

CONTINUOUS BLOOD PRESSURE ESTIMATION FROM PHOTOPLETHYSMOGRAM SIGNAL

Fields of use

Artificial intelligence related software, Expert systems, Medical instruments, Artificial Intelligence (AI), Computer Software, Applications for Health

Current state of technology

Under development/lab tested

Type of cooperation

Technical cooperation agreement,
Research cooperation agreement

Intellectual property

Copyright, Secret Know-how, Exclusive Rights

Developed by

Jožef Stefan Institute

Contact

Institut "Jožef Stefan",
Jamova cesta 39,
1000 Ljubljana,
Slovenija
Phone: + 386 1 47 73 224
E-mail: tehnologije@ijs.si
Web site: <http://tehnologije.ijs.si/>



Summary

A Slovenian public research organization has developed a method for continuous blood pressure estimation using a wearable photoplethysmograph sensor. The approach is validated using two distinct datasets, one from a hospital environment and the other collected during every-day activities. Partners are sought in the e-Health industry for technical cooperation, or academia for research cooperation agreements. Partners are sought for licensing and technical cooperation agreements.

Description of the invention

The Slovenian public research organization has developed a system based on photoplethysmogram (PPG) analysis for continuous blood pressure (BP) estimation. It was developed for a mobile health (mHealth) system featuring a wristband with an embedded PPG sensor.

According to the World Health Organization (WHO) cardiovascular diseases are one of the most common causes of death. Hypertension is one of the most common precursors of such diseases and can be easily detected with regular blood pressure monitoring. While regular blood pressure monitoring is important, it is also troublesome, as devices using inflatable cuffs are still considered the "golden standard". The cuff placement is critical, as the sensor must be located directly above the main artery in the upper arm area, at approximately heart height. Also, such a device is not suitable for continuous monitoring, or even comfortable to use several times a day.

The proposed system allows the user to wear the device without any interference or limits imposed upon their daily routine, allowing for truly continuous measuring without stressing the user and thus potentially influencing the BP values. The blood pressure estimation data model was trained and tested on a self-collected dataset. A prototype was developed working in real-time (using a wristband, smartphone application and methods running in the backend).

There is relatively little research and development on the estimation of blood pressure continuously with a wristband only. There are competitors that use a single fingertip sensor or two sensors (e.g., wristband + electrocardiogram), or a phone camera (not continuous).

Virtually all are academic. The few systems that are in the market are not backed by serious research and work hugely unreliably (e.g., budget wristbands, none from established manufacturers).

The researchers are experts in applied artificial intelligence and ubiquitous computing. The group has over 20 years of experience in R&D, and have developed several practical applications in the fields of intelligent information systems, mHealth, elderly care, language technologies and others. The group has extensive experience participation as well as coordination of international research project's consortia.

The partners are sought among e-Health industry as well as academia for:

- Technical cooperation agreements with healthcare technology solution providers, manufacturers of wearable devices and integrators for health care technology projects for joint development of the system.
- Research cooperation in research project proposals in this pioneering field of telemedicine with partners in academia.

Main Advantages

The main advantages of the proposed solution:

- Continuous blood pressure estimation, no user action required for every measurement.
- Only wristband with a PPG sensor needed, no additional devices.
- Accuracy borderline meets standards for regular blood pressure monitors.

Partner Sought

Healthcare technology solution providers, manufacturers of wearable devices and integrators for health care technology projects are sought for technical cooperation agreements: to jointly develop the blood pressure sensor for a commercial application.

Academic partners for research cooperation agreements: to prepare joint research project proposals in this pioneering field of telemedicine.