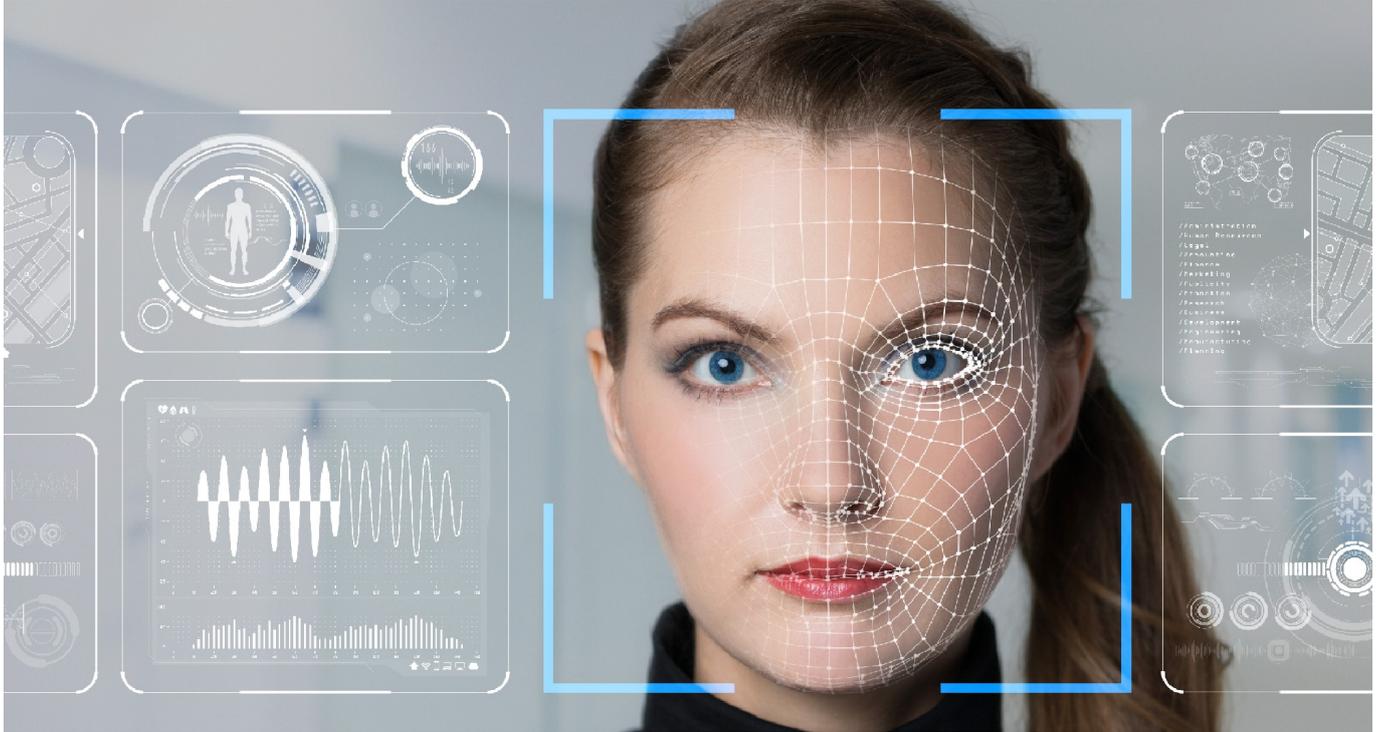


TECH OFFER

Remote Photoplethysmography For Contactless Vital Signs Monitoring



KEY INFORMATION

TECHNOLOGY CATEGORY:

Infocomm - Video/Image Analysis & Computer Vision
Infocomm - Big Data, Data Analytics, Data Mining & Data
Visualisation

Healthcare - Telehealth, Medical Software & Imaging

Infocomm - Healthcare ICT

TECHNOLOGY READINESS LEVEL (TRL): **TRL8**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174151**

OVERVIEW

This technology offer is a remote photoplethysmography (rPPG)-based solution for contactless vital signs monitoring. rPPG technology measures a user's health vital signs by using reflected light from the user's face. For context, traditional photoplethysmography (PPG) commonly found in wearable devices such as pulse oximeters and smart watches utilize light sources projected onto the skin's surface and a receptor in contact with the skin, capturing reflectivity information that corresponds to an individual's heartbeat. rPPG enables this process to be conducted remotely via the visible light around the subject.

Simply put, this technology enables the measurement of vital signs just by analysing a video feed of the user's face. The processing of the video can be done in real time, or done on a pre-captured video file. There is no need for any other sensors to

be placed in contact with the user.

The vital signs that can be captured via this rPPG technology today includes Heart Rate (HR), Heart Rate Variability (HRV), Respiration Rate, and Oxygen Saturation (SpO2). Stress level can also be derived from HRV.

The applications of rPPG are boundless, from wellness applications, and medical applications, to non-healthcare related industries such as security applications, education applications, and automotive applications. For instance, rPPG technology can help improve the medical accessibility in remote locations and for people belonging to resource-constrained groups. Using rPPG can improve the reliability of telemedicine and hasten the digitalisation of the medical industry. rPPG equipped security systems can be used in deception or liveness detection applications.

TECHNOLOGY FEATURES & SPECIFICATIONS

This technology offer is a proprietary software solution relying on computer vision algorithms and signal processing techniques to implement rPPG for contactless vital signs monitoring. The minimum hardware requirement is a digital camera that can record video with a minimum of 30 frames per second (FPS). This technology can also be applied to smartphones running on operating software systems that are still being serviced with security updates, from Android 8.1 onwards, and iOS 10 onwards.

POTENTIAL APPLICATIONS

- In this current Covid-19 pandemic situation, this rPPG technology can be used by organisations to implement contactless vital signs monitoring - to monitor employee wellness and filter potentially sick employees from entering work premises.
- This rPPG technology can make an invaluable contribution to the medical industry. It is a reliable contactless solution that can improve the ease and efficiency of tele-medicine by providing accurate data to aid in diagnostics and patient monitoring, since all that is required is a video camera, e.g, from a smartphone. It can measure HR, HRV, SpO2. If used in tandem with existing hospital infrastructures like appointment booking systems and in waiting rooms, it can help prioritise the provision of medical care to patients who are at immediate danger over others. It can also aid in tracking changes in patient vitals and documentation of patient's health journey. Due to its simplicity and affordability by making use of existing hardware like smartphones, this rPPG technology can expand medical accessibility to remote locations and low-income groups. It can also be used in dependent care like childcare, old age care, care for people with disabilities and chronic diseases and psychiatric facilities.
- This rPPG technology also has extensive applications in deception detection and the security industry. When used in combination with artificial intelligence (AI), an rPPG equipped security system can help identify potential threatful individuals by matching individual's vital and behavioural signs against previously positively identified individuals. Such systems can be adopted by casinos, banks, government buildings, airports, prisons, etc.

MARKET TRENDS & OPPORTUNITIES

The global digital health market is projected to grow to USD 639B by 2026. This technology offer will be an attractive addition to the market as it can enable contactless solutions that can change form of healthcare as we know it today. Furthermore, the application of rPPG technology is boundless and can reach well beyond the wellness and healthcare sector.

BENEFITS

- Reduction of waiting times for patients by efficient, contactless prioritisation of patients who require urgent care.

- Shortening of hospital stays by enabling remote and easy vital signs monitoring.
- Documenting of patient vital signs throughout their hospital journey easily.
- Improving the affordability and adoptability of remote diagnosis and e-consultations.
- Reducing human resource requirements and errors due to human neglect and misjudgement in the security industry, as rPPG can enable the earlier detection of potential threats by the contactless tracking of key vital signs.
- Ensuring workplace safety, and restricting the spread of disease by the efficient use of contactless vital signs monitoring.