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## **Low-Resource Keyword Spotting for Hearing Assistive Devices**

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## 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.

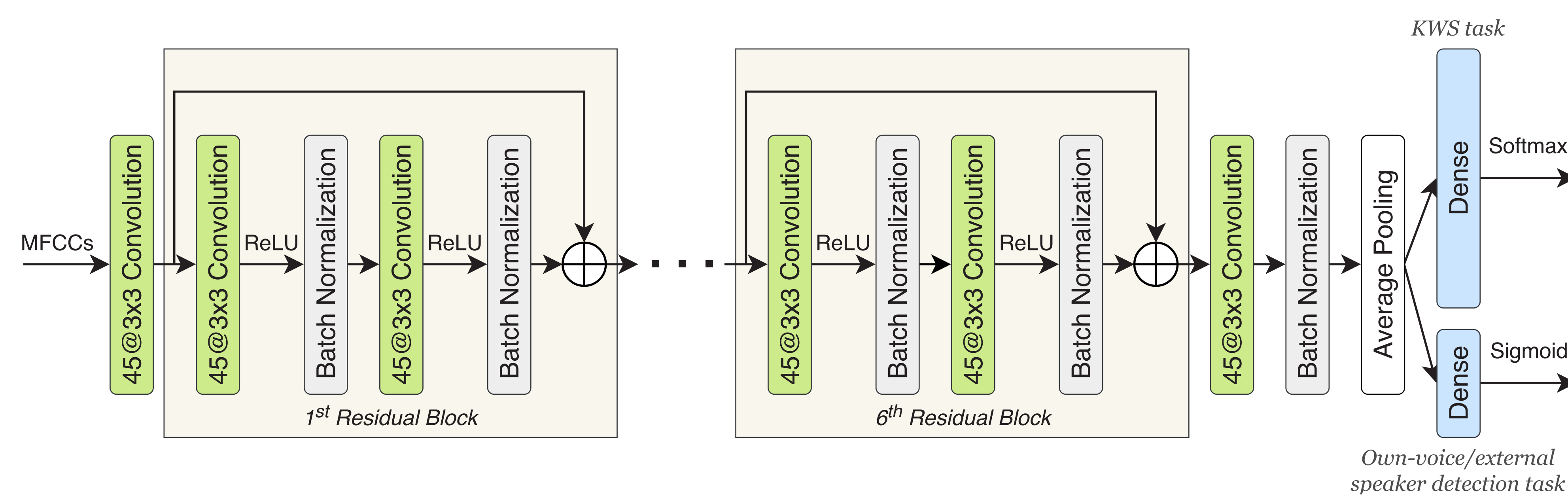
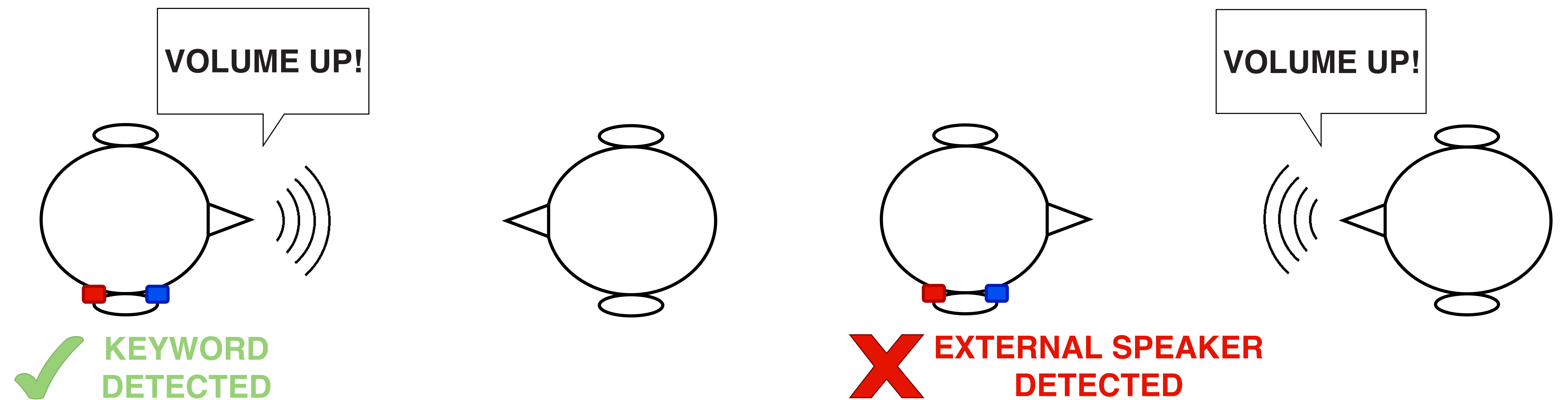
## Objectives

- ▶ 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
<b>Baseline [Tang18]</b>	94.21 ± 0.39	71.87 ± 0.30
<b>Proposal</b>	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.