Call identifier and title: HORIZON-HLTH-2025-01-TOOL-05: Boosting the translation of biotech research into innovative health therapies.

Introduction

The **Faculty of Information Technology and Bionics** at Pázmány Péter Catholic University (PPKE ITK), is a top-tier Hungarian research hub at the intersection of IT, bionics, and life sciences. Known for its strong theoretical foundations and cutting-edge applied research, ITK is home to the **Ányos Jedlik Laboratories**, encompassing over 30 interdisciplinary research groups driving breakthroughs in **bioinformatics, artificial intelligence, neurotechnology, nanodevices, and human-machine interfaces**.

The Faculty's researchers publish regularly in Q1 journals, contribute to major international projects (Horizon Europe, DARPA, EUREKA), and foster innovation through student-led spin-offs. Notable outcomes include **award-winning assistive technologies** like EyeRider in the Cybathlon, and novel lab-on-a-chip systems for diagnostics and drug delivery.

Education at ITK is closely integrated with research, training the next generation of scientists and engineers through **hands-on, research-driven programs** in computer science, electrical engineering, and bionics. Doctoral degrees are awarded in biology, information technology, and electrical engineering, reinforcing the institution's role as a key contributor to the European Research Area.

The AIMS-Lab Research Group

The Acoustic Imaging and Medical Signals Laboratory (AIMS-Lab) was established in 2021. AIMS-Lab conducts research across a broad spectrum of biomedical modalities, including phonocardiography (PCG), electrocardiography (ECG), photoplethysmography (PPG), ultrasound imaging, cardiotocography (CTG), as well as other sensor- and imaging-based medical data sources.

Expertise and references

One of the core research areas of our laboratory is the **development of open-source software tools** for the processing and analysis of physiological signals. To date, we have released two **Python-based toolboxes — pyPPG and pyPCG** — which we actively utilize in our ongoing AI-driven research projects. These tools are designed to **support and accelerate clinical diagnostic decision-making**, particularly in the context of physiological signal analysis.

The research lab has a strong ongoing collaboration with the Cardiovascular Center at Semmelweis University and has recently begun working with the Clinics of Obstetrics and Gynecology at the same institution. Our lab also collaborates internationally with Technion – Israel Institute of Technology in Haifa and the University of Cambridge in the UK.

Proposed activities and possible role in the project

I aim **to expand my recently funded research lab** with motivated, talented, and ambitious researchers, focusing on AI-based medical applications, particularly in wearable devices for fetal monitoring and cardiological signal processing. Simultaneously, we are actively **building long-term partnerships** with medical and research institutions, as well as international research laboratories.

Our goal is to conduct groundbreaking research that is not only impactful domestically but also influential on an international scale. Currently, we hold a **significant competitive advantage in the field of fetal monitoring** at the global level. This includes our proprietary database of several thousand records, strong research collaborations with internationally well-known Hungarian hospitals, deep technological expertise in programming and AI, and extensive experience in wearable medical devices.

We are offering our expertise for participation in an emerging consortium, as well as for coordinators and collaborators with technological and research **expertise for this or other calls driven by mutual interest**. Our core competence lies in scientifically grounded, research-oriented **medical data acquisition and advanced medical signal processing**. We are particularly interested in partnering with organizations or institutions with proven expertise in applied medical research and medical device development.

Contact

Márton Áron Goda, PhD
Head of Laboratory, Assistant Professor
E-mail: goda.marton.aron@itk.ppke.hu