Initiative A

Title
Computer in the Ear: Smart and Autonomous Companion accessible 24 h/day

Initiator

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Description

Today’s wearable and mobile computing platforms (smartphones and smartwatches) can do many things (measure our daily activity, stream HD videos) but still possess lots of limiting factors. To name a few: battery needs daily recharge (therefore are somehow cumbersome to use), smartwatches need smartphone for data offloading (therefore: no data privacy is guaranteed and to voice control through smartwatch only is impossible); only basic sensors like temperature or accelerometer are used (therefore: they do not allow for deeper well-being sensing like bacteria presence or pH values); “old” communication technologies are used (therefore: they are not ready for post-5G world) and most of all – they are still bulky. A radical way of building wearable computer is to have it in a form suitable to keep it forever in a human ear, the so-called “earable” computer. If all the above limitations are addressed we would have an earable computer with which we could communicate as with any other human (in the similar way as presented in Spike Jonze’s "Her" (2013) movie). Some early “earable” platforms exist such as esense.io, however they do not address all of the above research points.

Earable computing is a PERFECT example of a Cyber-Physical System. The Next Generation High-Tech Equipment call aims at a concrete demonstrator and the chance of building one within the project lifetime are VERY HIGH. Simply, the Netherlands has companies and universities with all the expertise to make this project happen.

Needed expertise

- Chip design and fabrication (needed for ultra-low power CPUs design)
- Signal processing (needed for signal fusion)
- Computer Security (needed for privacy-preserving computing)
- Wireless networking (needed for 6G-ready connectivity)
- Process integration (needed for small form-factor is the key)
- Embedded/low power sensor design (needed for chemical sensor for ear cavity)
- Circular economy (needed for process of sensor recyclability design)
- Computer vision (needed for in-ear camera processing)
- Psychology and human behaviorism (needed for evaluation of new form of Human-Computer Interaction)