

A wearable alert system for respiratory rate and immune level monitoring for corona pandemic

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Abstract: A novel corona virus is a transmissible disease which prominently affects the humans. And this Corona virus has emerged as a major challenge in health care providing sector. Corona virus is also named as Covid-19 and which may leads to a mild symptoms to death condition also. It mainly affects the older people when compared to young people and the corona virus infected percentage in older people rate are in high. So in order to monitoring the covid-19 infected persons mainly in older persons this model is proposed as a “Wearable alert system for respiratory rate and Immune level monitoring for corona pandemic”. In this model, the Accelerometer sensor, Immune sensor, Pressure sensor is connected as input devices to microcontroller and the output is obtained in LCD display. With that buzzer for the need of sound alert and GSM module is as output devices for alerting purpose for the caretaker as well as the patients (corona virus affected person) when reaches the respective ranges. And the main aim of this paper is to monitor the corona infected quarantine patients.

Index terms: respiration rate, immune level monitoring, alert system, accelerometer sensor, immune level sensor, pressure sensor

INTRODUCTION:

Corona virus is a collection of related RNA viruses and it is an enormous virus among all other viruses. Corona virus mainly causes infection in humans by affecting the respiratory path and also causes the low immunity level in corona infected one mainly in older persons (above the age of 55). COVID-19 plays a vital role in deviate respiration. The respiration is the action of oxygen (O₂) inhaling and exhaling of Carbon-dioxide (CO₂). And also the interchange of gas by alveoli is collapsed in corona infected patient. The immunity especially innate (natural) immunity is plays a prominent to fight against covid19. And this corona virus spreads in humans by person to person contact and also spreads when coughing and sneezing occurs. The corona virus is also named as COVID-19 (Corona virus disease in the year of 2019) and novel corona virus. The corona infected people have infections it may ranges from mild to lethal state. Some symptoms of COVID-19 may include mainly fever, cough, shortness of breathing, fatigue, chest pain, diarrhoea, nausea, loss of smell and taste while eating food, runny nose, sore throat, sick, chills, hand and leg shaking. The high causes of corona virus leads to respiratory failure, liver and heart problem, death. The prevention of corona virus may include mainly social distancing, often washing hands by using soaps, wearing facemask in public [1].

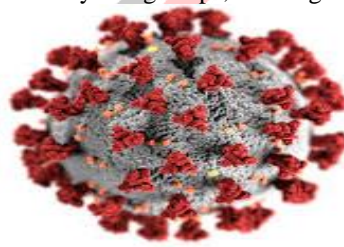


Fig 1.1

I. BACKGROUND:

In this paper that is Temperature sensor Based low cost respiration monitoring system and their main objective is to present a technique for the calculation of the respiration rate by monitoring continuously and the result is noted down while the changes occurs in the nasal region and this paper use the temperature sensor (AD950). Then it used the Instrument amplifier (INA122) which may develops for detecting purpose. And microcontroller At MEGA328 is as mixed signal oscilloscope and these are the instruments used to measure the output [2]. The drawback in this journal was here the respiration rate which is alone can be measured across the nasal region and which is in the wired form. And in next paper of “Respiration rate and volume measurement using wearable strain sensor” and their aim of this paper is to obtaining the normal and abnormal level of the respiration rate by respiration sensor. In this method, it find out the respiration signals is in the form of relaxed and strained condition by using the strain sensor, respiration sensor, triple axis accelerometer (ADXL326) on which of these components used to find out the values and this also used for monitoring chronic respiratory rate and can be implemented using the wearable accelerometer sensor[3]. And then in the journal of K. Gomathy, K.S. Gopal, R. Agilesh, K. Manoj Kumar, K. Gokula Krishnan of Detection of Immune organs which can used to found the immunity level by using the sensor like biosensor which has been used as pulse oximetry, Pressure sensor, respiration and load sensor and also the AT89552 microcontroller which is used with Bluetooth module to convey the messages. By the intake of food items and the caloric values of weights are stored in database processor. Also it does not have any particular disease and where the threshold value for immunity is in inaccurate form and it also undetermined the exact disease that infects the human of certain human level [4].

II. BLOCK DIAGRAM:

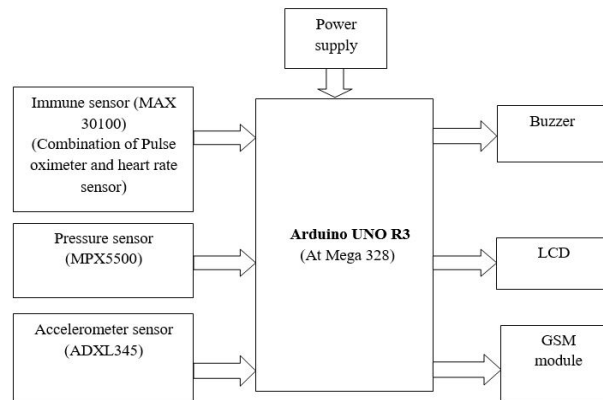


Fig 3.1 Block diagram

III. WORKING:

The working of this project is to demonstrate of how the alerting system concept is works to monitor mainly the respiratory rate and immune level for corona quarantine patients. In this model various sensors are used in non-invasive form. They are accelerometer sensor, immune sensor, pressure sensor, pulse oximeter, heart rate sensor. And this are connected as the input sensors which is used for this system. For obtaining respiratory rate the accelerometer sensor is used and which is placed in a hand wrist and accelerometer sensor pick-ups the signal from the human body. The immune sensor are used here is to indicate when immunity level reaches the threshold value. In addition to this pressure sensor is also used to obtain the Blood pressure (BP) value. Then these sensors are connected to microcontroller where operations are performed to alert patients by the output devices. The output is obtained in buzzer (indicates by producing sound) and the values obtained by various sensors are displayed in Liquid crystal display (LCD) and the alert message to caretaker is bypassed using the GSM (Global service for mobile communication) module.

IV. COMPONENTS:

1. Input sources: power supply, Accelerometer, Pressure and Immune sensor.
2. Output sources: Liquid crystal display, buzzer, GSM module.

1. ACCELEROMETER SENSOR:

Accelerometer sensor is an implemented device which is used to obtain the respiration rate. This sensor is widely used in many applications nowadays. It is able to wear on the hand wrist that may use to measure the angular changes during when the person is breathing. This sensor converts respiration rate in the form of analog to digital. The wireless form accelerometer represents a device which calculates the rotation axis and this sensor has able to obtain the breathing rate when the object is in motion. This sensor is made up of silicon piezoelectric transducer [3].



Fig 5.1

2. PRESSURE SENSOR:

Pressure sensor is used to obtain the value of blood pressure (BP) in a body. The pressure sensor is generally act as a transducer and with this sensor a pressure sensitive element is present, which converts the pressure into the electrical signal in analog form with it conducts a signal when the function of some pressure or force is inflicted. The normal blood pressure range is 120/80mm/Hg. The BP of a person which is above the value of 120mm/Hg then it is called as systolic blood pressure. The BP of a person is in below in the value of 80mm/Hg then it is called diastolic blood pressure [4].



Fig 5.2

3. IMMUNE SENSOR (MAX30100):

In obtaining the immunity level these sensors are used and it justify whether the immune level is low or high. In this the pulse oximetry sensor and Heart rate sensor is used to identify the solution. These sensors include two LED's, optimized optics, photo detector and it processing of low noise analog signal are performed to detect the considered operations. Both sensors are in the wearable form which is used to calculate the WBC (white blood cells) count in non -invasive procedure. The MAX30100 is operated in the voltage which is between the value of 1.8 to 3.3V of In pulse oximetry sensor the arterialized blood is taken by more Infrared (IR) light and it measures the pulsing blood by photo detector and with that it can done to calculate WBC count and the level

obtained is above the threshold values it gives an alert.



Fig 5.3

4. ARDUINO UNO:

Arduino UNO is an open source micro controller based on the microchip AT Mega 328P micro controller and it is developed by Arduino. The board is made with sets of digital and analog input and output pins. The board contains 14 digital pins and 6 analog pins with programmable as radio IDE (integrated development environment) with USB cable. The power supply is provided by the USB cable or an external 9V battery. It has the capacity of voltage between 7 to 20 volts. The microcontroller board is maintained by developing the embedded C software. It helps to give input or command to the microcontroller.



Fig 5.4

5. LCD:

LCD is a Liquid Crystal Display which able to display the values (the data) in digital form. In this paper LCD is preferred to get the value of sensors as the output for this system. The LCD display contains 8 data lines and it has 3 control lines and this control lines are used to perform the control operations. These LCD are used in many applications in our day to day life. In this paper 16*2 LCD is used and the operating range of voltage is 4.7 -5.3V and it includes rows as 2 which can able to produce 16 characters.



Fig 5.5

6. BUZZER:

A Buzzer is a device used for generating the audio signals. A Buzzer contains an outside case with the presence of two pins which is attached to the source (power) and to the ground. When the power supply flows it causes the ceramic disk in the Buzzer is contract or expand and varying this may causes the surrounding disk to vibrate and this may produce the sound which alerts the patients and doctors or caretaker when risk factor occurs in the body.



Fig 5.6

7. GSM:

GSM module is in the form of hardware and it took as a small chip or circuit. In which it can able to communicate between the

micro controllers or computing machine to the mobile device is performed. In this model, it prefers the SIM 900 GSM and the GSM is connected to the part of embedded system. And finally the GSM sends the alert message to respective persons when opposite values obtained.



Fig 5.7

V. CONCLUSION:

Thus we done a paper based on the Wearable alert system for respiratory rate and immune level monitoring for corona pandemic by using some sensors and this paper is proposed because it is more beneficial in this period and the alert system is mainly held for easy and real time application is in safer condition of covid19 infected persons. And this alert system alerts the infected person as well as the caretaker by GSM if any deviate cycle happens.

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