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Pre-Heart Attack Alarm System

A system which gives you alert about Heart attach few months before.

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ABSTRACT

Heart beat is a unit of computing or counting extremity of heart function, whose unit is beat per minute (bpm). Heart has pacemaker cells that creates electrical waves, these cells cause heart rhythm for right atrium with its spread throughout the heart, blood pumping occurs. The human heart naturally break about 60 to 100 bpm, which can vary from condition to condition. Any disorder in heartbeat will lead to heart attack. Which can be detect by human beings by measuring beats. I present a heart rate measuring system which will be first microcontroller system that continuously tracking the beats and wide awake human few months before heart attack. Infrared sensor (RX sensor) will send infrared lights to the body. This sensor has a pair of transmitter and receiver. Using Photodiode (RX sensor) we will detect reflective lights from the body and this signal is sent to the microcontroller which is embedded in the casual wearable(i.e. ring or bracelet etc.) to detect hearthbeat. Using this device will generate an alert to the person having increasing cholesterol after before reaching threshold specified for heart attack.

Keywords—heartbeat rate measurement, Infrared sensor, TX RX, heart attack.

I. INTRODUCTION

Prioritizing heart health is important because heart disease kills more adults across the globe than any other cause, even though 80 percent of heart disease and stroke is preventable. It not only affect your physical wellbeing, but your mental health as well. Not all heart attacks are the same. The task force that redefined the diagnosis of heart attack also identified six different types, as follows. Type 1, the most common situation: A heart attack occurring from a blood clot or other blockage in blood flow through an artery in the heart. The person usually has coronary artery disease. This is an oxygen supply problem, due to reduced blood flow. Type 2: A heart attack occurring when the heart needs more oxygen than it can get. This type of heart attack is an oxygen demand problem, resulting from higher need for blood flow. Type 3: A fatal heart attack that causes death before the diagnosis can be confirmed with blood tests. Type 4a: A heart attack that occurs during angioplasty, a procedure in which a blocked blood vessel is opened with a balloon on the end of a flexible tube inserted in the artery. Type 4b: A heart attack that occurs when a clot blocks blood flow through a stent—a small metal mesh tube that has been inserted in the artery during angioplasty to keep the artery open. Type 5: A heart attack that occurs during coronary artery bypass surgery. Therefore, heartbeat measurement is essential for heart health cognizance. Measuring heartbeat is measured in a variety of ways, such as an electric wrist, ECG devices[7] and finger placement on the forearm.[8] We present another method for measuring heart in this paper. The method of this device is to measure heartbeat with an optical sensor and with infrared light radiation via daily wearables and using a PIC microcontroller. This device displays the different heartbeat values in a maximum, medium, and minimum in a period of time. This device can be connected to a computer and store and analyze the obtained data. The block diagram of this device in **Figure2.**

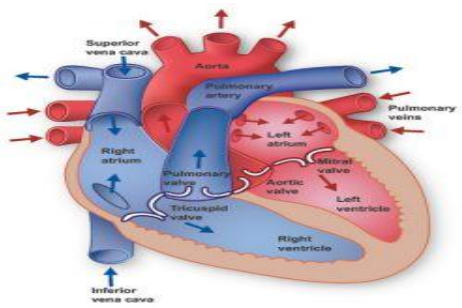


Figure 1: The heart's anatomy

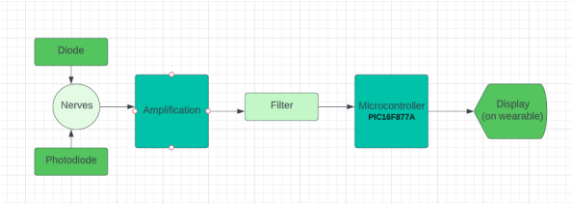


Figure 2: The block diagram of heart attack alarm system

II. METHODOLOGY

The heartbeat monitor is a smart wearable device that detects heartbeat from the body. This smart wearable devvce uses photo plethysmography (PPG) technology and also has two sensors.

COMPONENT DETAILS:

PIC16F877A PIC Microcontroller

A microcontroller is an integrated circuit (IC) device used for controlling other portions of an electronic system, usually via a microprocessor unit (MPU), memory, and some peripherals. These devices are optimized for embedded applications that require both processing functionality and agile, responsive interaction with digital, analog, or electromechanical components. PIC16F877A is used to measure output signal of heart beat pulse sensor and send the value to approximately 16 x 2 LCD for display.

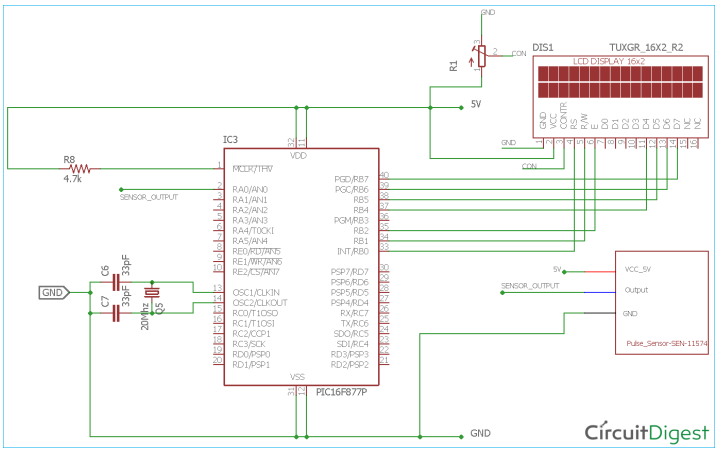
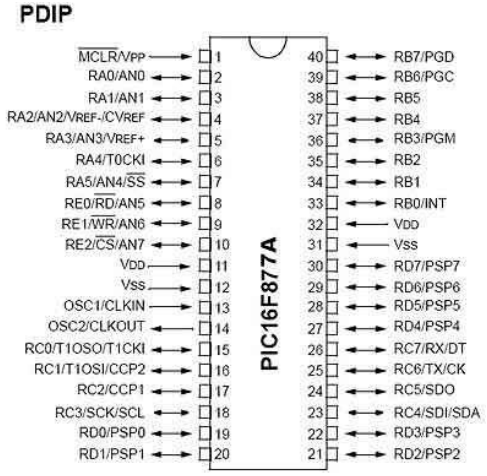


Figure 3A) Block diagram of PIC16F877A Microcontroller



3B) Configuration and description of PIC16F877A Microcontroller

Sensor

In this paper, we used two of the following diode (Figure 4).

1. Infrared light-emitting-diode (IR LED) TX.
2. Photodiode RX.

Amplification

The operational amplifier is a variety of linear devices and a differential amplifier and one of the important parts in electronic circuits. Operational Amplifier function is to amplify DC signals and provides high gain voltage.[16] This electronic piece with filtration and mathematical operators is used to amplify the signal. These amplifiers have pins for input, output and power supply. One of these inputs is inverted and the other is non-inverting.

The amplification section of the circuit used LM358 (see

Figure 5), a dual operational amplifier Integrated Circuit (IC) from Microchip which supplies a rail-to-rail output swing and operates at a single voltage source. The filtering section of the circuit consists of two active low pass filter of same specification. The heart rate signals detected by the IR sensor unit are small electrical signals that are susceptible to the ambient noise in the environment. Hence, the filtering process helps to eliminate any unwanted frequency in the heart rate signal. Also, the two stage amplification helps to strengthen the weak signal coming from the IR sensor unit. operates at a single voltage source. Also, the two stage amplification helps to strengthen the weak signal coming from the IR sensor unit.

The gain, A of each filter is given by [2]:

$$A = 1 + \frac{R_f}{R_i} \qquad (1)$$

Where;

R_i is the input resistor value

R_f is the feedback resistor value

While the cut-off frequency, f_c of each filter stage is [2]:

$$f_c = \frac{1}{2\pi R_f C_f} \qquad (2)$$

Where;

C_f is the feedback capacitor value.

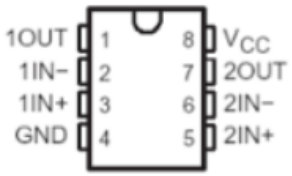


Figure 5 : Pin configuration of LM358

Signal Condition

The Signal Conditioning is to convert an output signal from the sensor into a suitable and usable quantity which will be ready for processing at a after stage. An operation such as filtering or amplify is a part of these stage.

Display Unit

He display unit can be a three to four digit unit and seven segment module with a common anode (CA) PIN configuration and employs multiplexing technique to display the measure heart rate

Pulse Oximeter

The Pulse Oximeter utilizes an electronic processor and a pair of small light-emitting diodes (LEDs) facing a photodiode through a translucent part of the patient's body, usually a fingertip or an earlobe. The pulse

oximeter uses a cold light source that shines a light through the fingertip, making the tip appear to be red. By analyzing the light from the light source that passes through the finger, the device is able to determine the percentage of oxygen in the red blood cell.

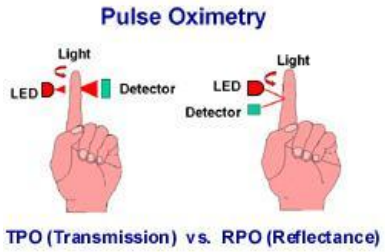


Figure 6: Working of Pulse Oximeter

III. RESULT & DISCUSSION

In this section I will present the articles that represents the increase in the cardiovascular disease and student death along with the examples.

The study, done by India Health Link (IHL) in collaboration with HEAL Foundation, said the incidence of cardiac arrest among the Indian population, especially among the youth, has increased significantly and it is due to sedentary lifestyle and working habits. The study also said that 53 per cent of Indians in the age group of 26-40 years are at high risk of CVDs due to double trouble of obesity and hypertension. The study saw participation of 1,461 (77 per cent men and 23 per cent women) respondents from four metro cities - Mumbai, Delhi, Bangalore and Chennai.

In 2019, any-mention sudden cardiac arrest mortality in the United States was 370,494. • According to 2020 US data, the majority of Out of Hospital Cardiac Arrests (OHCA) occur at a home or residence (73.9%). Public settings (15.1%) and nursing homes (10.9%) were the second and third most common locations of OHCA. Cardiovascular disease (CVD) is the leading cause of death in Asia. To combat the harmful impacts of CVD on public health in Asian countries with more effective strategies and actions, it is crucial to understand the current epidemiologic features of CVD in Asia. Through a systematic study and analysis of various timely data on CVD epidemiology in Asian countries from multiple sources, this state-of-the-art review provides an overview of the important epidemiologic features of CVD in Asia. Current and future challenges in CVD prevention implied by the epidemiologic features in Asian countries are highlighted and discussed in this review.

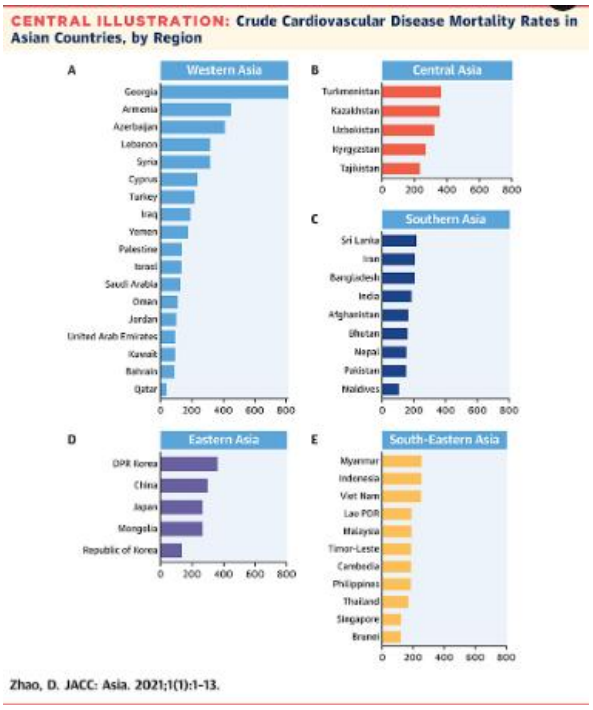


Figure 7: Comprehensive data for current state of CVD across Asian countries

CONCLUSION

The heartbeat rate is one of the vital parameter in every human's body, which by knowing it van be detect heart disease and prevent more serious problems. Therefore , I present a heart attack alarm system research based on the IR light in this paper which can be generate an alarm when your cholesterol reach to its benchmark which is enough for blocking the arteries, and increase the chances of heart attack. It is not enough to check the heartbeat only after the heart attack. But it is important to stop before it occurs and damage your heart(in most cases the death 15-20% according to AER Journal).The very good component of this device is low cost microcontroller which will provide ease to broadcast this device as more as possible. which is the overall function of the device. The advantages of this device is low cost, easy to use, high speed, high precision, accuracy, easy transportation, portability due to wearable.

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