Contactless Estimation of Vital Signs Using Real-Time Video

قياس العلامات الحيوية بدون تلامس باستخدام فيديو مباشر (فيتاليزم)

Vitalism — Towards Reshaping Healthcare

The International Science And Engineering Innovations Competition ISEIC 2023 — Air Defence collage — ISEIC - 2023

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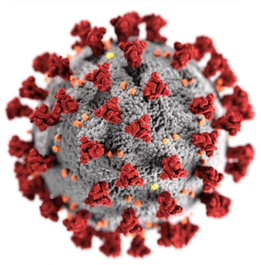
Problem Statement

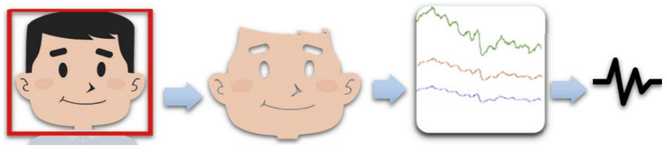
The Problem



The COVID-19 pandemic has underscored the importance of remote monitoring of individuals' vital signs. Measuring vital signs using traditional devices with bacterial contamination causing infection. People's irregularity in measuring their vital signs due to the necessity of going to the hospital and the increase in costs, in addition to people's lack of awareness of the importance of periodic measurement of their vital signs.

The Vitalism Solution

Vitalism is an AI-powered, video-based 100% software solution enabling users to measure vital signs with a smartphone. The system captures a face video, processes the data using rPPG algorithms.

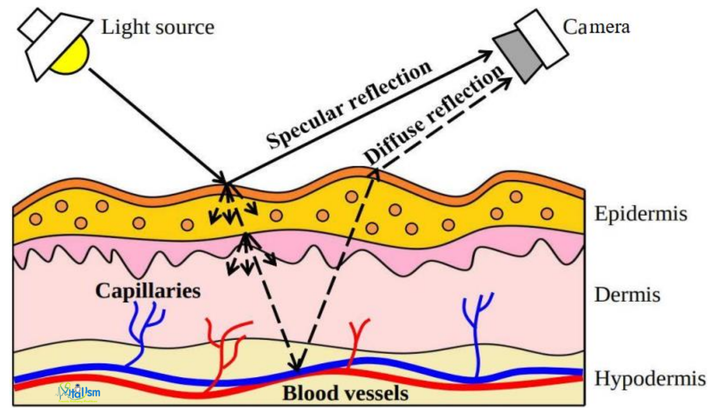


This data creates electronic medical records for easy health monitoring. Vitalism makes monitoring simpler, less costly, accessible, and raises awareness of regular measurement. It can predict potential health issues for immediate attention. Particularly beneficial for the elderly,

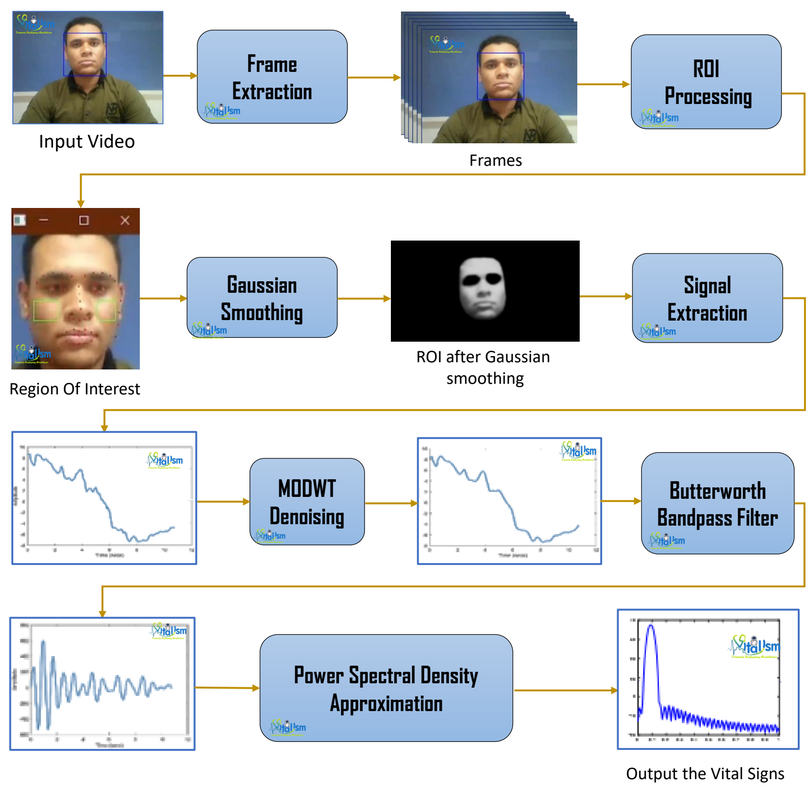
Vitalism provides a safe and convenient method for health management using cutting-edge smartphone technology.

Vitalism Methodology

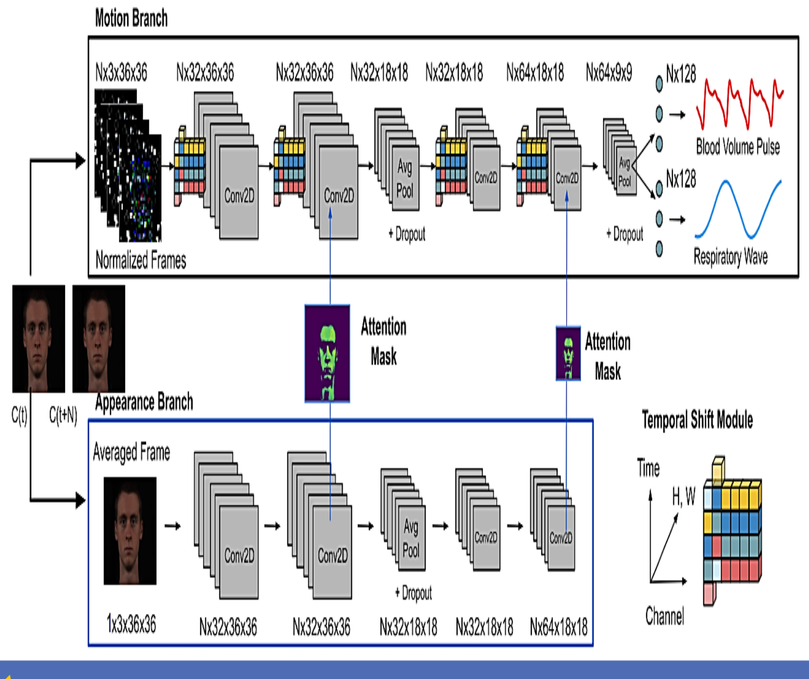
The Vitalism project aims to facilitate the process of measuring vital signs on a periodic basis by providing a fast, and convenient method suitable for all age groups. To achieve this objective, the project will utilize the remote Photoplethysmography (rPPG) and (PPG) technology and employ deep learning algorithms.



The next Pipeline extracts robust BVP signal from face video using deep learning and noise removal, streams to cloud for vital signs calculation as shown.

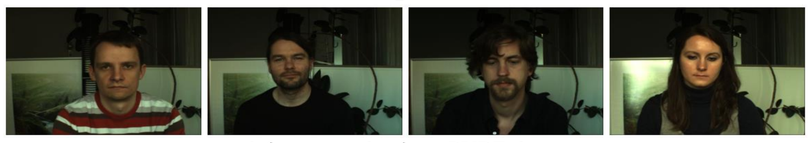


We carried out measurements with deep learning methods using DeepPyhs Architecture and PhysNet packages.



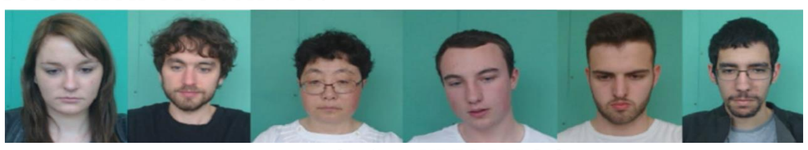
Datasets

1- Pulse Rate Detection Dataset - PURE data set: consists of 10 persons (8 male, 2 female) that were recorded in 6 different setups.



A few examples from PURE dataset

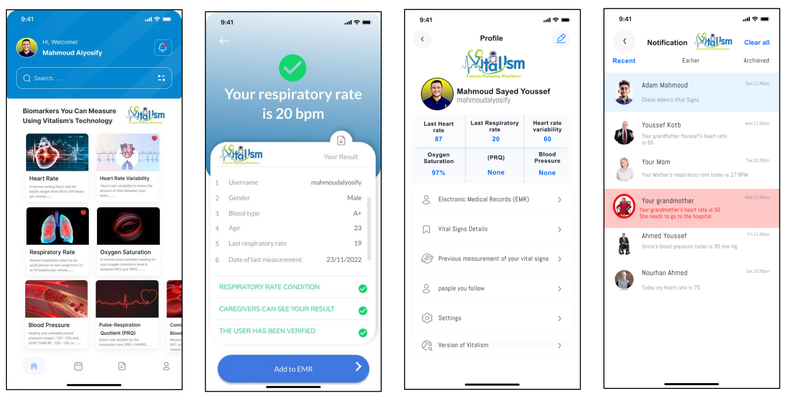
2- UBFC: There are 42 videos in UBFC dataset. Each people about 1m away from the camera. 30fps with a resolution of 640x480.



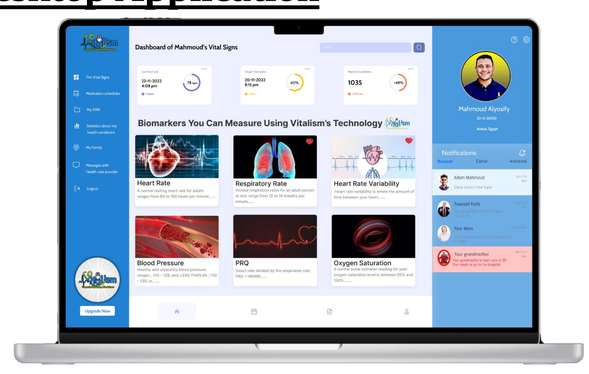
A few examples from UBFC-RPPG dataset

Vitalism Applications

1- Mobile Application

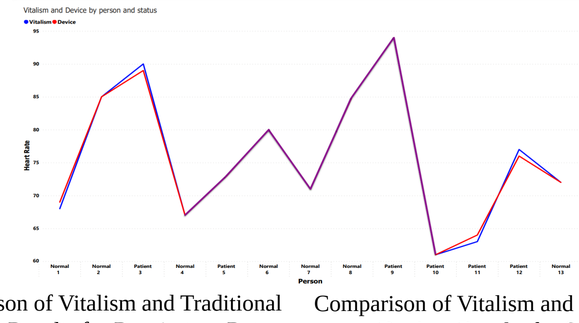


2- Desktop Application

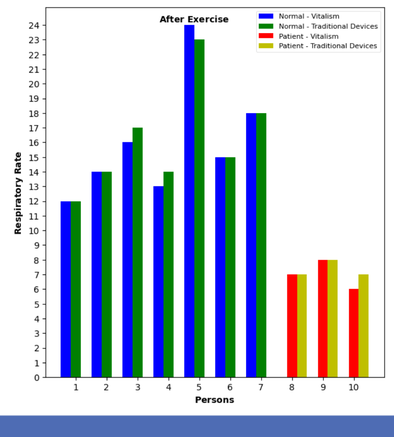


Results

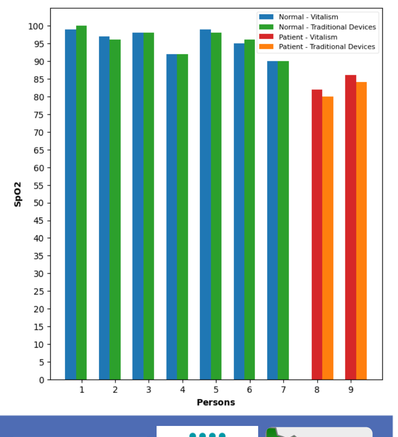
Comparison of Vitalism and Traditional Devices Results for Heart Rate



Comparison of Vitalism and Traditional Devices Results for Respiratory Rate



Comparison of Vitalism and Traditional Devices Results for SpO2



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