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Review Paper on E-Smart Watch for Early Detection of Covid-19

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Abstract: Smart watches have the potential to support health in everyday living by: enabling self-monitoring of personal activity; obtaining feedback based on activity measures; allowing for in-situ surveys to identify patterns of behavior; and supporting bi-directional communication with health care providers and family members. However, smart watches are an emerging technology and research with these devices is at a nascent stage. Seventy-three studies were returned in the search. Seventeen studies published were included. Included studies were published from 2014 to 2016, with the exception of one published in 2011. Most studies employed the use of consumer-grade smart watches (14/17, 82%). Patient-related studies focused on activity monitoring, heart rate monitoring, speech therapy adherence, diabetes self-management, and detection of seizures, tremors, scratching, eating, and medication-taking behaviors. Most patient-related studies enrolled participants with few exclusion criteria to validate smart watch function (10/17, 58%). Smart watch technical function, acceptability, and effectiveness in supporting health must be validated in larger field studies that enroll actual participants living with the conditions these devices target.

Keywords: smart watch, temperature and oxygen level detection, covid-19 symptoms.

I. INTRODUCTION

Wearable technology impacts the daily life of its users. On a daily basis, humans perform many physical and cognitive activities, such as decision-making, eating, studying, walking, and communication with others. New technologies are involved in many aspects of our lives, such as communication (through social networks) or shopping (through ecommerce websites). In 1995, a new field of research called affective computing, which considers human affects [1], was introduced by Picard. Wearable technology, as a type of affective computing, is mainly used for activity recognition [2, 3] and feeling or affect detection [4, 5]. Wrist wear device technology has been studied more recently, for example, the Wear Write system for smart watches [6]. Tomo is an example of an ad hoc wristwear system that uses hand gesture recognition [7]. Some other studies expand the interface of commercial devices, such as [8], where the interface of a wrist wear device is extended to the user's skin. In this article, we aim to provide a review of the studies based on only wrist-worn devices (WWDs). The field of wearable computing has spawned many conferences and research groups. The Conference on Human Factors in Computing Systems, the International Symposium on Wearable Computers, and the Enterprise Wearable Technology Summit are examples of high impact conferences. Also, popular research groups exist at Carnegie Mellon, Columbia University, Georgia Tech, MIT, Bremen University, Darmstadt University, ETH Zurich, Lancaster University, University of South Australia, and NARA in Japan. The structure of this paper is as follows: Initially, in Section 2, we provide background information on wearable computing (definitions, fields, devices, etc.). Then, in Section 3, we explain the methodology of this literature review, which includes search strategy and inclusion criteria. Section 4 presents a general overview of recent review studies of wearable computing. Section 5 focuses on experimental papers that are based on wrist-worn wearables. Sections 6 Hindawi Journal of Sensors Volume 2018, Article ID 5853917, 20 pages <https://doi.org/10.1155/2018/5853917> and 7 present discussion, challenges, and open directions. At the end of this review, Section 4 presents our conclusion.

II. PROBLEM EXPLORATION

Health Concern in today world is very essential to secure ourselves and also our families... That's too with this Corona (Covid-19), total Health structure itself is disturbed...

The basic test we are concerned with Covid-19 is Their Body Temperature.

Now body temperature is measured by using IR Thermometer, for this an Entity need to stand with this machine in the Entrance door and he need to pointing towards person who entering to the office and the machine seems verify temperature and reported in machine. Its good, but it measures the body temperature on that point of time, after words we don't have concerned with that person after once He/She entering to office... So, it is important that for each Employee there should be continuous monitoring facility like 24/7. Along with temperature it is also important to continuously monitor the blood pressure (BPM) towards report a Heart Rate Variability of a person towards its Healthy.

The multiplicity of uses exhibited in current smart watch studies shows the potential for these devices in health research. Smart watches have potential for use not only in patient-centered research, but also throughout the health community, as demonstrated by the CPR and ICU Nursing applications. In contrast to the observation by Bang et al. that a smart watch might serve as a transmission vector for infection when worn by a clinician in a clinical setting, we maintain that a smart watch worn by a patient to monitor individual conditions, may reduce the probability of infection because the device does not travel from room to room.

Information from smart watches have the capability to integrate with nascent Internet of Things platforms, such as Lab of Things or Piloteur and electronic health record (EHR) data to provide holistic views of personal health trajectories across contexts.

Here We are Designed Such Application called “E-Smart Watch” for early detection of covid -19 and to take corrective measures to save human life.

This Device Designed with the facility of continuously monitor the body temperature with also pulse rate of person, when something went wrong like body temperature may going to LOW or HIGH it immediate notify that to person itself by vibrating that device along with a notification to admin email. Our main intention is concerning with our Covid worriers, their Health is very important towards nation.

III. LITERATURE SURVEY

Related Background Story: Lockman et al. [10] Laboratory-based study that enrolled 40 participants to evaluate generalized tonic-clonic (GTC) seizure detection by the SmartWatch by SmartMonitor coupled with a Bluetooth link to a computer. Seizure detections were compared with video EEG data recordings. Six participants had a total of eight GTC seizures with two patients having two seizures each. Seven of the eight seizures were detected by the smart watch. The missed detection was attributed to either uncharged battery or failed Bluetooth connection. One false seizure was detected during a sleep period. Individual enrollment periods were not reported.

Carlson et al. [11] Two-week field study with a single participant to test the real-time in-home location identification functionality of the Texas Instruments Chronos smart watch in conjunction with wireless sensor motes. The system performed with 91% accuracy for location identification as compared to the participant’s journaled location

Wijaya et al. [12] Field test of an experimental prototype heart-monitoring smart watch with a single participant involving data collection during 3-day “sick” and 7-day “healthy” periods. Heart rate variations detected by the watch correlated with activity descriptions documented by the participant (e.g.: cooking versus eating). Temperature readings captured by the watch were unreliable.

Wile et al. [13] Laboratory-based feasibility test with 29 participants of smart watch accelerometry use for detection and differentiation tremor of Parkinson’s disease from essential tremor. Comparison of WIMM One smart watch and ENTRAN accelerometer measurements of tremor on the predominantly affected hand with 10 participants had nearly perfect concordance of peak frequency and proportional harmonic power. WIMM One measurements for all 29 participants accurately differentiated Parkinson’s disease postural tremor from essential tremor. Smart watch measurements in the outpatient clinic took 3–6 min.

Ahanathapillai et al. [14] Single session laboratory-based validation tests of worn state detection, activity levels and step count algorithms developed for the Z1 Android Watch-Phone. Worn state was correctly identified with a single participant as compared to ground truth. Intensity of activity levels for a single participant for a single day correlated with participant self-reports. The algorithm accurately detected step counts for normal and slow-paced walking with 20 healthy participants but did not perform well for ascending or descending stairs.

Arsand et al. [15] User-centered design study to design, develop and test a Smartwatch Diabetes Diary for self-management of blood glucose measurements, insulin injections, physical activity, and dietary information using the Pebble Classic smart watch. Field tests with six participants with Type 1 diabetes were enrolled in a two-week field test. Participants successfully recorded their physical activities, used program reminders, and automatically transferred data from the smart watch to an Android-based smart phone. Participants reported positively on smart watch features and provided recommendations for future design iterations.

Bang et al. [16] User-centered design study to design, develop and test the Nurse Watch smart watch application to support nursing work in the Intensive Care Unit (ICU) using the Motorola 360 smart watch. Nurse watch features include real-time patient vital-sign monitoring, threshold alarms, and a to-do list with reminders. Formative usability evaluation with seven nurses and nurses’ aides resulted in 83 percent task completion for eight primary tasks and identified the need for user interface design improvements. Subjective Usability Scale (SUS) mean score was 70 which is somewhere between an “OK” and “Good” subject score. SUS comfort and security scores were low. Participants expressed positive attitude about the Nurse Watch and the smart watch approach during interviews.

IV. ARCHITECTURE DESIGN

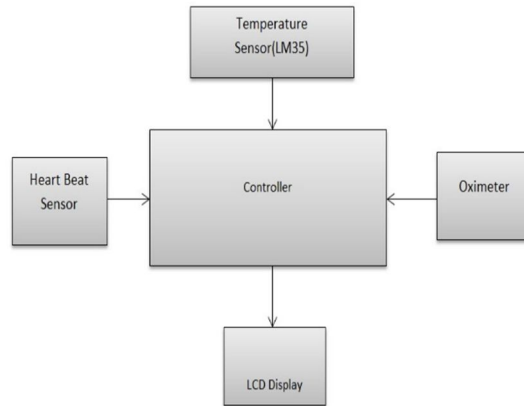


Fig 1: Block Diagram

A. Temperature Sensor (MLX90614)

MLX90614 is a temperature sensor that outputs an analog signal which is proportional to the instantaneous temperature. The output voltage can easily be interpreted to obtain a temperature reading in Celsius. The advantage of lm35 over thermistor is it does not require any external calibration.



Fig 2: Temperature sensor

B. Oximeter (MLX30100)

We will be Interfacing MAX30100 Pulse Oximeter Sensor with Arduino that can measure Blood Oxygen & Heart Rate and display it on 16x2 LCD Display.

C. Heart Beat Sensor

A heartbeat/ pulse sensor consists of an LED and a photo-diode. The photo-diode senses the light emitted by the LED. When a finger is placed such that it covers both the LED and the photo-diode, the photo-diode measures the light from the LED through the finger.



Fig 3: Heart rate sensor

V. CONCLUSION

Many review studies on wearable technology have been conducted. Therefore, this paper presented a review of previous research on wearable computing studies. As a result, and to the best of our knowledge, there were no review studies on WWDs that consider many aspects. This paper discussed the different kinds of WWD studies, highlighted important issues, and suggested future works. The next step is to attempt investigating more studies based on a specific domain or a specific topic that could be solved with wearable technology then explore and detect problems with the aid of a domain expert to determine requirements.

Conflicts of Interest: The authors declare that there is no conflict of interest regarding the publication of this paper.

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