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Sensor Fusion for Better Health Awareness: Guardian of Well Being

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ABSTRACT

This ground-breaking technology provides a health monitoring system that smoothly incorporates temperature, infrared (IR), heart rate, and SpO2 sensors. By combining these sensors, the initiative offers real-time, non-invasive tracking of critical physiological indicators, enabling proactive health management and early detection of possible concerns. With data representing body temperature, blood pressure, cardiovascular activity, and oxygen saturation levels, users of sensor fusion technology can acquire a comprehensive understanding of their health. This user-friendly technology gives people the power to decide for themselves what is best for their health and has the potential to revolutionize telemedicine, remote patient monitoring, and early warning systems in the healthcare industry. This study not only demonstrates the potential of sensor fusion for health monitoring, but it also has the potential to revolutionize personal healthcare and promote a society that is more concerned with its overall health.

Keywords: Heart rate, Blood pressure, Oxygen level, Temperature, App, Health Monitoring

1. INTRODUCTION

Health covering systems give precious sapience into the condition of a structure, enabling itineraries to make better opinions regarding conservation, and help to ensure the safety of a structure's occupants. Unfortunately, two factors have led to the lack of wide relinquishment of health monitoring systems. First, systems are precious to install with costs adding faster than a direct rate as systems grow in size. Second, the benefits presently deduced from a permanently installed structural monitoring system are delicate to quantify in terms of costs saved to structural possessors. easily, if the installation cost of covering systems can be reduced, while system capabilities are expanded to include robust identification of structural damage, perpetration of health covering systems would come more-wide. Wireless seeing bumps, with their on- board data processing capacities are also ideal for monitoring operations where data interrogation is performed automatically, therefore barring the demand for a mastermind to examine a prohibitively enormous aggregation of data collected by the seeing network (Straser and Kiremidjian, 1998). also, wireless seeing networks can be installed and uninstalled fleetly making temporary, exigency deployments of health monitoring systems possible at fairly short notice. With these provocations in mind, we explore in this chapter the unique challenges encountered in the practical perpetration of wireless structural health monitoring systems, strategies for prostrating those challenges including tackle considerations and bedded data recycling infrastructures, integration of wireless detectors into larger cyber-environments, and the extension of wireless detectors into operations taking actuation similar as active seeing and feedback structural control.

2. LITERATURE REVIEW

The primary goal is to create a Patient Health Monitoring System that will allow doctors to diagnose patients' conditions. In the busy modern world, providing critical care and medical assistance to bedridden patients at critical stages with state-of-the-art medical facilities has become a major challenge. It is inevitable that hospitals with large patient populations whose physical conditions must be checked regularly as part of a diagnostic procedure will require an alert mechanism that is both economical and quick to react. When these systems are implemented correctly, doctors and medical staff can receive timely warnings and be notified when an emergency arises. The sensors used in modern systems are hardwired to a PC that is placed next to the bed. Sensors are used to determine the patient's condition, and a microcontroller is used to gather and transfer data. In order to evaluate the patient's current state, doctors and nurses must visit him or her frequently. Further, high-level applicability in hospitals where numerous patients need to be regularly monitored is provided by the use of multiple micro-processors based intelligent systems. We do this by giving each patient a unique ID that allows the doctor to quickly identify them and their current state of health parameters. This is done by utilizing the concept of network technology with wireless applicability.

3.PROPOSED SYSTEM: Through sensor fusion, the Raspberry Pi is used to monitor the following parameters: heart rate, temperature, oxygen level, blood pressure, and body mass index. IoT-Based Healthcare-Monitoring System towards Improving Quality of Life. Doctors can assess user's medical feedback with picture using sensor fusion data for abnormalities. The information aids in keeping track of the patient's health and monitoring illness as soon as possible.

4.HARDWARE REQUIREMENTS

4.1 POWER SUPPLY: The purpose of the power supplies is to convert high-voltage AC mains electricity into a low-voltage supply that is appropriate for use in electronic circuits and other devices. A power supply can be disassembled into a number of blocks, each of which carries out a specific task. A "regulated DC power supply" is a DC power source that keeps the output voltage constant regardless of fluctuations in the AC mains. The regulated 5-volt power supply, as illustrated below.

4.2 RASPBERRY PI 4B MODEL: The BCM2837 controller, which supports the ARM11 processor unit, is found on a Raspberry Pi 4 board. This Broadcom chip is utilized in the Raspberry Pi 4 and later Raspberry Pi 2 models. The BCM2837 and BCM2836 share the same underlying architecture. The ARM Cortex A53 (ARMv8) quad-core cluster has replaced the ARMv7 quad-core cluster, which is the only notable change. The device is approximately 50% faster than the Raspberry Pi 2 due to its ARM cores operating at 1.2GHz. At 400 MHz, the Video Core IV operates. With a faster processor on board to boost speed, the Raspberry Pi 4 Model B improves upon the features of its predecessors. To improve functionality and enable the USB ports to power more powerful devices, it also has Wi-Fi and Bluetooth Low Energy features.

4.3 ULTRASONIC SENSOR: Ultrasonic sensors, also called transceivers when they can send and receive, operate on a similar principle to sonar or radar, which measure a target's characteristics by deciphering the echoes of sound or radio waves, respectively. High frequency sound waves are produced by ultrasonic sensors, which then analyze the echo they receive back. In order to calculate the distance to an object, sensors measure the time elapsed between sending a signal and getting an echo. This technology can be used to measure air or water speed, tank fullness, and wind direction and speed.

4.4 MAX30100 SENSOR: The MAX30100 is a versatile sensor with numerous uses. It is a pulse oximeter and a heart rate monitoring sensor. In order to measure pulse oximetry and detect heart rate, the sensor consists of two Light Emitting Diodes, a photodetector, and several low noise signal processing components.

4.5 MLX90614 SENSOR: A specific object's temperature can be determined using the MLX90614 Contactless Infrared (IR) Digital Temperature Sensor, which has a temperature range of -70°C to 382.2°C. Without making physical contact, the sensor measures the object's temperature using infrared radiation, and it uses the I2C protocol to connect with the microcontroller.

4.6 PIE CAMERA: A lightweight, portable camera module that works with Raspberry Pi is called the Pi camera module. It uses the MIPI camera serial interface protocol to communicate with Pi. Typically, image processing, machine learning, and surveillance applications use it. Since the camera's payload is so small, it is frequently utilized in surveillance drones. In addition to these modules, Pi can make use of standard USB webcams that are connected to computers.

4.7 16*2 LCD: A 16×2 LCD is a type of liquid crystal display (LCD) that is used to display text on electronic devices. It consists of two rows of 16 characters that can be used to display text and numbers. The LCD is commonly used in a variety of electronic projects, such as clocks, calculators, and other devices. The LCD is composed of two thin sheets of glass with liquid crystals sandwiched between them. The liquid crystals are polarized in such a way that they can be manipulated by electric fields. When an electric field is applied, the liquid crystals will rotate and create an image on the LCD.

5. HARDWARE IMPLEMENTATION: The interfacing of Raspberry pi with Mlx90614 and MAX30100 sensors using the I2C communication model. When we power up the system then led in the raspberry will indicate that the processor is came into picture. LCD will display the initial statement as Life Guardian monitoring System. When a patient comes in contact with the sensors the Sensors start operating and reads the patient health parameters and try to display it in the serial monitor and LCD with the parameters like temperature, heart-beat, oxygen level and blood pressure. If any of the above-mentioned parameters exceed the prescribed value the buzzer indication will be notified and the readings of the person with image is forwarded to the care taker. This process goes on and the system continuously reads the data of the patient when there in contact with the device.

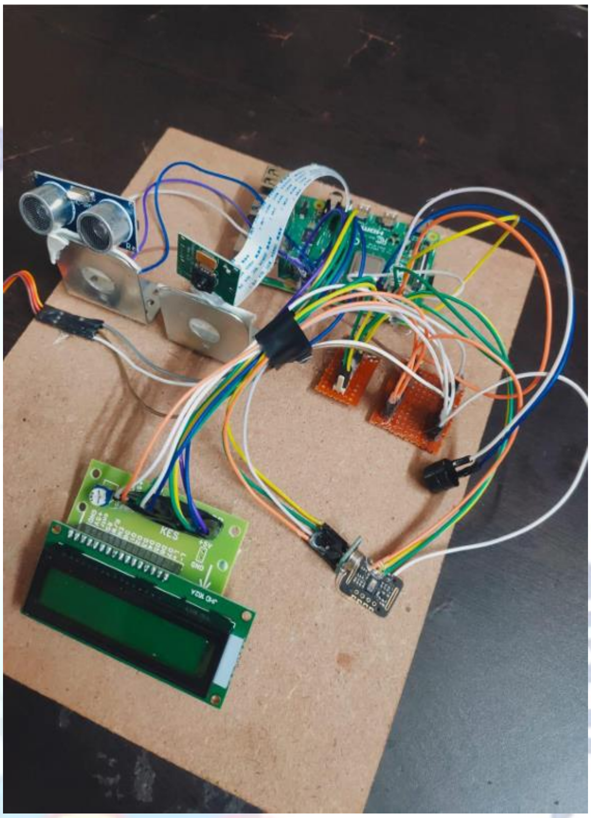

FIG 5.1 HARDWARE ASSEMBLE

Fig: 5.2 Output on Display

6. RESULTS:

There are two parts that was combined to make the system. The two parts that was combined were circuit for interfacing to Raspberry Pi and interface an App to raspberry pi. Circuit operation was in good condition with the right sequence of program that uploaded into microprocessor. The Internet of Things concept was studied, developed, and presented in the patient monitoring system. The patient provides personal physiological data that is used to simulate their blood pressure, heart rate, temperature, and oxygen level. A doctor or other healthcare provider can view the readings remotely thanks to a straightforward LCD display that collects them. Research on medical conditions impacting the elderly or those with chronic illnesses can also make use of the data. Advanced Encryption Standard (AES) is used to protect the database system's data security. This produces the secret key that can be used to decrypt patient records, guaranteeing that the information is only accessed by those who are authorized. In this way, the patient records are protected from hackers and unauthorized users who might try to access them.

7. CONCLUSION:

In conclusion it has been shown that defining the person health parameters is more efficient and reliable for poor and below middle-class people in the society. The successful implementation of these technologies in this project not only a more effective way to operate a health device, but it also shows how modern control systems may be includes into assistive equipment to improve user quality of life. Finally, the Life Guardian-Enhancing Health Awareness Through Sensor Fusion is a remarkable technological application for improving the life style of the people with financial issues. Users can simply notify about their health condition through Life Guardian with more accuracy and availability. In addition, this project has a scope to expanded in order to include security features and meet the user needs.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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