MEDICAL MIRROR FOR HEALTH CARE

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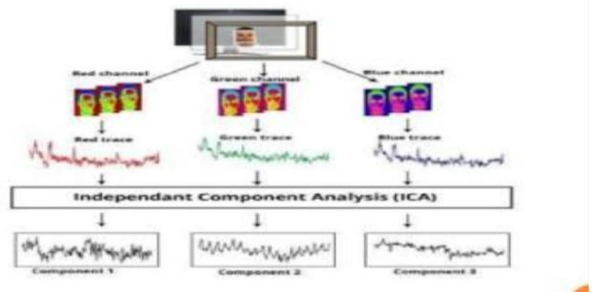
ABSTRACT: Systematic and non-invasive valuations of cardiovascular function are significant in surveillance for cardiovascular catastrophes and treatment therapies of chronic diseases. Inactive heart rate, one of the simplest cardiovascular parameters, has been recognized as an independent risk factor for cardiovascular sickness. Currently, the techniques for measurement of the cardiac pulse such as the electrocardiogram (ECG) require patients to wear adhesive gel patches or chest straps that can cause skin irritation and discomfort. Profitable pulse oximetry sensors that assign to the fingertips or earlobes also are difficult for patients and therefore the spring-loaded clips can cause pain if worn over an extended period. The ability to watch a patient's physiological signals by a foreign, non-contact means may be a tantalizing prospect that might enhance the delivery of primary healthcare. These methods can now enable longterm monitoring of other physiological signals like pulse or rate of respiration by acquiring them continuously in an unobtrusive and cozy manner. Such a system would also reduce the amount of cabling and clutter. The procedure of photoplethysmography (PPG) and non-invasive revenues of sensing the cardiovascular pulse wave over disparities in transmitted or reflected light, for non-contact physiological measurements has been investigated recently.This system can provide valued evidence around the circulatory system like pulse , blood oxygen saturation, vital sign , flow and autonomic function. Naturally, PPG has continuously been implemented using dedicated light sources , but modern work has revealed that pulse measurements are often acquired using digital camcorders/cameras with normal ambient light because the illumination source. In order to develop a clinically useful technology, there's a requirement for ancillary functionality like motion artifact reduction through efficient and robust image analysis.

Keywords: Pressure Monitoring, RGB Sensing, Patient Monitoring, Cardio-vasucular Function.

I.INTRODUCTION:

[1] Remote amounts of the cardiac pulse can deliver comfortable physiological assessment without electrodes. However, attempts thus far are non-automated, vulnerable to motion artifacts and typically expensive. During this paper, we introduce a replacement methodology that overcomes these problems. This novel approach are often applied to paint video recordings of the face and is predicated on automatic face tracking alongside blind source separation of the colour channels into



independent components. With Bland-Altman and correlation analysis, compared the cardiac pulse take out from videos recorded by a basic webcam to an FDA-approved finger blood volume pulse (BVP) sensor and achieved high accuracy and correlation even within the presence of movement artifacts. Furthermore, we applied this system to perform pulse measurements from three participants simultaneously. This is often the primary demonstration of a low-cost accurate video-based method for contact-free pulse measurements that's automated, motion-tolerant and capable of performing concomitant measurements on quite one person at a time. [2] Resting pulse (RHR) is one among the only cardiovascular parameters, which usually averages 60 to 80 beats per minute (b.p.m.), but can occasionally exceed 100 b.p.m. in unconditioned, sedentary individuals and be as low as 30 b.p.m. in highly trained endurance athletes. Epidemiological evidences demonstrate that RHR, or its corollaries, namely post-exercise pulse recovery, which is mediated primarily by vagal tone, and pulse variability (HRV, beat-to-beat variability also mediated by autonomic system nervosum, especially parasympathetic) correlates with cardiovascular morbidity and suggests that RHR determines anticipation. Multiple studies have identified RHR as an independent risk factor for disorder (comparable with smoking, dyslipidemia or hypertension). However, it's often overlooked. [3] we've developed a completely unique method to live human cardiac pulse at a distance. It's supported the knowledge contained within the thermal signal emitted from major superficial vessels.

This signal is acquired through a sensitive thermal imaging system. Temperature on the vessel is modulated by pulsative blood flow. To compute the frequency of modulation (pulse), we extract a line-based region along the vessel. Then, we apply fast Fourier transform (FFT) to individual points along this line of interest to maximize the pulse's thermal propagation effect. Finally, we use an adaptive estimation function on the typical FFT outcome to quantify the heart beat. We've administered experiments on a knowledge set of 34 subjects and compared the heart beat computed from our thermal signal analysis method to concomitant ground-truth measurements obtained through a typical contact sensor (piezo-electric transducer). The performance of the new method ranges from 88.52% to 90.33% counting on the clarit [4] Image processing covers tons of territory, including its use as an enabling technology for the more ambitious undertaking which is nowadays called computer vision (Jain et al., 1995). A comprehensive survey of fuzzy models for image processing and computer vision would require its own volume (cf. Chapter 5 of Bezdek et al., 1999). This chapter is confined to applications of image processing in medical domains that aren't supported neural network models or mathematical morphology. Others chapters of this handbook address these topics. Even these strict constraints leave us within the unenviable position of getting to settle on from more excellent work than we've space to review, and therefore the perhaps inexcusable position of being ignorant about some work of which we are simply unaware. With apologies to the various authors of papers in either category, we provide a snapshot of the utilization of fuzzy models for image processing in computational medicine.

II. LITERATURE REVIEW

Data from the Coronary Artery Surgery Study (CASS) published last year underline the prognostic importance of RHR for morbidity (time to rehospitalization), as well as total and cardiovascular mortality[5]. Heart rate proves to be the best predictor after myocardial infarction in patients with congestive heart failure, as well as in patients with diabetes mellitus or hypertension. In addition, it was found that elevated RHR is also strongly associated with mortality in the general population. [5] In the Framingham Study, in a cohort composed of 5070 problems who were free from cardiovascular infection at the time of entry into the study, cardiovascular and coronary death bigger progressively with RHR6. In a subset of 4530 untreated hypertensive (.140 mmHg systolic or .90 mmHg diastolic) patients included in this study, using 36-year follow-up data, odds ratio (OR) for each addition in heart rate of 40 b.p.m. were 1.68–1.70 for cardiovascular mortality and fascinatingly also 2.14–2.18 (CI: 1.59–2.88) for all-cause mortality. This latter study, however, also underlines a key concept: because high RHR is associated with elevated sympathetic activity, it is also frequently related to arterial hypertension. [5]A key step is consequently to know whether high RHR is also connected with cardiovascular mortality when governing for potential confounding cardiovascular risk factors, such as arterial hypertension or age. Following study demonstrated that rapid RHR was not an meter of pre-existing illness, but was rather an independent risk factor. Moreover, four studies involving hypertensive subjects demonstrated that this effect was sustained in this subset of patients. This abundant literature was further incremented by data also demonstrating this effect in elderly.

A novel method is developed to measure human cardiac pulse at a distance [6]. It is created on the material checked in the thermal signal emitted from major superficial containers. This signal is acquired through a highly sensitive thermal imaging arrangement. Temperature on the vessel is modulated by pulsative blood flow. To add the frequency of modulation (pulse), a line-based region along the vessel is extracted[7]. Then, fast Fourier transform (FFT) is applied to individual points along this line of interest to capitalize on the pulse's thermal propagation effect. The adaptive assessment utility on the average FFT outcome to quantify the pulse. The experiments are accepted out on a data set of 34 subjects and compared the pulse computed from our thermal signal analysis process to connected ground-truth dimensions gained through a standard connection sensor

III. PROPOSED METHODOLOGY:

Post processing and analysis of both the video and physiological recordings were done using custom software written in MATLAB (The Math Works, IncFirst, an automatic face tracker was wont to detect faces within the video frames and localize the measurement region of interest (ROI) for every video frame.

We utilized a free MATLAB-compatible version of the Open Computer Vision (OpenCV) library to get the coordinates of the face location. The OpenCV face detection algorithm is predicated on work by Viola and Jones, also as Lienhart and Maydt. A cascade of boosted classifier uses 14 Haar-like digital image features trained with positive and negative examples. The pre-trained frontal face classifier available with OpenCV 2.0 was used. The cascade environment uses a cluster of straightforward classifiers that are useful to every area of interest sequentially [6].. At each stage, a classifier is made employing a weighted vote, referred to as boosting.

Either all periods are passed, meaning the region is possibly effective to contain a face, or the world is excluded. the size of the world of notice are changed sequentially so as to spot positive matches of various sizes.

For each face detected, the algorithm returns the x- and y-coordinates alongside the peak and width that outline a box round the face. From this output, we selected the middle 60% width and full height of the box because the ROI for our subsequent calculations. To stop face segmentation errors from affecting the performance of our algorithm, the face coordinates from the previous frame were used if no faces were detected. If multiple faces were detected when just one was expected, then our algorithm selected the face coordinates that were the closest to the coordinates from the previous frame.

Heart Beat Rate:

Mechanism of fitness level, also the cardiovascular health. A high sleeping pulse growths the threat of attack and may be indicative of a predisposition for diabetes and obesity. A wonderful display of the overall fitness.

An LCD monitor with a inherent webcam to stream an interactive display. The user is visible to webcam and LCD monitor are often wont to project information onto the reflective surface of mirror. The monitor and webcam are connected to a laptop running the analysis software in real time

Working:

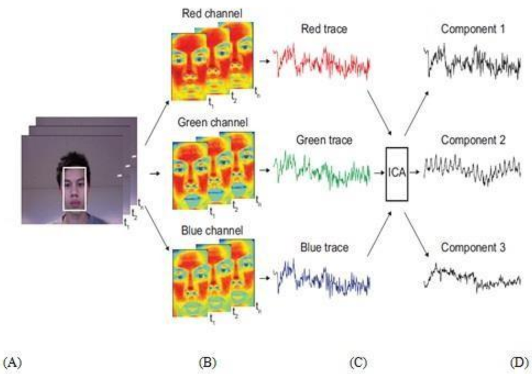


Fig 2. Physiological quantity methodology

An automated face follower detects the most significant face from the webcam. The raw RGB signals are decayed into three autonomous modules. The users pulse is measured for the frequency that corresponds to maximum power of the spectrum inside an operational waveband.

Face Tracker:
The automated face tracker which detects largest face from the video captured by webcam. Automatic face tracker may be a technology to detect size and site of the users face.

RGB Channel:
RGB colour sensor capture a mix of the reflected plethysmo graphic signal with the opposite source of change in light caused by the movement or changes in ambient lighting condition.

Interaction:
A single user at a time. The user will see a box appear around his/her face. Users pulse are going to be displayed on the mirror. The heart rate measurement are going to be updated continuously until the user looks away.

Calculation of Heart Beat:
45-240bpm operational waveband. • Video Physiological recording are done by using MATLAB.

Experimental Setup:
Basic webcam embedded during a laptop (built-in iSight camera on a Macbook Pro by Apple Inc.) to record the videos for analysis. All videos were recorded in color (24-bit RGB with 3 channels × 8 bits/channel) at 15 frames per second (fps) with pixel resolution of 640 × 480 and saved in AVI format on the laptop.

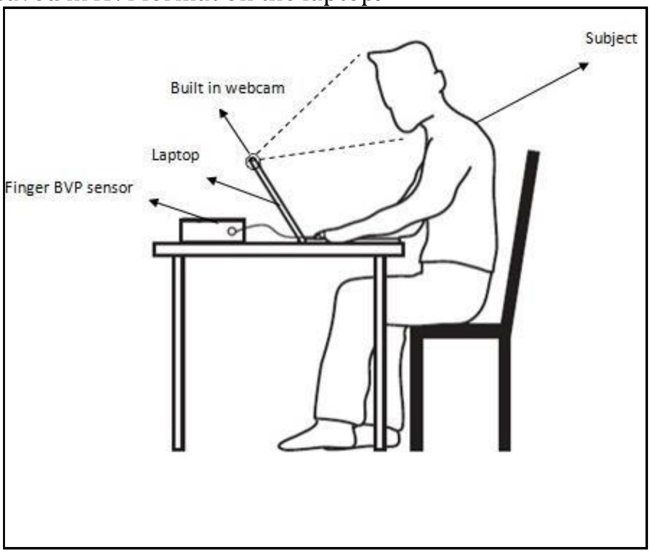


Fig 2. Experimental setup

IV. CONCLUSION:

This system defines a totally exclusive organization for improving the cardiac pulse from video recordings of the face and operation retaining a simple webcam with ambient daylight providing illumination. This is often the primary demonstration of a low-cost method for non-contact pulse measurements that's automated and indication tolerant. Although this idea only addressed the retrieval of the cardiac pulse, several other significant physiological parameters comparable rate of breathing, pulse variability and blood oxygen saturation can possibly be valued using the suggested system. Creating a real-time, multi parameter physiological measurement platform supported this technology are going to be the topic of future work.

V. REFERENCES:

[1]. POH, M.-Z., MCDUFF, D.J. AND PICARD, R.W. Non-contact, Automated Cardiac Pulse Measurements Using Video Imaging and Blind Source Separation. Optics Express, vol. 18, no. 10, 10762-10774.(2010)

[2]. Bhagyashree J. Bhoyar, Smita R. Londhe, 2014. Methodology for Medical Mirror. International Journal of Scientific and Research Publications, 4(1) 1-4.

[3]. M.Garbey, N.Sun, A.Merla., I. Pavlidis,2007. Contact-free measurement of cardiac pulse based on the analysis of thermal imagery, IEEE Trans. Biomed. Eng. 54(8), 1418–1426.

[4].W.Verkruysse, L.O. Svaasand, J.S.Nelson,2008. Remote plethysmographic imaging using ambient light, Optics Express 16(26), 21434– 21445 .

[5]Stephen cook,Mario Togni,Murcus Schoub,Peter Wenaweser,"High heart rate: A cardiovascular risk factor"European Heart Journal,27(20),Nov 2006,2387-93

[6]Ming-Zher Poh, Daniel J. McDuff, and Rosalind W. Picard "Non-contact, automated cardiac pulse measurements using video imaging and blind source separation" OSA Publishing Vol. 18, Issue 10,pp. 10762-10774(2010)

[7]. B. S. Kim, S. K. Yoo,2006. Motion artifact reduction in photo plethysmography using independent component analysis,"IEEE Trans. Biomed. Eng. 53(3), 566–568. Int. J. Adv. Sci. Eng. Vol.6 No.1 1244-1250 (2019) 1250

[8]. Vaibhav Khanna, yash Vardhan, Dhruv Nair, Preeti Pannu,2017. design and development of a smart mirror using raspberry PI, International Journal Of Electrical, Electronics And Data Communication, 5(1), 63-65.

[9]. Paul Viola, Michael Jones.,2001. Rapid Object Detection using a Boosted Cascade of Simple Features,conference on computer vision and pattern recognition, pp 1-9

[10]. Suryansh Chandel, Ashay Mandwarya, S.Ushasukhanya,2018. Implementation of magic mirror using raspberry pi 3, International Journal of Pure and Applied Mathematics,118(22)451-455.

[11]. Khurd Aishwarya .S, Shweta .S. Kakade, R. M. Dalvi, 2018. Smart Mirror, International Journal for Research in Applied Science & Engineering Technology 6 Issue XI, 93-95

[12]. Priya Saha, Debotosh Bhattacharjee, Barin Kumar De, Mita Nasipuri, 2014.An Approach to Detect the Region of Interest of Expressive Face Images, International Conference on Information and Communication Technologies, pp 1739 – 1746.

[13]. S. Cook, M. Togni, M. C. Schaub, P. Wenaweser, and O. M. Hess, "High heart rate: a cardiovascular risk factor?" Eur. Heart J. 27 (20), 2387-2393 (2006).

[14]. I. Pavlidis, J. Dowdall, N. Sun, C. Puri, J. Fei, and M. Garbey, "Interacting with human physiology,"Comput. Vis. Image Underst. 108 (12), 150-170 (2007).

[15]. M. Garbey, N. Sun, A. Merla, and I. Pavlidis, "Contact-free measurement of cardiac pulse based on the analysis of thermal imagery," IEEE Trans. Biomed. Eng. 54 (8), 1418-1426 (2007).

[16]. Davé, R. N. (1992). Boundary detection through fuzzy clustering, Proc. IEEE Int. Conf. on Fuzzy Syst., IEEE Press, Piscataway,NJ,127–134.CrossRefGoogleScholar

[17]. Davé, R. N. (1993). Robust fuzzy clustering algorithms, Proc. IEEE Int. Conf. on Fuzzy Syst., IEEE Press, Piscataway, NJ,1281–1286.Google Scholar