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DEVELOPMENT OF A HEALTH MONITORING SYSTEM USING MOBILE PHONE

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ABSTRACT

A health observance system that tracks the state of health of a patient and compiles a written account health history of the patient uses a multi parametric monitor that sporadically and mechanically measures and records a plurality of physiological knowledge from sensors connected with the patient's body. Mainly impelled by increasing aid prices and propelled by recent technological advances in miniature biosensing devices, sensible textiles, electronics, and wireless communications, the continual advance of wearable sensor-based systems can doubtless rework the long run of aid by sanctioning proactive personal health management and present observance of a patient's health condition. These systems will comprise varied kinds of little physiological sensors, transmission modules and process capabilities, and might so facilitate inexpensive wearable unnoticeable solutions for continuous all-day and any-place health, mental and activity standing observance. The mobile phone analyses the information and determines whether the person desires aid or not. It helps to produce the steerage or provides recommendation like exercise a lot of, follow healthy diet etc.

Keywords: health monitoring, sensors, Wi-Fi module,
Microcontroller, mobile phone, android application.

I. INTRODUCTION

In Asian country death rates because of vas Diseases area unit analyzed to be 1.8 million. A lot of deaths in 2013 than in 1990 with increase of ninety seven. This specific increase in death rates is because of growth in population, modification in manner, adulteration of food, etc. As a complimentary approach and promising alternative to visual structural inspections, structural health monitoring (SHM) systems have been proposed to predict, identify, and locate the onset of structural damage (Sohn et al. 2001, Chang et al. 2003, Elgamal et al. 2003).

According to Dr. Gregory Philip Milton Roth "Cardiovascular malady stays a threat as population grows and folks aging". research worker found that population aging contributed to associate calculable fifty fifth in disorder deaths and increase contributed to a twenty fifth increase. These very important factors aren't solely thought-about the drivers behind the explanation of enlarged death rates and falling of death rates. Another vital issue disorder is dynamic patterns in mortality and population dynamics. Many different forms of vas causes of

death followed constant pattern, together with aneurysm, hypertensive heart diseases, and carditis, among others.

The cost of cardiovascular diseases, diabetes, cancer, chronic, metabolism diseases and psychological state conditions has been calculable $6.2 trillion for Asian nation. CVD (cardiovascular diseases) and psychological state conditions square measure the best economic threats followed by metabolism diseases and cancer.

WHO (World Health Organization) assistant director for health systems and innovation Marie-Paul Kieny and UN-Habitat administrator Joan Clos expressed within the report that in cities progress in health depends not solely on the strength of health system however additionally on shaping surroundings.

What if wireless and medical sensors were combined? During this paper, we've got used have totally different simply accessible device that monitors necessary signals of the users (patients). Implementation of those devices takes place with the assistance of existing technologies. Wireless technology is employed in several applications like military, agriculture, Medicare, good home systems etc. Wi-Fi technology is employed during this system for storage of result received by the user. The data received from the system is distributed to the Wi-Fi module that is any connected to Associate in nursing automaton application. The appliance connects to the specified Wi-Fi module by getting informatics address and also the Arcanum of the transportable used. Info is received by medical personnel or patients. Many patients will monitor from one system. The system designed is straightforward to use and capable of being transported or sent anyplace.

In this analysis work, we've developed a gaggle of sensors for measure vital sign, pulse rate, skin response and respiratory rate with real time watching system based mostly Wi-Fi network. Young Dong Lee et al measured motion throughout ambulant victimization pulse measuring instrument and tri-axial measuring system that was developed by him. Hyon Young et al developed wearable display victimization several sensors.

II.OVERALL SYSTEM DESIGN

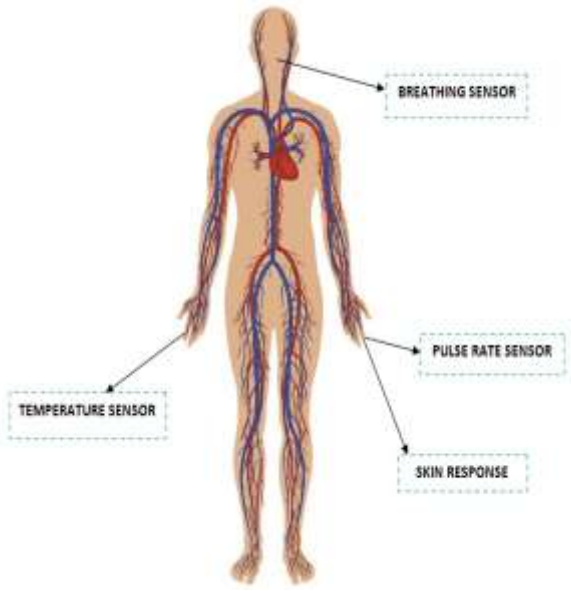

Figure 1 Body Measurement of different Parameters

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To decrease these price and anxiety of individuals with well-known CVD issues, we have a tendency to propose a "Health watching System" that monitors pulse, temperature, skin response and breath-in response and notifies the person just in case of abnormalities. The patients will live the various parameters by their own and obtain the results through the appliance via Wi-Fi affiliation. The system will show the measurements of eight – ten patients at identical time. to make sure responsibility and accuracy the projected system has been field tested. With the assistance of this technique, doctor will acquire the leads to their movable in order that directly the doctor will attend the patient for the more treatment if necessary.

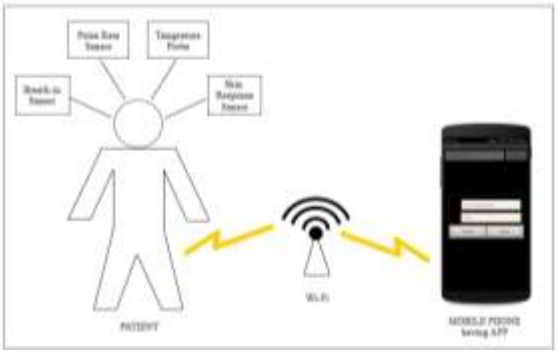

Figure 2 Basic block diagram of health monitoring system

This system is developed using AVR microcontroller along with ADC attached with sensors. XML and JAVA programming is used to make application to display and record the results via Wi-Fi connection.

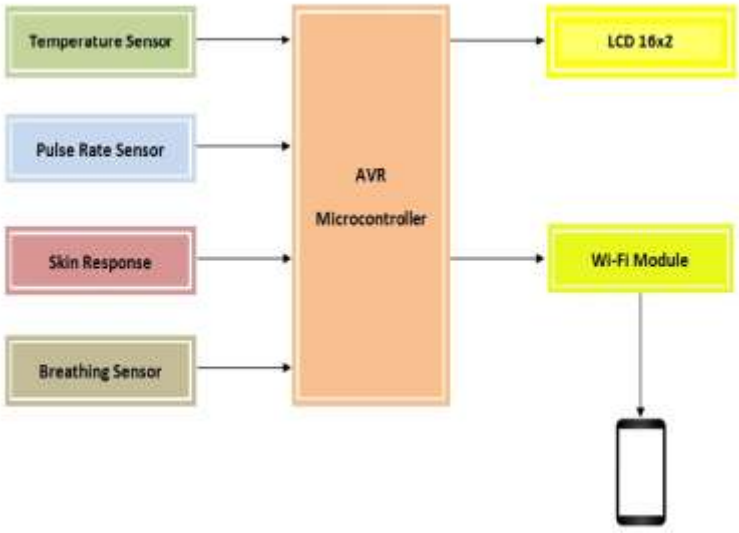

Figure 3 Block Diagram of health monitoring system

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III.SENSORS USED

1. Pulse Rate Sensor

Heart rate is important and essential parameter that is directly connected correctness of the human vas system. The project demonstrates a way to live the guts rate by police investigation the amendment within the blood volume in finger artery whereas the guts are pumping the blood. The mirrored signal is detected with the assistance of a photograph diode sensing element. This variation within the volume of blood can ends up in a train of pulses at the output of photodiode, the magnitude is just too little to be detected directly through a microcontroller. The guts rate is showed on a three digit seven phase display.

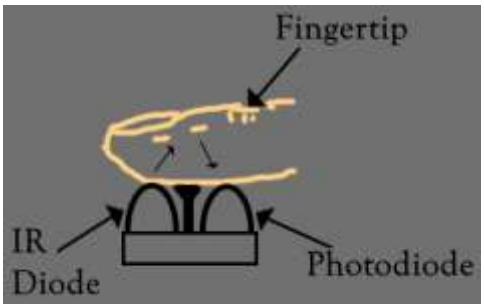

Figure 4 Fingertip placement over the sensor unit

The heart beat count is calculated because the range of heart beats per unit of your time. It's expressed in beats per minute (bpm). The vary heart beats vary from person to person in adults, the center beats concerning sixty to a hundred times a moment throughout resting amount. This resting pulse rate is expounded to the health and fitness of someone and therefore a vital truth to understand. The places wherever you'll simply discover pulses are gliding joint and neck. The time intervals for measurement the quantity of pulses are often let's say fifteen sec and confirm the speed in bpm.

The microcontroller primarily based system is associate degree optical detector to live the amendment in blood volume at tip with every heartbeat. It contains associate degree infrared light-emitting-diode (IR LED), photodiode, placed aspect by aspect. Infrared is emitted into the tip with the assistance of IR diode, additional the diode senses the mirrored light-weight. The intensity depends upon the blood volume within the tip. Thus it alters the quantity of mirrored infrared. With correct signal acquisition, the amplitude is born-again into a pulse.

2.Temperature Sensor (LM35)

Temperature sensors square measure used for mensuration the number of warmth or coldness that's created by associate object or system. It helps in detection or to sense associate natural process within the temperature generating an analogue or digital output.

Two basic physical types of temperature sensors are:

a) Contact temperature sensing element – these sensors area unit needed to be in physical contact with the system that's to be detected. These sensors use conductivity to watch modification in temperature. The foremost common factor it will notice area unit solids, liquids or gases.

b) Non-contact temperature sensing element – these sensors uses convection and radiation to look at modification within the temperature. Sensors square measure accustomed verify liquids Associate in nursing gases that emit energy because the temperature rises and cold relax at very cheap in convection current transfer from an object within the variety of infra-red radiation.

Why LM35?

This sensing element helps to calculate temperature additional accurately. The sensing element electronic equipment is sealed and not subjected to oxidisation. Output voltage provided is higher and should not need any amplification to be done. Its output voltage is to proportional to astronomer temperature. It doesn't need any external standardisation that helps to take care of an accuracy of +/- 0.4 degree at temperature. LM35 provides solely sixty small amps from its provide and maintains an occasional self- heating capability. The sensing element self – heating causes lower than zero.1 degree temperature rise in still air.

3.Skin response

The skin response detector determines concerning the strain or relaxation level a body will bear. It utilizes the skin's galvanic property for activity the strain level of a body. The desired circuit doesn't live the strain level properly, so it may be used as Associate in nursing indicator to see the strain level.

What is stress?

Stress can be stated as the way in which our body responds back to any kind of demand. Stress occurs by both good and bad experiences. If a person is in a state of stress their body releases chemicals in the blood. Stress is a state in which a person's body becomes excited to face an emergency situation. This causes different biological changes in one's body like change in heart rate, breathe rate etc. These are basically the symptoms of High stress level. The sudden change causes body to be alert and face the situation.

A permanent stress is injurious to the body and may occur in many health problems. Now days there are multiple relaxation techniques in practice which helps to keep the body in relaxed condition.

Galvanic Skin Response GSR

Galvanic skin response defines the amendment in electrical properties of the skin. These signals area unit used for representing the involuntary nerve responses as a parameter of the sudoriferous gland operate. The mensuration is easy and possesses sensible repeatability. The galvanic skin response is largely AN indicator of stress. The strain level of the body depends upon the electrical conduction of the skin that varies person to person. Skin offers high resistance of about 2 Meg ohms or more in the relaxed state, further it get reduced to 25K or less in a stressful state. As a result there is sweating and leakage of water from the blood vessels in the

skin during high stress state. With these physiological changes in the body the skin becomes moist and electrical conductivity of the skin increases drastically. This change is observed specially in the left palm and fingers.

IV.BREATHING SENSOR

Assessment of physiological parameters like heart rate, respiration rate etc. in field of medical science. Respiration rate indicates the state of heart and gaseous exchange between the bloods. Respiration rate meter are used for measuring the CO_2 in the expired and in apnea detectors. This meter plays a vital role in our day to day life by providing the status of a person mainly about the human respiratory system. The abnormal respiratory rate indicates different conditions like respiratory system as well as systematic abnormalities include cardiovascular abnormalities and acidosis. The daily basis routine check-up can be managed with this respiratory rate system to detect disease and deterioration in clinical conditions. These measurements are equally important in vulnerable patients, critically ill, infants, and elderly. The respiratory rate meter is an indicator in case of severe asthma.

The breath sensor works differently for the different categories a for instance in adult the breath range is about 12-17 beats per minute and if this range is exceeded the buzzer will beep.

I. WI-FI MODULE (ESP 8266)

It provides complete and self- contained Wi-Fi networking solution, granting it to either host the application or to offload the Wi-Fi networking functions from another application processor. When ESP8266 hosts the application, being the only application processor, it boots up an external flash. This device contains integrated cache for improving the system performance and reduces the memory requirements.

The device additionally works as a web access that is additional to any microcontroller based mostly style with property of UART interface. This device having property of on board process and storage capability to be integrated with sensors and devices through its GPIOs with token development up-front and token loading throughout runtime.

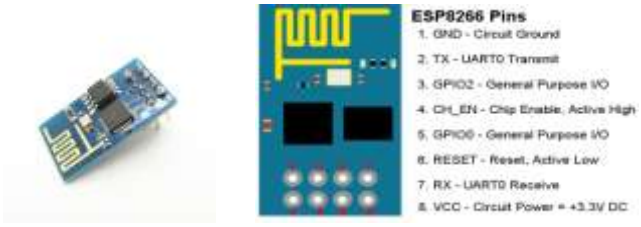

Figure 5 Wi-Fi module (ESP8266)

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V.LEVEL SHIFTER

Level Shifters are commonly used in complex circuits for increasing compatibility of the devices working at different voltages. It shifts the input voltage to desired voltage required by another device. Level shifter is needed for connecting the lower voltage circuit to 5V devices existing already.

Figure 6 Level Shifter

VI.ANDROID APPLICATION

Android could be a mobile OS (OS) presently developed by Google, supported UNIX kernel and designed primarily for bit screen mobile devices similar to good phones and tablets. The interfacing relies on direct manipulation, exploitation bit gestures that correspond to real- world actions, and similar to swiping, tapping, and pinching, to govern on-screen objects, in conjunction with a virtual input device for text input. Google has additionally introduced varieties like automaton TV for TV, automaton motor vehicle for cars, automaton wear bands for radio carpal joint every with a specialized interface. In 2015 automaton has largest put in base of all in operation systems. It's the second most ordinarily used mobile OS within the U.S. whereas iOS is that the initial.

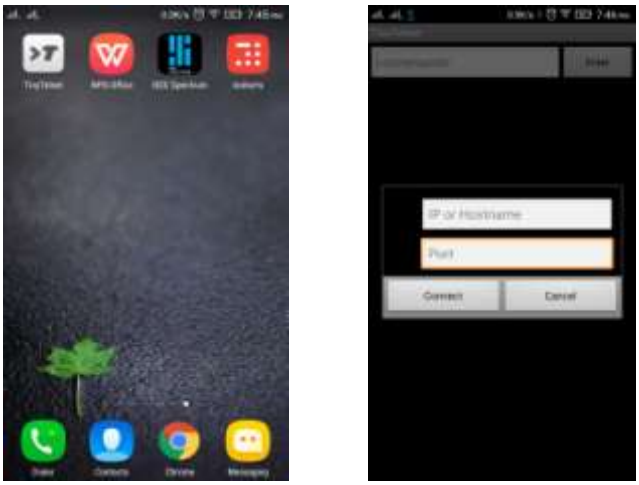

Figure 7 GUI of Application

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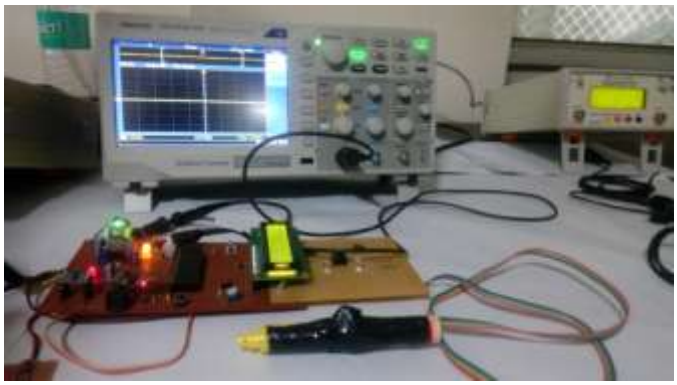
VII.DISCUSSION AND CONCLUSION



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In this section we have measured voltages of different sensors and modules by using Multimeter. The sensors being measured shows their appropriate reading which are required for the module to work properly. After analyzing modules and parameters it is predicted that the system is error free and the correctness of the system is to the mark.

Our project is an operating model which includes sensors like temperature, heart beat rate, breathing rate and skin response. It is thus an object of the current invention to produce a health watching system that is capable of properly decision making the condition of health of every person to be monitored even once many folks to be monitored exist. This can be terribly helpful for the longer term analysis and review of patient's health condition. For additional versatile medical applications, this project is temporary by, incorporating vital sign observance system, dental sensors and annunciation systems, thereby creating it helpful in hospitals as an awfully economical and dedicated patient care system.

VIII.FUTURE DEVELOPMENT

In addition to the system it conjointly provides over one variety in order that over one user will receive emergency message. In step with handiness of sensors or development in medical specialty trend additional parameter is sense and monitor which can drastically improve the potency of the wireless observance system in medical specialty field.

We can add more sensors for measuring multiple parameters these sensors are like pulse oximeter, blood pressure sensor, ECG sensor, shape sensor, force sensor, position sensor etc.

We can enhance this project by using different technologies such as Bluetooth technology, Zigbee technology, RF technology etc.

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