

IoT-based effective patient monitoring system

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Abstract

The patient monitoring system is a IOT based system designed to manage the patient health monitoring wearable device. This device enhance the different sensors to manage body temperature, stress level measurement and PPG sensor to identify irregular heart rate level is continuously monitoring in the application based app to transfer the data in the doctor or individual person. A mobile device based wireless health care system is developed which can provide online information about physiological conditions of the patient are mainly used in sensors. The sensors are fixed device and GSR app record skin conductance systematically determine the stress level of a person during a texting task. The stress level was based on the value of skin conductance of the person. Galvanic skin response is measure of skin conductivity, and is perhaps most well known as element of the polygraph test. A sensor covert the biological signal such us heat, heart rate and stress level, sound and motion into electrical signals. These signals is convert in analog into digital convertors used to convert electrical signal and passed through an interface that converts them into binary code and passed through the computer to be processed. The body is transmit only in biological signals and this biological signals can change in temperature increment, tension, body can weak and it is also reflect in body muscles, circulatory system. Stress level increment can contribute to many health problems such as high blood pressure, heart disease, obesity, diabetes and potentially raise your heart rate weaken your immune system. Also, it can be a factor in poor decision making because under stress we may not think logically or consider the consequence of the choices we make. This process in running in the Arduino IDE and processing embedded C programming. So this problem is detecting in average calculation in the skin conductance base record the app.

Keywords: GSR Sensor, PPG sensor, ADC, temperature sensor, IOT, ARDUINO IDE, Embedded C.

1. Introduction

Using wearable devices for health care monitoring is future health care industry. It is used in the one choice of the health care monitoring device. This device fixed in the hand and normal persons can also handle the device. The measurement and the values is

different variations in different problems and it is display on the app. Temperature range, heart rate, stress level is present in the app so individual persons also understand the values and differentiate the values so can easily identify the problems and go to the doctor consultation. These devices also connect in the transferred information in doctor and take care persons. The increased mobile technology smart devices and technology is connected to the each and every persons life. The technology is monitoring the persons in without permission and anything else is happened the camera to identify and help it. The technology improvement is interconnect between the hardware and software this device interconnect between sensors and embedded c programming and Arduino board etc. the program is process in the already fixed value in the heart rate, blood pressure and stress level. The app is shows in the color coding to display normal, low and high so it is easy to understand.

II. OBJECTIVE

The wearable device health based monitoring system is the outside of the body placed and collect the value. Measure and record vital signs according to industry standard. To determine change in client health status to help in diagnosis of disease, the result of treatment and medication. Vital signs are measure of various physiological statics in order to assess the most basic body functions. The act of taking vital signs normally entails recording body temperature, pulse rate (or heart rate), blood pressure and respiratory rate, but may also include measurements like pain, vital signs often vary by age. This device using sensors have uncomplicated and inexpensive optical measurement method that is often used for heart rate monitoring purposes. PPG is a non-invasive technology that uses a light source and a photo detector at the surface of skin to measure the volumetric variation of blood circulation.

III. LITERATURE REVIEW

The health monitoring basic level of monitoring sensors based monitored the values. The values are processed and transferred the information in IOT based application app. The GSR, PPG, temperature sensors used to calculate the value and human body transferred in analog biological signal transmitted in sensors, sensors convert in analog to digital convert used to convert in ARDUINO board, the board can be processed to data to display in IOT app. The patient health monitoring system MWCNT/PDMS composite breath sensor for human respiration monitoring using breath monitoring of patient can be a useful technique to access the health condition of patients with overgrowing respiratory problems like asthma, pneumonia and COVID 19 this technique could be an easy, simple and non-invasive real time technique of monitoring respiratory patterns. The IOT based hybrid emotion-aware monitoring system based data volumes transmitted in IOMT would become huge and most data can be very sensitive this requires deploying additional security mechanisms and privacy preserving techniques against cyber-attacks. A wearable IOT sensors system for continuous transversal alcohol monitoring wearable sensor prototype were fabricated and characterized in a laboratory environment and validated by human subject studies with

alcohol consumption in lab settings. A patient-centric agent based health care architect. the architecture consists of BSN ,Smartphone (sensor data provider) patient centric agent, block chain, and healthcare provider interface. There are multiple communication channels from end to end of this architecture such as BSN to Smartphone, Smartphone to PCA, PCA to block chain. The modularized design allows conveniently interchanging customized antennas for different application to validate the integration and modularization concepts, three different modular antennas dedicated to three typical applications have been modeled, fabricated and experimentally characterized.

IV. PROBLEM STATEMENT

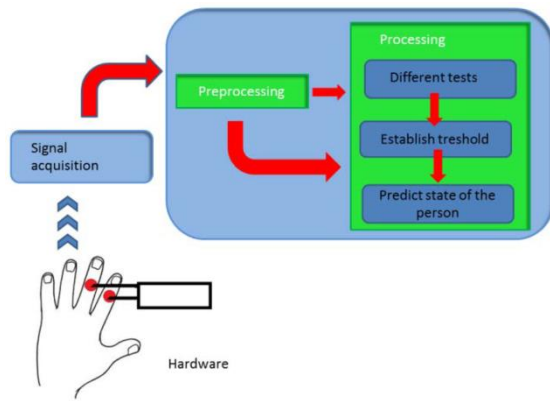
1. The sensors for this instrument are diurnal fluctuations in eccrine sweat-gland activity. Therefore, the time of assessment can influence results. Temperature and humidity can also influence skin conductance.
2. The sweating on hands and feet is triggered by emotional stimulation: whenever we are emotionally aroused, the GSR data shows distinctive patterns that are visible with bare eyes and that can be quantified statistically.
3. The issue faced by wearable sensors, chemical sensors, continuous exposure to biofluids may lead to biofouling, chemical changes on the transducer surface.
4. Poor quantitative discrimination. Reproducibility may vary from lot to lot. Pretreatment of sample may be required.

Due to above problems that faced by many human body outer body surface in skin. To avoid over heating places, suddenly increased emotional arousal and continuously monitoring patient health.

V. PROPOSED SYSTEM

In this method we always keep track on patient with the help of different types of sensors. Sensor based detection helps to know the people are in comfortable air places are not. If he/she are not placed in require air space, it will intimate to the respective one. Temperature sensor used in measure the body heat. Humidifier sensor used amount of water content present in air. Pulse sensor heart rate of person if anything goes abnormal. Sensor Buzzer will use for alarm all information update the IOT. Everything will monitor and send the information to respective via Mobile. The GSR sensor measures the varying levels of the skin conducting the electric current. Higher levels of perspiration on the skin lead to a greater conductance of electrical current.

A higher level of the skin after an event can therefore be interpreted as either positive or negative emotional arousal. PPG device contains a light source and photo detector. When a light travels through biological tissues it is absorbed by bones, skin pigments and both venous and arterial blood. Since light is more strongly absorbed by blood than the surrounding tissues, the changes in blood flow can be detected by PPG sensors as changes in the intensity of light.



VI. METHODOLOGY

The important process of this project can explained in three main sensors: PPG sensor, temperature sensor, GSR sensor and Arduino IDE to processed.

LPPG SENSOR:

A PPG sensor is also known as photoplethysmography. It is a simple optical technique used to detect volumetric changes in blood in peripheral circulation. It is measurement of the surface of the skin. This technique provides valuable information related to our cardiovascular system. PPG shows the blood flow changes as a waveform with the help of a bar or graph. The waveform has an alternative current (AC) component and a direct current (DC) component. The DC component shows minor changes with respiration. The basic frequency of the AC component varies with the heart rate and is superimposed on the DC baseline.

Using this sensor, wearable pulse rate monitors have been developed. These low cost and small devices have high-intensity green light emitting diodes (LED) and photo detectors that help reliable monitoring of the pulse rate in a noninvasive manner.

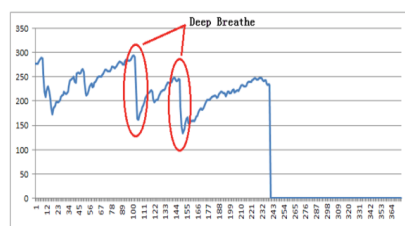
Important design requirements for these systems include miniaturization, robustness and user-friendliness. These devices have a sensor that monitors minor variations in the intensity of light transmitted through or reflected from the tissue. These intensity changes are associated with changes in blood flow through the tissue and provide vital cardiovascular information such as the pulse rate.



II.GSR SENSOR:

The skin tells everything – our skin gives away a lot of information on how we feel when we're exposed to emotionally loaded images, videos, events, or other kinds of stimuli – both positive and negative. No matter whether we are stressed, nervous, fearful, psyched up, stoked, baffled, or surprised – whenever we are emotionally aroused, the electrical conductivity of our skin subtly changes.

Galvanic Skin Response originates from the autonomic activation of sweat glands in the skin. The sweating on hands and feet is triggered by emotional stimulation: Whenever we are emotionally aroused, the GSR data shows distinctive patterns that are visible with bare eyes and that can be quantified statistically. So far, so good: Emotional experiences trigger **changes in autonomic arousal** quite impressively. Exposure to fear-inducing



stimuli (an angry face, the sight of a creepy spider etc.) induce emotional arousal, causing an increase in sweat secretion and, ultimately, measurable electrodermal activity. In emotional situations, **bodily processes are triggered automatically**: The heart beats faster, the pulse rises, hands become sweaty. To put it bluntly: While we are physiologically or psychologically aroused (in fear, extreme joy or under stress), we start to sweat.

In case you were thinking sweat running down in streams, let's give the all-clear here: Actually, we don't need to be sweat-flooded in order to see differences in electrodes activity. Besides emotional stimulus properties, recent findings indicate that skin conductance is also sensitive towards **other aspects of a stimulus**. Against this backdrop, changes in skin conductance might also reflect **motivational processing**.



III.TEMPERATURE SENSOR:

Infrared (IR) temperature sensors enable accurate non-contact temperature measurement in medical applications. The most common applications for this type of temperature sensor is measuring ear temperature forehead temperature, or skin

temperature. The sensing element is composed of multiple thermocouples on a silicon chip to measure an object's infrared energy. TE packages and customizes thermopiles in various package sizes and with different wire lengths to accommodate customer needs.



External temperature measurement has advanced in technology with addition of sensors technologies, increasing patient comfort, improving accuracy and creating better tools for monitoring. Its data can be crucial to patients suffering from various conditions from infections to hypothermia. The temperature measurement of the surface of the body can be accomplished using body or skin temperature sensors. TE connectivity (TE) manufactures NTC (negative thermal coefficient) thermistors, thermopiles and digital temperature sensors to support the wide range of accuracy; packaging and performance conditions amongst the different applications. NTC (negative thermal coefficient) thermistors are a common type of temperature sensor to measure surface temperature. The sensor is a two wire connection and uses the resistance properties of ceramic metal composite to measure temperature. For medical applications, packages are available with right angle connectors to simplify installation.

VII. CARDIOVASCULAR SYSTEM:

India has one of the highest burdens of cardiovascular disease worldwide. In this device used to avoid problems and easy to convey doctors proper solution given to the patient. The annual number of death from CVD in India projected rise from 2.26 million to 4.77 million. Coronary heart disease prevalence rates in India have been estimated over the past several decades and have ranged from 1.6% to 7.4% in rural populations and from 1% to 13.2% in urban populations. Your cardiovascular system, which is made up of your heart and blood vessels, is a crucial part of your body. When your cardiovascular system is working right, the cells in your body get a continuous supply of oxygen and nutrient from your blood. Blood vessels is also remove carbon dioxide and other waste. Abnormalities or injuries to any or all parts of the cardiovascular system can result in serious health complications. Common conditions that can affect the cardiovascular system include coronary artery disease, heart attack, high blood pressure and stroke. A muscular pump that forces blood around the body. Arteries that carry blood away from the heart, veins vessels that bring blood back to the heart, capillaries tiny vessels that branch off from arteries to deliver blood to all body tissues. There are two circulatory system in the body. The first is the systemic circulatory system. This is the main blood circulatory system that transports blood to the organs, tissues, and cells throughout the body. The second is the pulmonary circulatory system. This circulatory

systems moves blood between the heart and lungs. It is where oxygen enters the blood and carbon and carbon dioxide leaves the blood. An IOT based smart wearable devices monitoring also depth of the body blood pressure levels and PPG sensor to analyze the heart rate levels continuously monitoring. So avoiding the many problems and easy to identify and doctor prescription identify the solution the problem.

VII. CONCLUSION:

It concludes that the human health monitoring system based on the internet of the things can provide people with daily health management, instrumental in heightening health service quality and level. Along with an exponential growth in connected devices, each thing in IOT communicates packets of data that require reliable connectivity, storage and security. With IOT, an organization is challenged with managing, monitoring and securing immense volume of data and connections from dispersed devices. But this challenge doesn't have to be a roadblock in a cloud-based environment. Health monitoring is growing worldwide at a faster rate in domains such as medical and health care etc. The project is developed in the sensors and information transferred in IOT application app so the patient health information is continuously transferred in doctor. By using the system the health care professionals can easily monitor, diagnose, and advice their patient all the time. The health parameters data are stored and published online. Hence, the healthcare professionals can monitor their patient from a remote location at any time. The future work of this project is very essential to make the design system more advanced. In the designed system the enhancement would be connecting more sensors to internet which measures various other health parameters and would be beneficial for patient monitoring i.e. connecting all the object to internet for quick and easy access. Establishing Wi-Fi mesh type network to increase in the communication range. The health care industry is one of the most fastest-growing industries in the world, with the growing population the increase in the demand for health care is also improve simultaneously. Implementing the internet of things in health care will not only be profitable but also serve society globally. IOT will be integrated into nearly all sectors of healthcare. From prescribing medicines to offering the best services in ambulances, IOT will change the face of the health care sector. As technology has become an essential part of daily life, IOT too will upgrade the existing healthcare system and provide fast and better services.

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