



AALBORG UNIVERSITY
DENMARK

Aalborg Universitet

Low-Resource Keyword Spotting for Hearing Assistive Devices

Lopez-Espejo, Ivan; Tan, Zheng-Hua; Jensen, Jesper

Publication date:
2019

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Lopez-Espejo, I., Tan, Z.-H., & Jensen, J. (2019). *Low-Resource Keyword Spotting for Hearing Assistive Devices*. Poster presented at Kick-off: AI for the people, Aalborg, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.



Motivation

- ▶ Manual operation of **hearing assistive devices (HADs)** is cumbersome in a number of situations.
- ▶ To assist in addressing this issue, **voice interfaces** are envisioned as a means for **handling and operating HADs** in a practical manner.

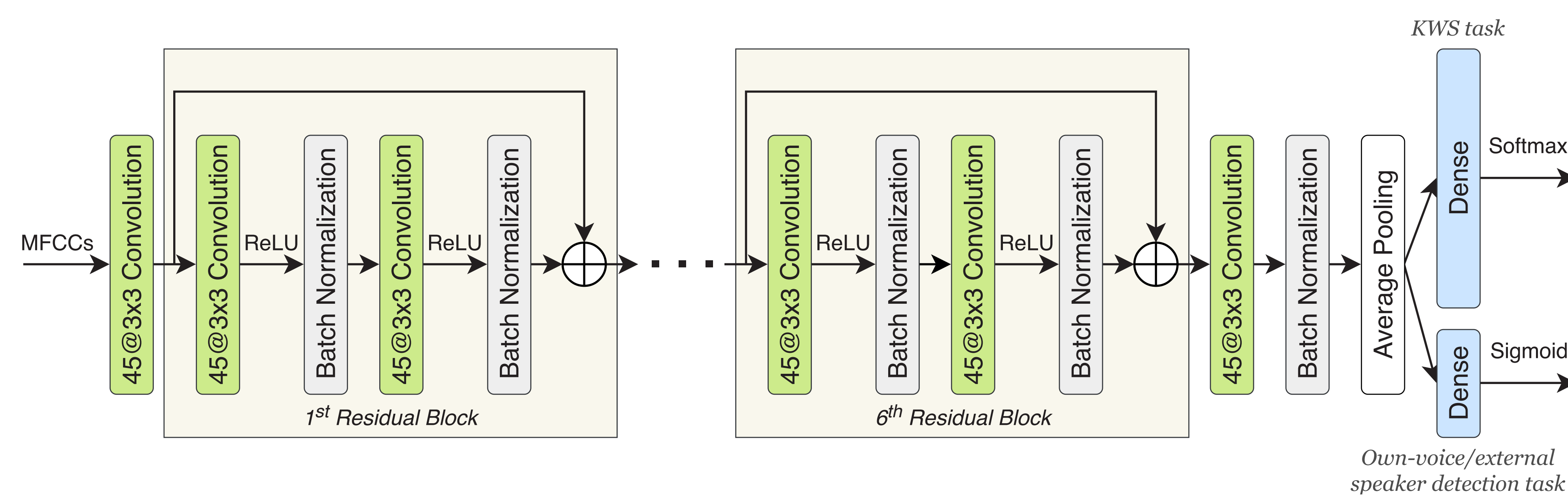
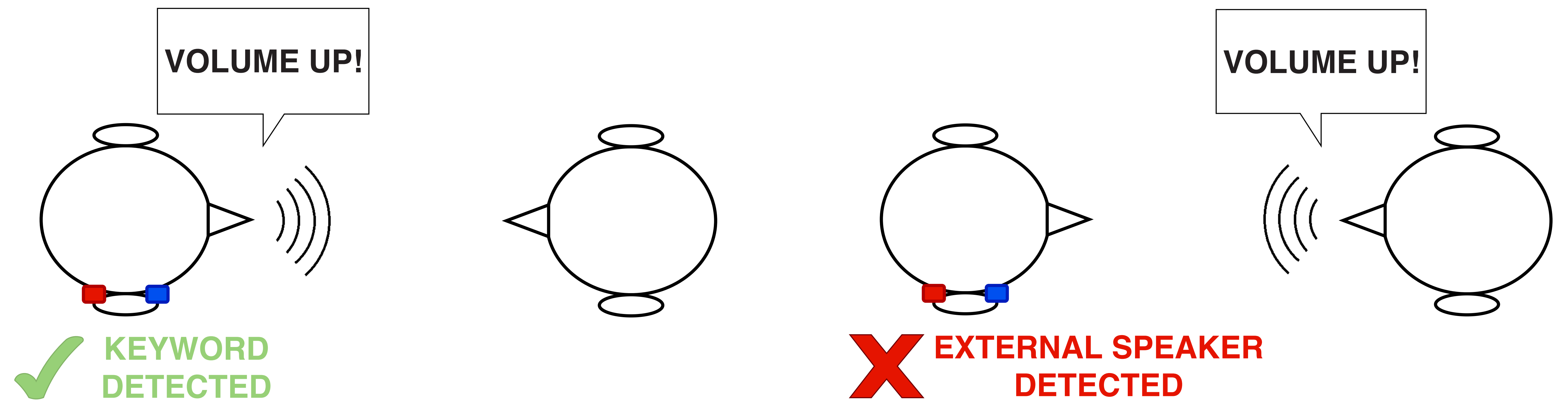
Objectives

- ▶ Research and development of **keyword spotting (KWS)** systems for HADs:
 - ▶ Personalization.
 - ▶ Robustness against noise.
 - ▶ Low memory and low computational complexity.
- ▶ To accomplish these objectives, **we explore...**
 - ▶ ...the combined use of **multi-microphone signals** from HADs along with signal processing **and** the latest **deep learning** techniques.
 - ▶ ...the utilization of **user-specific aspects**, e.g., voice characteristics or head-related acoustics of the specific user.
- ▶ We expect to contribute to enhance the life quality of hearing-impaired people.



Example: KWS for HADs Robust to External Speakers

- ▶ **KWS systems for HADs must be robust against external speakers**, that is, the user must be the only one allowed to trigger actions on her/his HAD.
- ▶ A first attempt on **personalized**, i.e., user-dependent, **KWS for HADs**:
 - ▶ Iván López-Espejo, Zheng-Hua Tan and Jesper Jensen, “Keyword Spotting for Hearing Assistive Devices Robust to External Speakers”, in Proc. of Interspeech 2019, pp. 3223–3227, Graz (Austria), 2019.



- ▶ **Experiments on a (simulated) two-microphone hearing aid speech database** showed that our proposed approach is robust against external speakers.

	Keyword spotting accuracy (%)	
	Own-voice subset	Overall set
Baseline [Tang18]	94.21 ± 0.39	71.87 ± 0.30
Proposal	94.59 ± 0.32	94.86 ± 0.39

[Tang18] Raphael Tang and Jimmy Lin, “Deep residual learning for small-footprint keyword spotting”, in Proc. of ICASSP 2018, pp. 5484–5488, Calgary (Canada), 2018.