# New era in medicine: Artificial Intelligence in biomedical data processing to support clinical diagnosis

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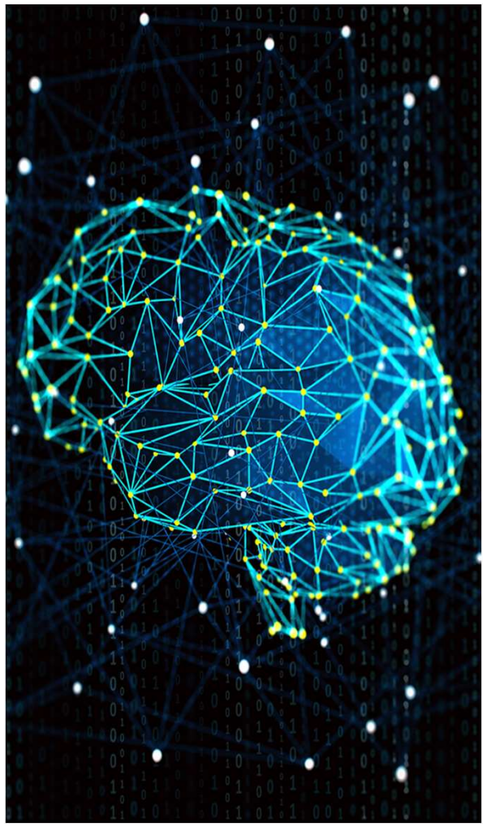
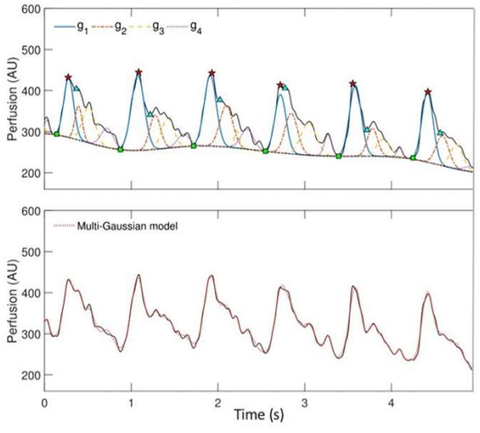
## Abstract

Innovation is the key of our century. Medicine is becoming more and more technological and Biomedical engineers becoming increasingly fundamental. This is the moment when doctor meets AI. It can be strongly used as a diagnostic support tool. Our laboratory exploits this wire for the processing of biosignals and bioimages focusing on the quality of the bones, microcirculation and many other fields.

## Introduction

AI is defined as the technology that provides computer with human intelligence. Artificial intelligence is an approach based on data to describe complex systems characterized by relationships that are difficult to describe trough mathematical or statistical models.










## Bone quality

Bone is a connective tissue that plays a fundamental role in supporting the entire body. The strength that characterizes this organ is defined by two factors: bone quantity and bone quality. There are several ways to measure bone quantity. Nowadays, no measurable clinical methods are used for bone quality. Knowing the bone quality would avoid the failure of the prosthetic implant and the prevention of osteoporosis. Our project aims to build a system that processing cone images is able to evaluate the quality of the bone under study using an artificial intelligence system. The aim is to correlate the parameters extracted from the images through processing with their performance in the context of biomechanical tests that we will perform in the Beam Department in Belgium.

## Microcirculation

Microcirculation represents the terminal vascular network of systemic circulation consisting of vessels with a diameter below 200 microns. Impaired microcirculatory function can lead to serious cellular dysfunction and can result from numerous diseases such as sepsis, diabetes and Covid-19.
Rapid identification of such changes is essential to improve patient diagnosis and treatment. In clinical practice, there are no direct methods to evaluate microcirculatory function, but such alterations are evaluated by indirect parameters. The use of non-invasive optical techniques such as photoplethysmography may be an additional tool to study such alterations. Our project aims to develop artificial intelligence systems that, from the analysis of PPG data, will allow the derivation of new parameters for the evaluation of the microcirculation function and consequently improve the treatment of patients.

## What about our lab?

LABORATORY IN EXPANSION THAT FACES THE MYRIAD CHALLENGES THAT THE BIOENGINEERING WORLD POSES EVERY DAY HARDWARE DESIGNS AND SOFTWARE PROCESSING APPLIED IN MEDICINE MAKE US SUITABLE FOR ANY TYPE OF WORK.1 PROFESSOR, 3 PHD STUDENTS, 3 RESEARCH FELLOWS, 1 JOINT LAB, SEVERAL THESIS STUDENTS, 2 COMPANIES COLLABORATIONS, 5 ACADEMIC COLLABORATIONS, MULTIPLE TOPICS PASSION, DETERMINATION AND PERSEVERANCE .

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