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# Seismic Wave-Based Human Movement Detection and Storage System

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**ABSTRACT**: In the current health environment, COVID management is a biggest challenge; prevention of transmission is at the core of this issue. The aim of this work was to assess the impact of increasing oximetry provision in terms of benefits to identification of patient problems during covid; to identify affordability needs; to explore perceptions regarding barriers to more comprehensive oximetry coverage and to determine a view on the desirable functionality for an ideal low-cost oximeter. This paper reports specifically on pilot work undertaken in hospitals in one Indian State. The ratio of red and infrared signals after normalisation is calculated and is related to arterial oxygen saturation. The SaO/sub-2/ is finally calculated using the well-known Mendelson and Kent equation which is derived based on Beer Lambert law. In CSIO's pulse oximeter, a Nellcor finger clip probe is employed. The system operates at 400 Hz which is locked with power line frequency. Constant current feedback circuits are employed for driving the LEDs in a particular sequence. The detector output is given to sample and hold circuits for demultiplexing the three signals namely red, ambient and infrared. Our oximeter has provision for high and low alarm settings of SaO/sub 2/ from 50% to 100% and pulse rate setting from 30 BPM to 250 BPM.
**KEYWORDS**:oximetry, pulse tracking,hypoxemia

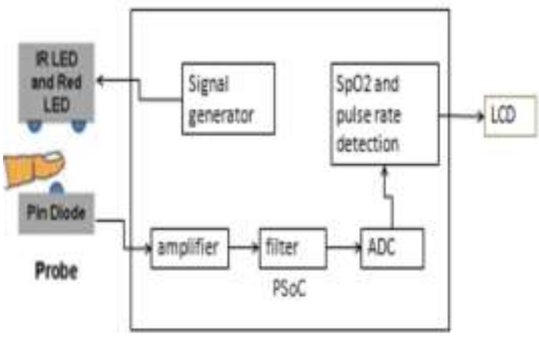
## I. INTRODUCTION

Dr. TakuoAoyagi who invented pulse oximetry to measure the oxygen saturation in the blood in 1974. The importance of pulse oximetry is felt more in this coronavirus pandemic. Dr. Takuo Aoyagi, a Japanese Bioengineer, whose pioneering work in 1974 led to the invention of modern first commercially available pulse oximeter, a life-saving device that clips on a finger and shows the level of oxygen in blood, died on April 18, 2020, at Tokyo, at the age of 84. Hanning and Alexander William described the monitoring of the oxygen saturation as the "the greatest advance in patient monitoring since echocardiography. "This research develops a gadget for providing data. The system of which this gadget is a part derives information from the data regarding oxygen level to measure correct reading against it.

## II. SYSTEM DESIGN

Pulse oximetry makes use of principle of Photo-plethysmography (PPG). It is one of non-invasive method used to measure proportional quantity of blood change using light absorption phenomena in biological tissues. When fingertip is illuminated by infra-red light, depending on the oxygenated blood content either red or infrared light is detected by photodetector. Oxygenated haemoglobin absorbs more infrared light while deoxygenated haemoglobin absorbs more red light. Because of their different absorption spectra

## III. BLOCK DIAGRAM




**FUNDAMENTAL BLOCK DIAGRAM**

Initially, a fundamental block diagram was formed to lay the system's foundation.

At 660nm red light absorption coefficient and at 940nm infra-red light coefficients can be

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obtained [5].Ultimately the amount ofoxygen bounded with haemoglobin can be decided based on the absorption coefficientsfoundational skeleton and the requirements.

## IV. OBESERVATIONS FROM THE TESTS CONDUCTED SOLENOID FORCE

The MAX30100 pulse oximeter and heart rate sensor is an I2C-based low-power plug-and play biometric sensor. It can be used by students, hobbyists, engineers, manufacturers, and game mobile developers who want to incorporate live heart-rate data into their projects.

It combines two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse oximetry (SpO2) and heart rate (HR) signals. The MAX30100 has an on-chip temperature sensor that can be used to compensate for the changes in the environment and to calibrate the measurements. This is a reasonably precise temperature sensor that measures the 'die temperature'.

## V. PROCESSING SUBSYSTEM

Pulse oximeter is the most portable and can be used in home to observe oxygen saturation. It is in the shape of an alligator clip and has to be put on the finger.

The display screen is on the clip. Infrared light is passed through the veins and this can measure the difference between oxygenated and deoxygenated blood cells. Pulse oximeter may not give the right reading if there is a blood clot or the hand is cold. A handheld oximeter is used in medical institutions and hospitals. The machinery is slightly more sophisticated. The screen is not attached to the clip,Instead, there is a cable attaching the clip to the screen.

Oximeter used in the diagnosis of disorders like hypoxia, sleep apnea, hypertension. The portable version of it helps to monitor the conditions even at home.

## VI. STORAGE SUBSYSTEM

A Lithium-powered battery pack of 3.7 V was used as the power source. It was necessary to maintain the potential of the battery between 3.2 V to 3.7 V. Hence, this introduces the necessity of a Battery Management System (BMS) TheMAX30100 can be programmed to generate an interrupt, allowing the host micro controller to perform other tasks while the data is collected by the sensor.

The interrupt can be enabled for 5 differentsources. Power Ready triggers on power-up or after a brownout condition. SpO2 Data Ready triggers after every SpO2 data sample is collected.

## VII. POWER SUPPLY SUBSYSTEM

This is a cost-sensitive, portable and space limited set-up. Hence, MCP73831 by Microchip (Appendix D) was selected as the battery management system.

It is less dependent on external components, which makes it more suitable for this application.

The AP7312 by Diodes Incorporated (Appendix E) was used as a DC/DC Converter since its built-in thermal shutdown circuitry protects the system from damage in fault conditions.

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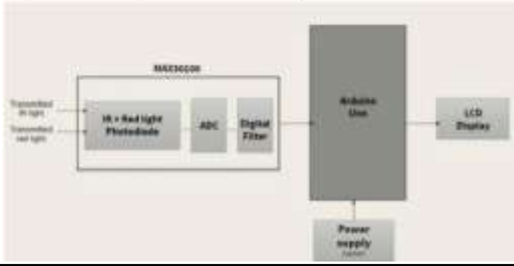
It has low dependence on external components, making it more suitable for this application.

The AP7312 by Diodes Incorporated [8] was used as a DC/DC Since its built-in thermal shutdown circuitry, the Converter protects the system from damage in fault conditions.

## VIII. FINAL DESIGN

A final block diagram was created wherein suitable components replaced the subsystems.




**FINALIZED BLOCK DIAGRAM**

## IX. IMPLEMENTATION

Hence, the components were assembled, and the MAX30100 was powered and programmed to work with the components used so that the PULSE signals would be sensed.

## X. RESULTS AND DISCUSSION

The system, after its establishment, was tested. It was placed on the finger of the patient so that the pulse signal was detected by oxymeter. The 20 seconds were completed, and the signals were observed on a monitor temporarily connected to the system. The system worked as expected.

## XI. CONCLUSION

To date, the largest randomized controlled trial that has evaluated the impact of pulse oximetry on outcome was the study by Moller and colleagues. Although myocardial ischemia occurred less frequently in the oximetry than the control group, the numbers of post-operative complications and hospital deaths were similar in the two groups [4].

The percentages of patients transferred to the ICU were similar in the oximeter group and the control group (6.7 The lack of demonstrable benefit of pulse oximetry on outcome in clinical trials may be due to the signal-to-noise ratio.It is this perspective that has made pulse oximetry a crucial part of standard of care despite the absence of proven efficacy.

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