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BrainAnswer

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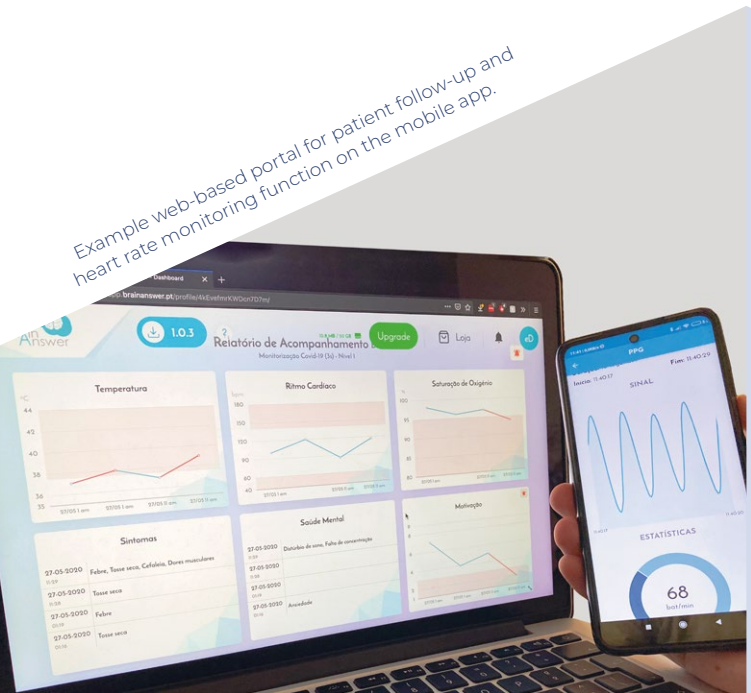

Example web-based portal for patient follow-up and heart rate monitoring function on the mobile app.

CONTACTS

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e-CoVig

Automated COVID-19 Symptomatology Remote Monitoring System

PROJECT
E-COVIG 19

WHAT PROBLEM WE SOLVING?

e-CoVig aims to implement a low-cost technological solution for monitoring a large number of subjects in COVID-19 quarantine. The system couples a cloud-based eHealth platform for collection, management and visualization of physiological and clinical data, with a smartphone-based ubiquitous system for acquiring COVID-19 symptomatic measurements (pulse oximetry, temperature, heart rate and respiration).

WHAT TECHNOLOGIES ARE WE USING?

Our system is centered around a the cross-platform mobile app, and uses the BrainAnswer platform (https://brainanswer.pt/) for the cloud storage and analytics backend, as well as for the web-based patient management portal that healthcare professionals can access.

For collecting physiological data, we use as many embedded sensors of the mobile phone as possible. The camera is used for Photoplethysmography (PPG) data acquisition, from which heart rate and heart rate variability indicators can be derived. The microphone is used to record audio snippets, with the purpose of detecting cough and periodically monitoring respiratory activity.

Optical Character Recognition (OCR) is used to automate in-app insertion of the readings obtained with standard household devices, namely thermometer, blood pressure monitor, and/or oxygen saturation level (SpO2) meter.

Given that most household devices only provide momentary readings, a purpose-built specialized wearable device with wireless connectivity, has been created within the project, for dense recording of SpO2, heart rate, and temperature data. This device can be deployed in large volumes at a comparatively low cost.

HOW IT WORKS?

Patients undergoing e-CoVig monitoring are assigned with an unique QR code that can be used across the different components of the system (i.e. mobile and web apps).

The mobile app is installed either by the patient, informal carer, or healthcare professional, and serves as the primary data collection tool.

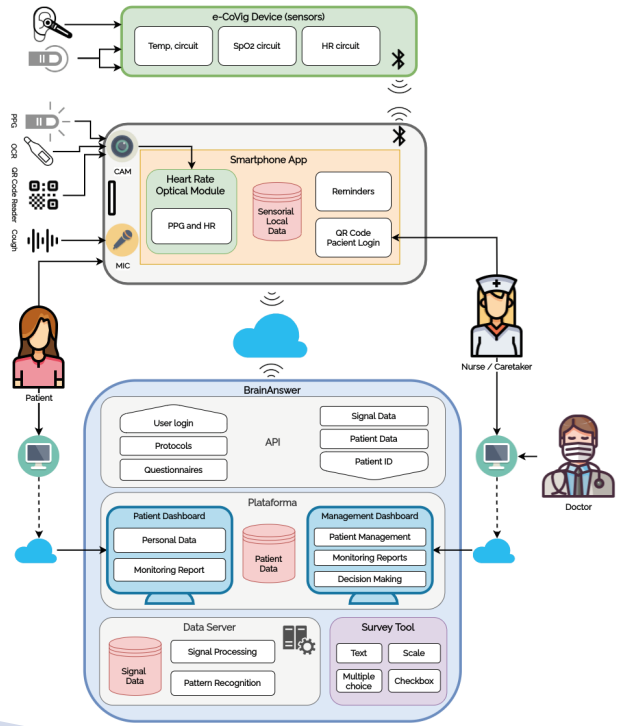
Qualitative assessment of the symptoms is performed periodically using an in-app measurement diary; self-report questionnaires enable the recording of other relevant clinical data to support the characterization of the pathology.

Quantitative assessment of physiological parameters can be performed momentarily or near-continuously with the specialized wearable (when applicable). The mobile app also issues reminders and enables the patients to access historical data. All the collected data is stored locally and synchronized with the BrainAnswer cloud backend whenever an Internet connection is available.

The BrainAnswer platform provides a web-app with a user-friendly eHealth dashboard through which healthcare professionals can review the status of the population that they are following, receive alerts for patients in which abnormal parameters are detected (e.g. hypoxia), and review the collected qualitative and quantitative data. The platform also inegrates algorithms for analytics and risk assessment of the monitored subjects, following the guidelines set forth by the Trace COVID-19 task force.

For patients with enhanced risk or already diagnosed, a specialized low-cost wearable device, with wireless connectivity, and equipped with specific sensors of added value for the COVID-19 monitoring, is assigned to the patient, enabling the recording of temperature, heart rate, and SpO2.

e-CoVig wearable for physiological data acquisition.



WHAT IS THE POTENTIAL IMPACT OF THE TECHNOLOGY?

We believe that it can greatly automate the interaction between the subjects and the national healthcare systems (NHS), reducing the risk of contamination, and to densify the monitoring process over time, by increasing the number of symptomatic measures.

The proposed system has the ability to streamline the simultaneous monitoring of a large number of subjects and generate automatic alerts.

The fact that it uses the mobile phone as primary multimodal integrated biomedical sensing tool is also quite disruptive, given that for subjects with a high degree of frailty and less proficient in modern technologies, other approaches may constitute more of a burden than a solution.

Finding a good balance between functionality and usability has been a key aspect, in order to devise a "human-friendly" solution.