

NSERC-EERS INDUSTRIAL **RESEARCH CHAIR IN** IN-EAR TECHNOLOGY

## **1. Abstract**

At this age of Internet of Things (IoT), wearables are now everywhere, sometimes even in your earcanal. The research team from the NSERC-EERS Industrial Research Chair in In-Ear Technologies (CRITIAS) has been actively developing various in-ear technologies designed to complement the human ear, from "smart" hearing protection against industrial noises, to advanced interindividual communication systems, to hearing health monitoring devices using otoacoustic emission (OAE), to in-ear EEG Brain Computer Interface (BCI). More fundamental research has also been conducted, particularly on the microharvesting of electrical power from inside the earcanal to power future auditory wearables. Current state of the research conducted within CRITIAS is presented in this –hopefully- exhaustive pie chart representing possible in-ear technologies.

## **2. Developed tools**



## **3. Latest references**

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[5] Martin, A., and J. Voix. 2018. "In-Ear Audio Wearable: Measurement of Heart and Breathing Rates for Health and Safety Monitoring." IEEE Transactions on Biomedical Engineering 65 (6): 1256-63.

[6] Valentin, O., M. Ducharme, G. Cretot-Richert, H. Monsarrat-Chanon, G. Viallet, A. Delnavaz, and J. Voix. 2018. "Validation and Benchmarking of a Wearable EEG Acquisition Platform for Real-World Applications." IEEE Transactions on Biomedical Circuits and Systems 13 (1): 1–1. [7] Carioli, Johan, Aidin Delnavaz, Ricardo J. Zednik, and Jérémie Voix. 2016. "Power Capacity from Earcanal Dynamic Motion." AIP Advances 6 (12): 125203.

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## The connected protected worker at the age of IoT

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