bessiere, Frédéric Koriche, Nadjib Lazaar, and Barry O'Sullivan. Constraint acquisition. *Artificial Intelligence*, 244:315–342, 2017. Combining Constraint Solving with Mining and Learning.

REQUIRED SKILLS

Applicants should have a PhD in artificial intelligence, ideally in constraint programming, Boolean Satisfiability, and/or Machine Learning. Good programming and English communication skills are also required.

APPLICATION PROCEDURE

Formal applications should include detailed cv, a motivation letter and reference letters.

Samples of published research by the candidate will be a plus.

> applications should be sent by email to: advisor_email

More information: <https://aniti.univ-toulouse.fr/>