

FEUP and CINTESIS are to create an app capable of natural voice reconstruction



This research project seeks to provide a solution for patients suffering from temporary or permanent aphonia. The system will serve as a “modified amplifier, but using smart technology,” capable of projecting and correcting voice, and restoring its natural sound.



Text: Raquel Pires
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Being voiceless can be a nightmare. It affects communication and self-esteem, causes frustration and can trigger depression. To assist millions of people who are affected by a lack of voice - or dysphonic voice - a group of Portuguese researchers is developing a project that aims to develop an innovative system for natural voice reconstruction.

The project, designated DyNaVoiceR, brings together engineers, medical specialists in otorhinolaryngology and speech therapists, from the Faculty of Engineering of the University of Porto (FEUP), CINTESIS - Center for Health Technology and Services Research, and the University of Aveiro, respectively. Aníbal Ferreira, leading researcher and FEUP professor, affirms that “the objective is to create an advanced technological assistant that converts whispered speech signals into natural speech signals”, pointing out that “no effective system is known that provides a convincing solution to the problem of oral communication for patients with dysphonic voice”.

In effect, the project aims to create an app that can serve as a solution for all those patients suffering from a particular type of dysphonic voice: (temporary or permanent) aphonia, which can result from oncological diseases (such as thyroid or laryngeal cancer), neurological disorders (such as multiple sclerosis or Parkinson's) or psychological disorders (such as anxiety), among other causes.

Jorge Spratley is an ENT physician and researcher at CINTESIS, responsible for the clinical area of the project. As he explains, “voice is produced by the vibration of air expelled from the lungs by the diaphragm and which passes through the vocal folds and is later modified by the tongue, palate and lips. The emission of a healthy voice is called euphonia, while a ‘sick’ voice, that is to say, when certain characteristics are changed,

is called dysphonia.” Speaking very hoarsely or in a whisper, those suffering from chronic aphonia find that their ability to communicate is greatly reduced and natural interaction becomes limited, since a dysphonic voice cannot convey emotions or the speaker's identity. The system to be developed should serve as a “modified amplifier, but using smart technology”, which will not only project the voice by enhancing the linguistic message, but also correct it, restoring its natural sound and even the speaker's sound signature.

Technically, the voice can be deconstructed and those aspects requiring correction can then be reconstructed, while any missing elements can also be inserted. In this regard, it will be the job of CINTESIS to collect samples of voice at the place and time that it is generated by the vocal cords. “It's like fetching water directly from the source, before it has passed through any streams or pollution that alter it,” explains Jorge Spratley. To do this, the researchers will use a sample of healthy volunteer speakers. The non-invasive examination will take place at the São João Hospital Centre and will serve to help collect this individual “voice print”.

This data will then be processed by the engineering specialists, who will be tasked with developing techniques and tools for the precise synthesis and control of the different elements of the voice signal, fundamental in the reconstruction of natural voice from dysphonic voice. In short, the intention is to “preserve and highlight linguistic information, convey distinctive elements of an individual's voice, in addition to improving vocal projection”, explain the researchers.

Financed by the Foundation for Science and Technology (FCT), the project also involves the participation of the Faculty of Medicine of the University of Porto (FMUP) and the Institute of Electronics and Informatics Engineering of Aveiro (IEETA). ■

