UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

# Thesis Project Form

**Title (tentative):** Advancing Hearing Device Assessment through Virtual Reality and Spatial Audio Technologies

**Thesis advisor(s):** Canessa Andrea, Fulvio Missoni, Michele Ricchetti (Linear srl)

**E-mail:** Andrea.Canessa@unige.it

**Address:** Via All'Opera Pia, 13 - 16145 Genova Pad E piano 1

**Phone:** (+39) 010 3532789

## Description

**Motivation and application domain**

Landscape of hearing devices has undergone a remarkable transformation, evolving from basic amplifiers to sophisticated instruments capable of adapting to diverse environments. Conventional hearing assessments in soundproof cabins lack ecological validity needed to evaluate how individuals truly interact with these devices in dynamic, real-world settings. Disconnection between controlled environments and complex daily life soundscapes hinders an accurate evaluation of device performance.

**General objectives and main activities**

The emergence of virtual reality (VR) technologies and spatial audio tools presents a unique opportunity to revolutionize hearing device assessment by creating immersive, multisensory environments that mimic real-world scenarios mirroring the challenges of everyday life while maintaining precise control over stimuli.
This approach allows for a nuanced understanding of how hearing devices perform in diverse, complex environments, ensuring that assessments align more closely with the demands of everyday life.
The overarching goal is to pioneer the development of innovative clinical tests that immerse users in lifelike, challenging auditory scenarios within the controlled confines of virtual reality. This approach offers several advantages, including the ability to standardize testing conditions, manipulate variables, and introduce realistic background noiseâ€”all while maintaining a high level of experimental control. Such tests can assess hearing device performance in scenarios like crowded public spaces, busy workplaces, or social gatherings, providing valuable insights into real-world functionality.

**Training Objectives (technical/analytical tools, experimental methodologies)**

The student will learn to employ an array of methodologies and instrumentation, including:
â€¢ Graphic Engines (Unity3D) and Shaders
â€¢ Virtual Reality (VR) technologies, 3D monitor/projectors
â€¢ Audio virtualization
â€¢ Psychophysics methodologies
â€¢ Task design and data collection with subjects

**Place(s) where the thesis work will be carried out:** DIBRIS - LINEAR srl

## Additional information

**Maximum number of students:** 1