ISBN: 978-605-73901-3-4

6th INTERNATIONAL CONGRESS OF EURASIAN SOCIAL SCIENCES

(6. ULUSLARARASI AVRASYA SOSYAL BİLİMLER KONGRESİ)

13-16 Mayıs 2022 / 13-16 May 2022

Bodrum/Mugla/TURKEY

FULL PAPERS

CONGRESS E-BOOK

ISBN: 978-605-73901-3-4

KORİNT YAYINCILIK

ISBN: 978-605-73901-3-4

THE DEVELOPMENT OF SMART DEVICES FOR COVID USING IOT

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ABSTRACT

The development of smart devices for covid using IoT is a device that is placed on a fingertip. This device uses to determine the blood's oxygen saturation and pulse rate The amount of oxygen carried in the blood is determined by oxygen saturation. The traditional Oximeter can only be read briefly, and the data cannot be recorded automatically. Besides that, the traditional Oximeter device can only be seen by the person who uses it. The development of smart devices for covid using IoT is to design the tool that doctors can make online monitoring of the patient. Next, to develop a tool that can also make it easier for other family members to monitor. Lastly, to evaluate record patient data from home. The development of smart devices for covid using IoT using the ESP8266 module as the main component enables microcontrollers to connect to 2.4 GHz Wi-Fi for the IoT system. The MAX30100 is an integrated pulse oximetry and heart rate monitor sensor solution. OLED (Organic Light-Emitting Diodes) is displayed, and ARDUINO is a program. The expected result in this project is a hybrid method using a pulse oximeter and IoT system combined to make one medical device.

Keywords: Smart devices for covid using IoT, Covid, IoT.

ISBN: 978-605-73901-3-4

INTRODUCTION

COVID-19 is caused by a novel coronavirus that enters the body through the respiratory system, causing direct harm to the lungs through inflammation and pneumonia, both of which can impair oxygen transmission into the bloodstream. Fluid collects in the lung tissue causing pneumonia. This impairs the transfer of oxygen between air sacs and blood. This oxygen deficiency can happen at any stage of COVID-19, not just in severely sick patients on ventilators. The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, or breathe. These particles range from larger respiratory droplets to smaller aerosols. A pulse oximeter is a device that is usually placed on a fingertip. It uses light beams to estimate the oxygen saturation of the blood and the pulse rate. Oxygen saturation gives information about the amount of oxygen carried in the blood. Traditional oximeters can only be read briefly after short among of time the device will reset the reading. The pulse oximeter can estimate the amount of oxygen in the blood without having to draw a blood sample. Traditional Oximeter devices can only be seen by the person who are using them. Doctor unable monitor the patients if the patients at home. Data cannot be recorded automatically, and Traditional Oximeter devices do not have an IoT system.

METHOD

1.Proteus

The Proteus Design Suite is a proprietary software tool suite that is primarily used to automate electronic design. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. It can design the project circuits.

1.1. Arduino

Arduino is an open-source platform used for building electronics projects. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, by using the Arduino the project program can test and do on the software.

2 HARDWARE

3.1 ESP8266

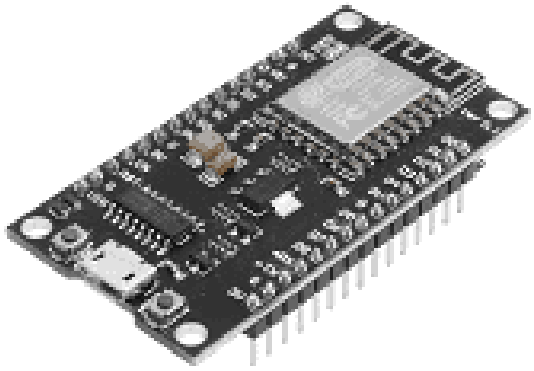

Figure 3.1: ESP8266

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The ESP8266 module enables microcontrollers to connect to 2.4 GHz Wi-Fi, using IEEE 802.11 ban. It can be used with ESP-AT firmware to provide Wi-Fi connectivity to external host MCUs, or it can be used as a self- sufficient MCU by running an RTOS-based SDK.

3.2MAX30100

Figure 3.2: MAX 30100

The MAX30100 is an integrated pulse oximetry and heart rate monitor sensor solution. It combines two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart-rate signals.

3.3OLED DISPLAY MODULE

Figure 3.3: OLED display module

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. OLEDs are emissive displays that do not require a backlight and so are thinner and more efficient than LCD displays (which do require a white backlight).

3.ARDUINO UNO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards can read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

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FINDINGS

4.1 HUMAN BODY TEMPERATURE

The average human body temperature stays around 36.5 C to 37 C, regardless of the external temperature or weather. Each person's body is different, but generally, when muscles are primed and ready to go, the body's optimum core temperature falls within a specific range; it is right around 37.5 degrees Celsius.[1]

Normal body temperature, on the other hand, can range from 97 degrees Fahrenheit (36.1 degrees Celsius) to 99 degrees Fahrenheit (37.2 degrees Celsius) or higher. The temperature of your body varies based on how active you are and the time of day. The body temperatures of older persons are often lower than those of younger ones. Fever is indicated by the following thermometer reading. Temperatures of 100.4 (38 C) or greater in the rectal, ear, or temporal arteries. Oral temperature of 100 degrees Fahrenheit (37.8 degrees Celsius) or higher A temperature of 99 degrees Fahrenheit (37.2 degrees Celsius) or greater in the armpits.[2]

Table 2.1: *Temperature table*

Observation	*Oxygen saturation (SpO2) %	Pulse rate (bpm)	*Temp (°C)	**Respiratory Rate	**PEFR
Normal readings	>96%	40-100	36.5-37.5	10-16	ǂ
Patient Baseline					
Acceptable to continue home monitoring	≥95	≤100	≤38	≤21	
Seek GP advice	93-94%	100-110	38.1-39	22-24	
Need urgent medical advice	≤92%	≥111	≥39	≥25 or unable to talk in sentences	

4.2. HUMAN PULSE AND BLOOD PRESSURE

The effect of blood pumped by the heart causes the cyclic expansion and contraction of an artery. The pulse can be felt with the fingers at various pulse pressure sites throughout the body, and it can also be heard with a stethoscope. The radial pulse (at the wrist) and the brachial pulse (on the inside of the arm at the elbow) will be used to acquire pulse and blood pressure measures in this survey.[3]

The force produced by blood on the wall of a blood vessel when the heart pumps (contracts) and relaxes is known as arterial blood pressure. The degree of force when the heart is pumping is called systolic blood pressure (contracting). The diastolic blood pressure is the force exerted by the hearts when they are relaxed.

The focus of the blood pressure measuring approach is on measurement for research purposes rather than as a diagnostic test. In a survey context, these measurements will not be utilised to make a medical diagnosis of disease, but rather as a statistical description of the survey group. The person who is having his pulse and

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blood pressure tested is known as the SP (sampling person), and the person who takes the measurements is known as the interviewer. The information concerning the pulse and blood pressure will be recorded on the Blood Pressure Measurement form.[3]

4.3. COVID-19 AND SYMPTOMS

(COVID-19) known as Coronavirus disease is an infectious disease caused by the SARS-CoV-2 virus. Coronaviruses cause respiratory tract infections that can range from mild to lethal. Coronavirus latches its spiky surface proteins to receptors on healthy cells causing infection. The effects of covid can make Lungs might become inflamed, making it tough for you to breathe. This can lead to pneumonia, an infection of the tiny air sacs (called alveoli) inside your lungs where your blood exchanges oxygen and carbon dioxide. Three common clusters of symptoms have been identified. Most common symptoms: Fever, Cough, Loss of taste or smell. Less common symptoms: Sore throat, Headache, Aches and pains, and Diarrhea. Serious symptoms: Difficulty breathing or shortness of breath, Loss of speech or mobility, or confusion, and Chest pain.[4]

4.4. COVID-19 DETECT USING TRADITIONAL PULSE OXIMETER

COVID-19 patients may experience a wide range of symptoms, ranging from no symptoms to mild symptoms to severe sickness. Low oxygen levels are common in COVID-19 patients, which can be fatal. However, not everyone who has a low oxygen level will have trouble breathing. A pulse oximeter is a gadget that you place on a patient's finger, toe, or earlobe to test their oxygen level. It's a quick and painless exam that takes less than two minutes to complete.

A pulse oximeter is composed of the sensor (or probe) and the monitor with the display. The probe is on the finger and is detecting the flow of blood through the finger. This is displayed as a pulse wave on the monitor. A pulse wave must be present to demonstrate that a pulse is being detected.

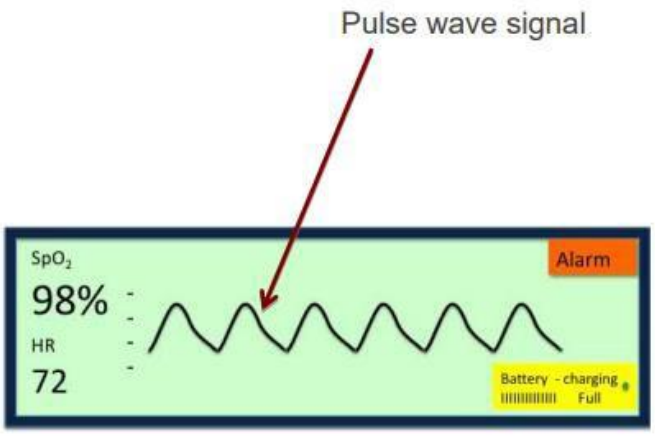

Figure 2.1: Pulse wave signal

In this figure, the patient has a pulse rate of 72 beats/minute and an SpO2 of 98%. This monitor describes the pulse rate as the heart rate. All pulse oximeter probes (finger or ear) have light emitting diodes (LEDs) which shine two types of red light through the tissue. The sensor on the other side of the tissue picks up the light that

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is transferred through the tissues.

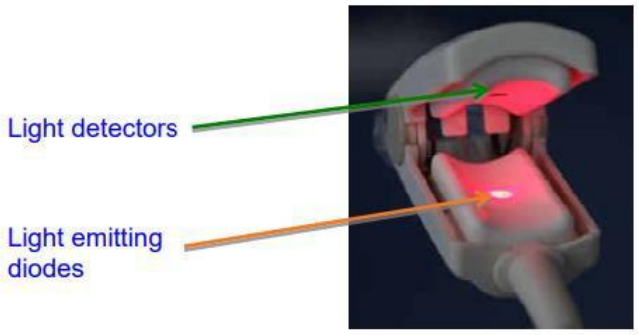

Figure 2.2: Oximeter probes

The oximeter can determine which of the haemoglobin is in pulsatile blood (arterial) and can then determine the SpO2 of arterial blood in the peripheral circulation. The oxygen saturation, or proportion of oxygen in the patient's blood, is measured by pulse oximeters. For healthy children and adults, an oxygen saturation of 95 to 100 percent is considered typical. Trouble breathing, bewilderment, difficulty waking up, and pale lips or face are all indicators of a low oxygen level. Adults may experience persistent chest pain. Some COVID-19individuals may not have any symptoms at all. Even if there are no physical indicators of a low oxygen level, you should initiate oxygen therapy on any COVID-19 patient with an oxygen saturation below 90%. Start oxygen therapy right away if the patient shows any signs of low oxygen levels.

4.5. TECHNOLOGY BASED ON IOT

Remote patient monitoring

Remote patient monitoring is the most common application of IoT devices for healthcare. IoT devices can automatically collect health metrics like heart rate, blood pressure, temperature, and more from patients who are not physically present in a healthcare facility, eliminating the need for patients to travel to the hospital.

The Internet of Things (IoT) keeps promising us a smarter future, The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals, or people that are provided with unique identifiers, and smart gear that monitors your health and sends real-time data to your doctor's smartphone. An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors, and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. These fantasies would never come true if it weren't for the plethora of IoT technology that surround us.[5]

4.6. HYBRID METHOD

ISBN: 978-605-73901-3-4

A method that combination traditional pulse oximeter and IoT system. This method is using the oximeter and the smart phone. By using the Wi-Fi and Bluetooth it can connect to the phone and can give the data or reading to the device. It is using the Arduino program. Using this method, it can help the doctor and make an easy to record the result for medical record. This number gives your doctors and nurses an idea of the treatment. This method is a new way in the medical field.

4.7. THE DEVELOPMENT OF PULSE OXIMETER FOR REMOTE MONITORING

This hybrid method using pulse oximeter and IoT system combine to make one medical device. The development of smart devices for covid using iot using a smart phone to monitor the result in another place. It can record a data use for doctor to monitor a patient.[6]

CONCLUSION and DISCUSSION

Finally, pulse oximetry is a non-invasive and straightforward method of measuring blood oxygen levels and heart rate. These assessments can be used to track overall health and assess persons with lung and heart problems quickly. The Internet of Things is a concept that connects the virtual world of information technology to the physical world of things. RFID and sensor technologies, which are part of the Internet of Things, make our lives easier and more comfortable.

RECOMMENDATIONS

With this tool it can help doctors and nurses more easily and quickly. In addition, it can help to test and study in more depth the pulse oximeter seteursnya, with the presence of iot in medical devices it will have a good impact on the developing medical devices. In addition, the presence of iot technology in the medical system also provides a step forward in the medical world.

ETHICAL TEXT

In this article, the journal writing rules, publication principles, research and publication ethics, and journal ethical rules were followed. The responsibility belongs to the author (s) for any violations that may arise regarding the article.

REFERENCES

[1] M. L. Hoang, M. Carratù, V. Paciello, and A. Pietrosanto, “Body temperature—indoor condition monitor and activity recognition by mems accelerometer based on IoT-alert system for people in quarantine due to COVID-19,” Sensors, vol. 21, no. 7, Apr. 2021, doi: 10.3390/s21072313.

[2] London Medical College, “Guidance for practices Guide to using pulse oximetry during Covid-19 pandemic Role of pulse oximetry during Covid-19 pandemic,” pp. 1–6, 2021, [Online]. Available: https://www.lmc.org.uk/visageimages/Covid-19/Guide to using pulse oximeters during Covid-19 pandemic.pdf.

ISBN: 978-605-73901-3-4

[3] Westat Inc., "Pulse and Blood Pressure Procedures," Blood Press., no. July, pp. 1–3, 1993.

[4] Ontario Ministry of Health and Long-Term Care, "COVID-19 Reference Document for Symptoms v7.0," pp. 19–22, 2020.

[5] WHO, "COVID-19 weekly epidemiological update," World Heal. Organ., no. 58, pp. 1–23, 2022, [Online]. Available: https://www.who.int/publications/m/item/covid-19-weekly-epidemiological-update.

[6] G. Narmadha, M. Ramasamy, H. Prasad, and P. Nair, "Design of Smart Pulse Oximeter using ATMEGA 328 Microcontroller," Int. J. Emerg. Technol., vol. 11, no. 3, pp. 696–700, 2020.

[7] T. M. Kadarina and R. Priambodo, "Monitoring heart rate and SpO2 using Thingsboard IoT platform for mother and child preventive healthcare," in IOP Conference Series: Materials Science and Engineering, Nov. 2018, vol. 453, no. 1, doi: 10.1088/1757-899X/453/1/012028.