IOT BASED CARDIO ALERT

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Abstract:

Heart attacks are a leading cause of mortality worldwide, often occurring with little warning. Timely detection and immediate medical intervention can significantly increase the chances of survival.

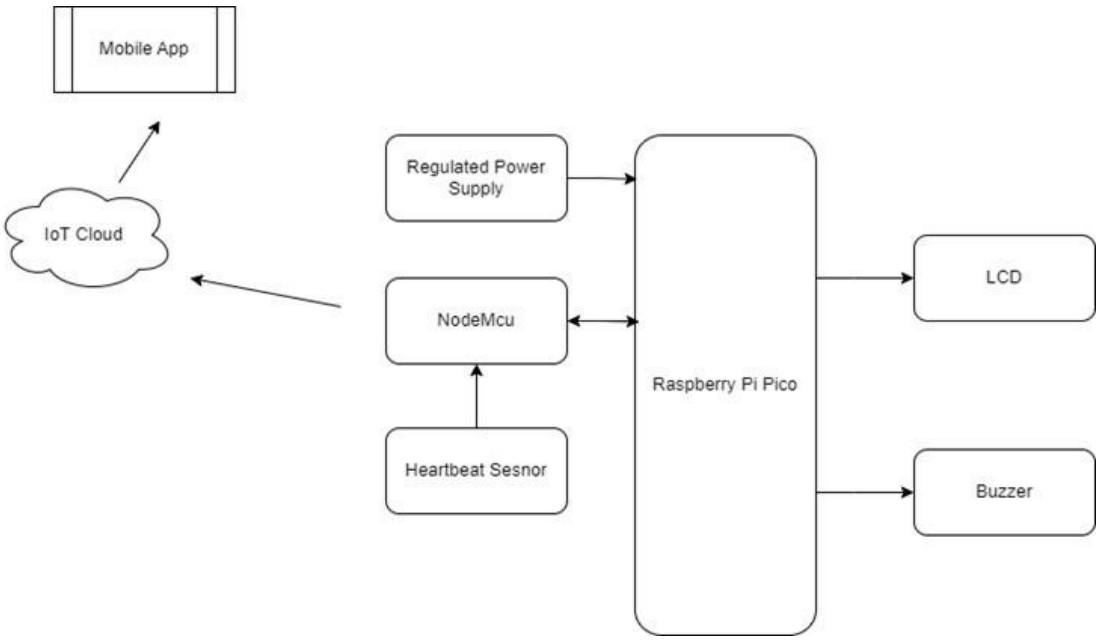
This project presents an innovative IoT-based Heart Attack Detection and Alert System that employs the MAX30102 pulse oximeter sensor, Raspberry Pi Pico, LCD display, buzzer, Firebase, and a mobile application.

The system continuously monitors a person's heart rate and oxygen saturation levels and alerts both the user and designated contacts in real-time when irregularities suggestive of a heart attack are detected

Introduction:

This project describes about to build heart rate monitoring and heart attack detection system using onboard Wi-Fi module. Remote monitoring is seen as an effective method of providing immediate care as it allows for continuous as well as emergency transmission of patient information to the doctor or healthcare providers. Remote patient monitoring will not only redefine hospital care but also work, home, and recreational activities. These new technologies enable us to monitor patients on a regular basis, replacing the need to frequently visit the local doctor for a recurring illness. Recent report says chronic diseases are the leading cause of deaths in India. People who have suffered from chronic diseases are monitored their vital signs continuously. Vital signs include the measurement of temperature, pulse rate, blood pressure and blood oxygen saturation. It provides information about a patient's state of health. They can identify the existence of any medical problem, illness and person's body physiological stress. In hospitals both in ICU ward and general ward nurses take care of chronic disease patients. In the system we designed an integrated patient monitoring device with low cost and this way of technology is mainly used to continuously monitor the patient health condition, for effectively and accurately measuring the patient physiological parameter such as temperature, pulse rate and spo2 of the patient. IOT related heart rate monitoring system is based on IOT as a network of devices that connect directly with each other to capture and share vital data.

Block Diagram



Problem Statement

- Heart attacks are a significant global health concern, often occurring suddenly and without prior warning. Timely detection and immediate medical intervention are critical for increasing the chances of survival and minimizing the damage caused by a heart attack. However, many individuals may not be aware of their heart health status or may not have access to continuous monitoring and immediate alert systems. This presents several challenges:
- **Lack of Continuous Monitoring**
- **Delayed Response**
- **Limited Access to Healthcare Services**

Hardware Tools

- Rasberry Pi Pico
- NodeMcu
- Heart Rate Sensor
- LCD
- Buzzer
- Regulated Power Supply
- PCB
- Connecting wires

Software Tools

- Thonny IDE
- Micro Python programming language
- Google firebase IoT cloud
- Android App

ADVANTAGES

- **Early Detection of Heart Attacks:** Continuous monitoring of heart rate and SpO2 levels allows for the early detection of irregularities associated with potential heart attacks, enabling timely intervention and potentially saving lives.
- **Comprehensive Heart Health Monitoring:** The system provides a holistic view of heart health by monitoring both heart rate and oxygen saturation levels, offering valuable insights into cardiovascular well-being.
- **Immediate Alerts:** Audible alerts and real-time notifications sent to emergency contacts ensure that assistance can be provided promptly in case of critical health events.
- **Remote Monitoring:** Family members, caregivers, and healthcare providers can remotely monitor the user's health status, enhancing their ability to provide support and assistance.

Key Features

- **Continuous Heart Rate Monitoring:**
  The system continuously monitors the user's heart rate using the MAX30102 pulse oximeter sensor, providing real-time data.
- **Oxygen Saturation (SpO2) Monitoring:**
  In addition to heart rate, the system measures oxygen saturation levels (SpO2) non-invasively, offering a comprehensive assessment of heart health.
- **Raspberry Pi Pico Controller:**
  The Raspberry Pi Pico processes sensor data, performs real-time analysis, and manages system functions.
- **Real-Time Data Display:**
  An LCD display provides real-time feedback to the user, showing heart rate, SpO2 levels, and system status.
- **Immediate Alerts:**
  The system includes a buzzer that triggers immediate audible alerts in response to irregular heart rate or SpO2 levels indicative of a potential heart attack.

CODE:

```
 import machine
 from machine import Pin, UART
 import utime
 import ustruct
 import sys
buz = Pin(8, Pin.OUT)
import time
wifi = UART(1, baudrate=9600)
  kk=0
 rs = machine.Pin(10,machine.Pin.OUT)
 e = machine.Pin(11,machine.Pin.OUT)
 d4 = machine.Pin(12,machine.Pin.OUT)
 d5 = machine.Pin(9,machine.Pin.OUT)
 d6 = machine.Pin(14,machine.Pin.OUT)
 d7 = machine.Pin(15,machine.Pin.OUT)


 hb=0
 sp=0
 tm=0


 def pulseE():
     e.value(1)
     utime.sleep_us(40)
```

```
    e.value(0)
    utime.sleep_us(40)
def send2LCD4(BinNum):
    d4.value((BinNum & 0b00000001) >>0)
    d5.value((BinNum & 0b00000010) >>1)
    d6.value((BinNum & 0b00000100) >>2)
    d7.value((BinNum & 0b00001000) >>3)
    pulseE()
def send2LCD8(BinNum):
    d4.value((BinNum & 0b00010000) >>4)
    d5.value((BinNum & 0b00100000) >>5)
    d6.value((BinNum & 0b01000000) >>6)
    d7.value((BinNum & 0b10000000) >>7)
    pulseE()
    d4.value((BinNum & 0b00000001) >>0)
    d5.value((BinNum & 0b00000010) >>1)
    d6.value((BinNum & 0b00000100) >>2)
    d7.value((BinNum & 0b00001000) >>3)
    pulseE()
def  setUpLCD():
    rs.value(0)
```

```
    send2LCD4(0b0011) #8 bit
    send2LCD4(0b0011) #8 bit
    send2LCD4(0b0011) #8 bit
    send2LCD4(0b0010) #4 bit send2LCD8(0b00101000)
    #4 bit,2 lines?,5*8 bots
    send2LCD8(0b00001100) #lcd on, blink off, cursor off.
    send2LCD8(0b00000110) #increment cursor, no display shift
    send2LCD8(0b00000001) #clear screen
    utime.sleep_ms(2) #clear screen needs a long delay


def LCD_Clear():
    rs.value(0)
    send2LCD8(0b00000001) #clear screen
    utime.sleep_ms(2 ) #clear screen needs a long delay


setUpLCD()
buz.value(0)
rs.value(1)
for x in 'WELCOME':
    send2LCD8(ord(x))


tmcnt=0
```

```
while True: if(wifi.any()):
        buff = str(wifi.readline().decode())
        print(buff)
        parts = buff.split(',')
        if(len(parts)>2):
            if(parts[0]=='NA'):
                parts[0]=0
            if(parts[1]=='NA'):
                parts[1]=0
            if(parts[2]=='NA'):
                parts[2]=0
            try:
                hb=int(parts[0])
                sp=int(parts[1])
                tm=float(parts[2])
                setUpLCD()
                buz.value(0) rs.value(1)
                for x in 'H:'+str(hb) + '  S:'+str(sp):
                    send2LCD8(ord(x))
                rs.value(0)
```

```
            time.sleep(0.01)
            send2LCD8(0b11000000)
            time.sleep(0.01)
            rs.value(1)
            time.sleep(0.01)
            for x in 'T:'+str(tm):
                send2LCD8(ord(x))

            if(hb>100 or (sp>10 and sp<70) or tm>102):
                buz.value(1)
                time.sleep(1)
                buz.value(0)

wifi.write('232019,0Z4IAXY5N272DDXD,0,0,Saichandra,chandra@in
ternet,'+str(hb)+","+str(sp)+","+str(tm)+",\n")
            time.sleep(2)
        except:
            utime.sleep(0.01)

  time.sleep(1)
```

Conclusion:

The IoT-Based Heart Attack Detection and Alert System not only has the potential to save lives by detecting heart attacks early but also promotes proactive heart health management and encourages individuals to take control of their well-being. Its adaptability and wide-ranging applications make it a significant contribution to the field of healthcare and remote monitoring, promising better health outcomes and improved quality of life for user

THANK YOU