

GUIDE : THUSHARA PS
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**LENUUS:Innovative solution for
health care**

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ABSTRACT

The Low Powered Mobile Health Kiosk is designed to address the critical lack of healthcare access in underserved communities. This compact and sustainable unit enables basic health check-ups, ensuring timely diagnosis and care. The kiosk operates reliably in remote areas with access to limited electricity, bridging the gap in rural healthcare infrastructure. Combining technology with telemedicine, this innovative solution promotes equitable access to healthcare while fostering sustainability and improved health outcomes. The project focuses on developing a low-powered mobile health kiosk designed to provide accessible and efficient healthcare services in resource constrained environments.

LENUS- Overview

- ACCURATE
- RELIABILITY
- STABLE AND CONSISTENT
- Healthcare
- Accessibility
- Monitoring
- Prevention
- Support



MOTIVATION BEHIND THE WORK



Four tribal children and a woman have died of malnutrition in the Attappady hills during the past month, and two children are undergoing treatment for the condition in hospitals, a report by the Integrated Tribal Development Project (ITDP) officer says.

"Malnutrition and low blood count are found to be the reasons for the deaths. A large number of tribal children are born underweight and are affected by malnutrition," says the report sent to the State government on Friday by the officer, P.V. Radhakrishnan.

He said Minister for Welfare of Scheduled Tribes P.K. Jayalakshmi had sought a report on the recent deaths of tribal children in Attappady.

THE PROBLEM

Millions in remote region lack access to quality healthcare due to geographic isolation, insufficient medical facilities. The absence of regular health check-ups exacerbates preventable diseases and increases mortality rates in these areas

**127.52/
1000**
**The annual
hospitalization
rate for tribal
community as a
whole in India**

**282/
1000**
**The annual
morbidity rate
for tribal
community as a
whole in Kerala**

60%
**of deaths in low
income regions
due to delayed
diagnosis**

Health alert: 20.7% of Bengaluru children overweight or obese, says study

The cut off waist-to-height ratio of 0.5 is universally used for children and adults, and helps to convey the message of 'keep your waistline to half your height'.

Rebecca Kuriyan, assistant professor, St. John's Research Institute



13.3% are at the risk of developing lifestyle diseases in adulthood

CETHYA ANAND

BENGALURU: Hours spent cooped up in classrooms and in front of electronic gadgets was bound to have an effect: A cross-sectional screening of nearly one lakh children across Bengaluru schools has shown that 20.7% were either overweight or obese, and 13.3% at risk of developing lifestyle diseases in adulthood.

The screening, conducted by healthcare startup, AddressHealth, between January and December 2016,

is based on the results of a 2015 study conducted by researchers from St. John's Research Institute (SJRI).

According to the SJRI study led by Rebecca Kuriyan, associate professor in clinical nutrition and lifestyle management, SJRI, which sampled 1,913 schoolchildren in Bengaluru, high obesity indicators were associated with an increased risk of high blood pressure.

"More than obesity, the levels of overweight children had increased in the last few years in both re-

search and clinical practice," said Dr. Kuriyan, who has been studying childhood obesity for several years.

"A waist-to-height ratio greater than 0.5 puts them at risk of hypertension and other lifestyle diseases in adulthood. Measuring this ratio is an inexpensive initial screening tool that everyone can use," Dr. Kuriyan said. She added that armed with this information, parents could make positive lifestyle changes like increasing physical activity

and inculcating healthy eating habits.

The AddressHealth survey included a equal number of children from private schools ranging from affordable (where fees are less than ₹15,000 a year) to expensive schools (where fees was more than ₹45,000 a year).

"The aim is to bring preventive healthcare to parents, so that they understand the need to instil healthy habits in children," said Anand Lakshman, founder of AddressHealth.

A similar trend across the country

STAFF REPORTER

BENGALURU: Obesity and overweight levels have increased sharply in India in the last 15 years.

A WHO-supported study collated data from 52 different studies across the country to show that combined prevalence of childhood overweight and

obesity recorded between 2013 and 2015 was 19.3%, a significant increase from the earlier prevalence of 16.3% reported in 2001-2005. The study was published in the Indian Journal of Medical Research in February 2016 titled 'Epidemiology of childhood overweight & obesity in India: A systematic review'.

One of the researchers behind the study, Krish-

nan Anand, professor at All India Institute of Medical Sciences, New Delhi, said childhood stunting owing to poor nutrition in early childhood was also contributed to the high levels of obesity among Indian adults.

"Since Body Mass Index is inversely proportional to square of height and early nutrition plays a major role in determining height, a person who was stunted owing

to poor economic conditions is likely to have increased BMI when their economic situation improves later on," Dr. Anand said.

Neglected issue

Terming obesity as a neglected health issue in the country, he blamed the reduced importance given to physical activity in schools and homes for the current crisis.

NEED FOR ATTENTION

96,391 Number of children examined (4-17 age group)

20.7% Children overweight or obese

12.5% Overweight **8.2%** Obese

13.3% Children whose waist/height ratio puts them at risk of cardiac ailments/diabetes in adulthood

29.9% Children with dental caries

13.6% Children with vision problems

THE PROBLEM

Kerala hospitals face acute shortage of nurses

May 16, 2017



Kannur: An acute shortage of the nursing staff in Kerala government hospitals has impacted prompt and effective healthcare services. Over 2,000 nursing posts are lying vacant as a result of delay in recruitments and promotions.

OBJECTIVE

The objective is to address the critical lack of healthcare access in underserved communities. This compact and sustainable unit enables basic health check-ups, ensuring timely diagnosis and care.

The Problem

Millions in remote region lack access to quality healthcare due to geographic isolation, insufficient medical facilities. The absence of regular health check-ups exacerbates preventable diseases and increases mortality rates in these areas

PROPOSED SOLUTION

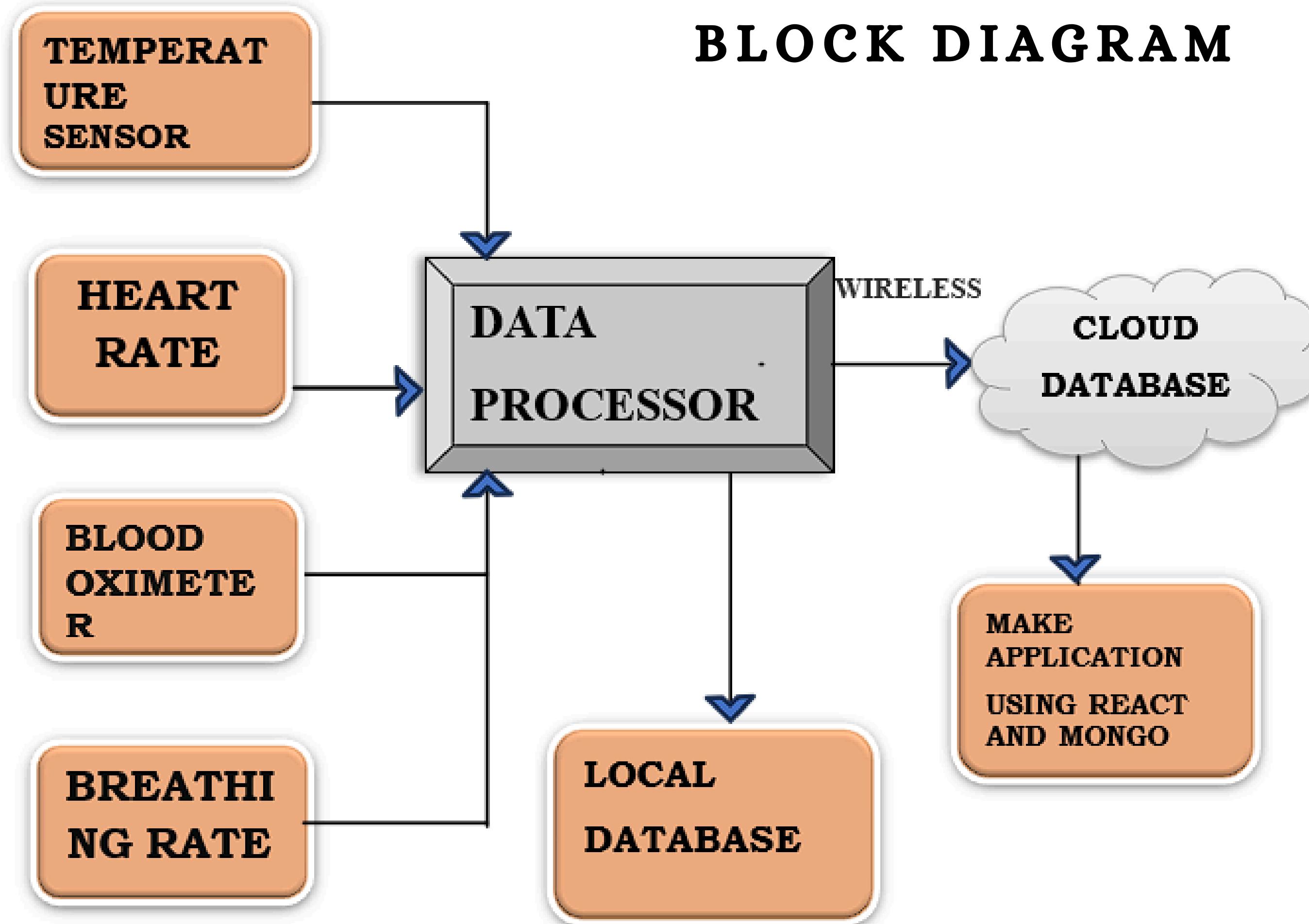
Brief Explanation of the Approach

Lenus is a health kiosk equipped with

- Basic health monitoring tools (temperature, pulse oximeters, breathing rates , heart rate)
- Health record management system
- Warning system for early detection
- Simple User Interface

- How This Project Addresses the Problem?
- Enables basic health check-ups
- Operates reliably in remote areas with access to limited electricity
- It integrates health monitoring tools and unified data collection
- affordable and sustainable healthcare solution

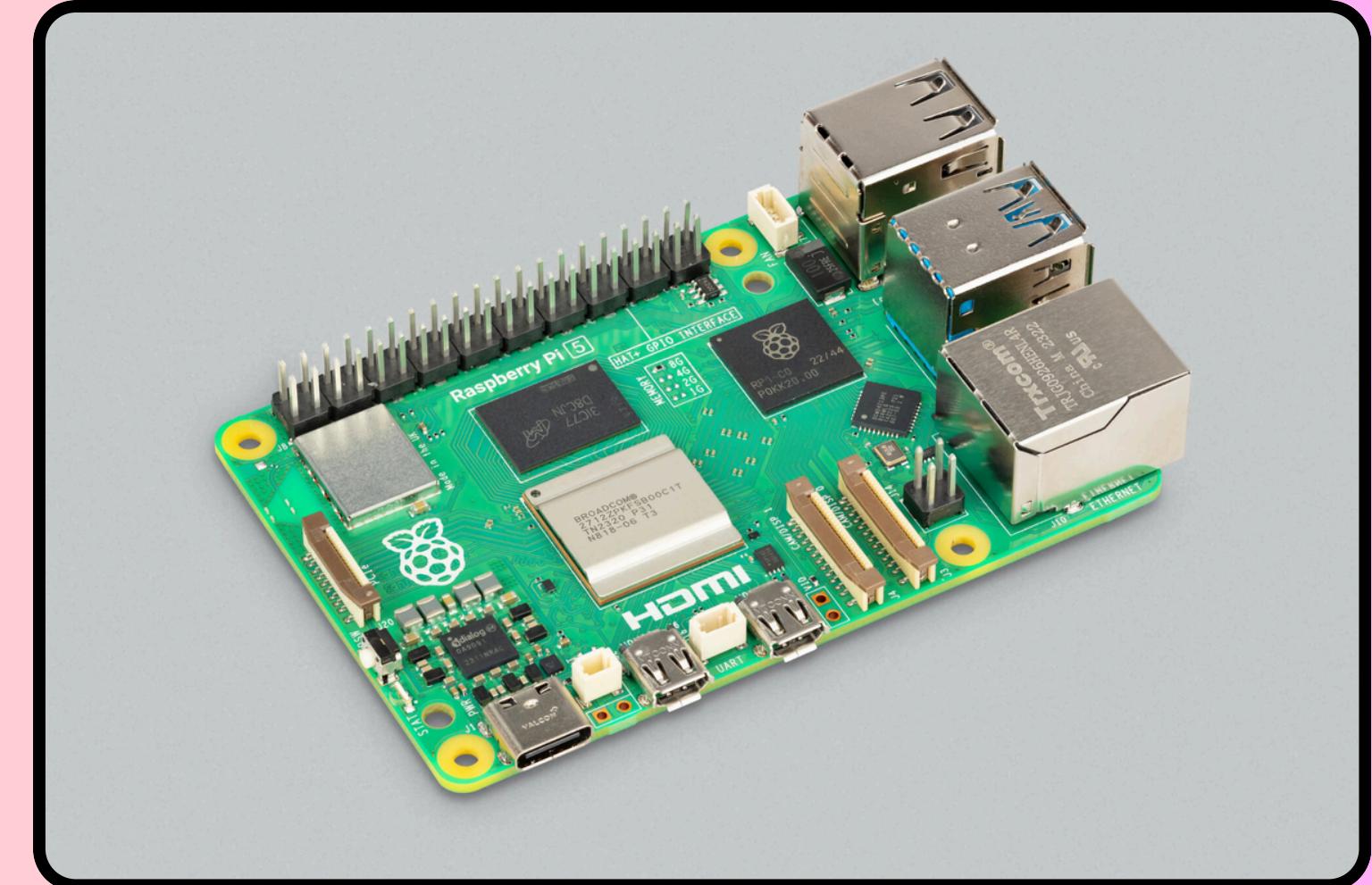
BLOCK DIAGRAM



Components used:

1.Raspberry pi-4

- Processor: Quad-core ARM Cortex-A72 @ 1.8 GHz
- 8GB LPDDR4X RAM.
- Graphics: VideoCore VII GPU
- Dual 4K HDMI at 60Hz.
- Connectivity:
 - Gigabit Ethernet for fast networking.
 - Dual-band Wi-Fi (2.4 GHz and 5 GHz)
- 4 USB ports.



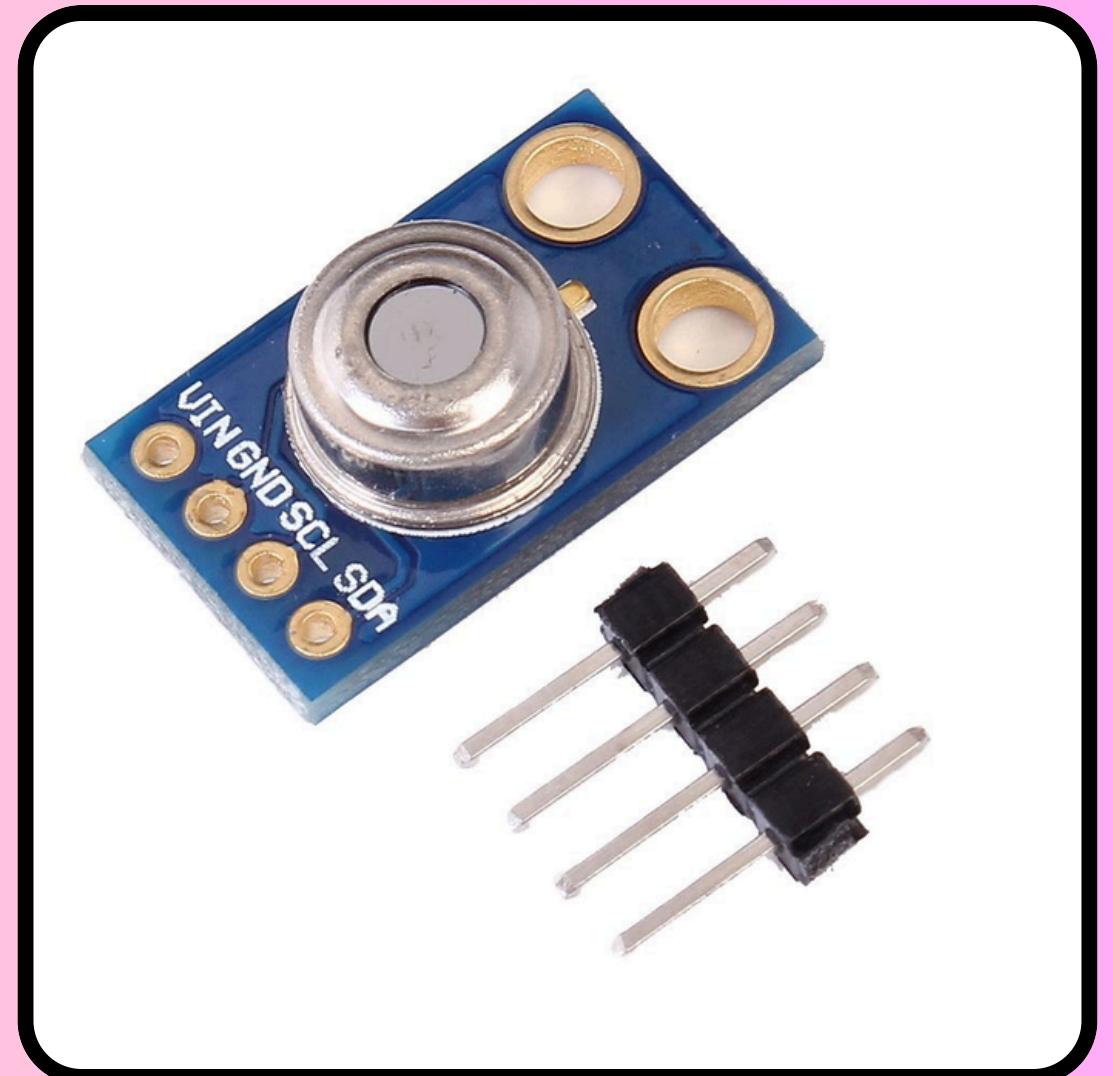
Technical Details

- CPU: Broadcom BCM2711, Quad-core ARM Cortex-A72 @ 1.5 GHz
- Architecture: 64-bit
- Options: 8GB LPDDR4X-3200 SDRAM
- Ethernet: 1 Gbps
- Wi-Fi: Dual-band 802.11ac (2.4 GHz & 5 GHz)
- Power Input: USB-C, 5V/5A

2.Temperature Sensor : MLX90614

MLX90614 Infrared Temperature Sensor
Features

- Type: Non-contact infrared (IR) temperature sensor.
- Measurement Range:
 - Object Temperature: -70°C to 380°C.
- Accuracy: $\pm 0.5^\circ\text{C}$ for precise measurements.
- Resolution: High resolution with a 16-bit ADC and digital signal processing.
- Interfaces: Supports both I₂C and PWM for easy integration.

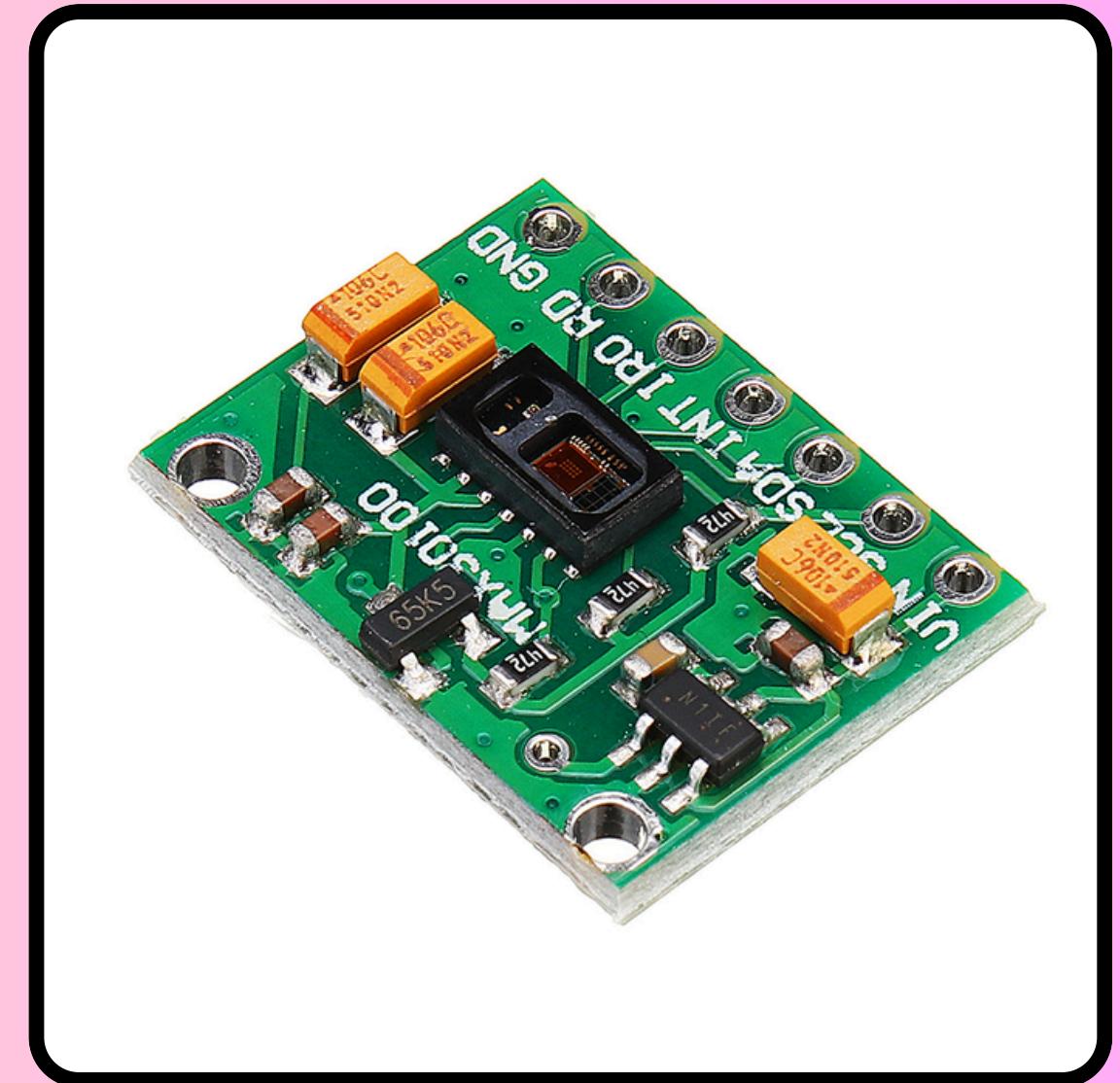


Technical details

- Object Temperature Range: -70°C to 380°C
- Accuracy: $\pm 0.5^\circ\text{C}$ (for 0°C to 50°C range)
- Resolution: 0.002
- Operating Voltage: 3V – 5V DC
- Current Consumption: 1.5 mA (typical), 0.1 μA (sleep mode)
- Built-in 16-bit ADC & DSP for high accuracy
- Factory-calibrated for both ambient and object temperature

3. Heart Rate Sensor : MAX30102

- Technology: Uses photoplethysmography
- Components:
 - Red and infrared LED
 - Photodetector
- Interface: Communicates via I₂C, ensuring easy integration with microcontrollers.



Technical details

- **Technology:** Photoplethysmography (PPG) using red and infrared (IR) LEDs
- **Principle:** Measures light absorption changes in blood to calculate pulse rate and oxygen level
- **Heart Rate Range:** 30 – 240 BPM (beats per minute)
- **SpO₂ Measurement Range:** 70% – 100%
- **Operating Voltage:** 1.8V (core), 3V - 5V

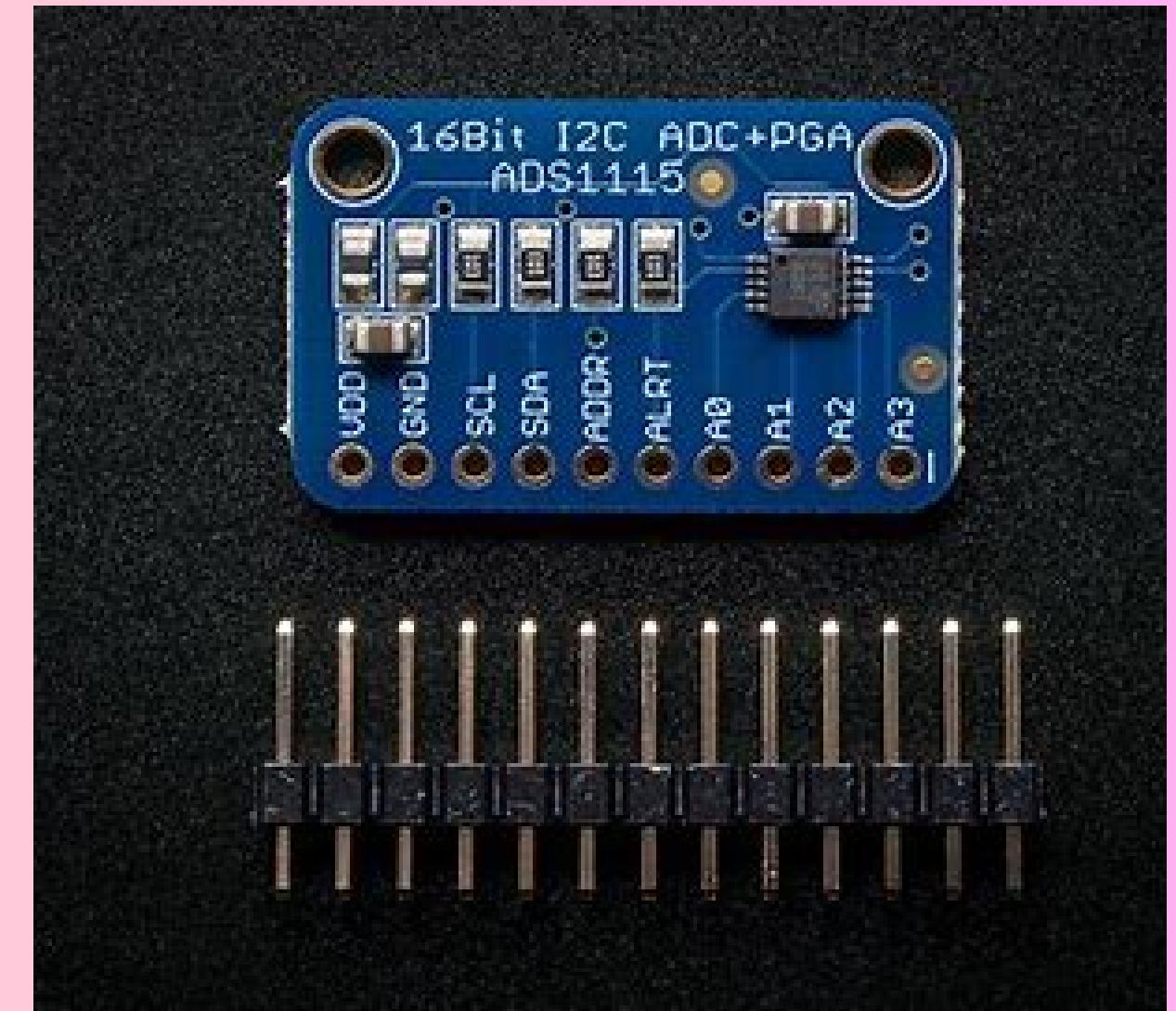
4.Flex sensor

- Sensor Type: Bend/Resistance Sensor
- Length: 2.2"
- Operating Voltage: 3-5V
- Resistance Change Due to Bending

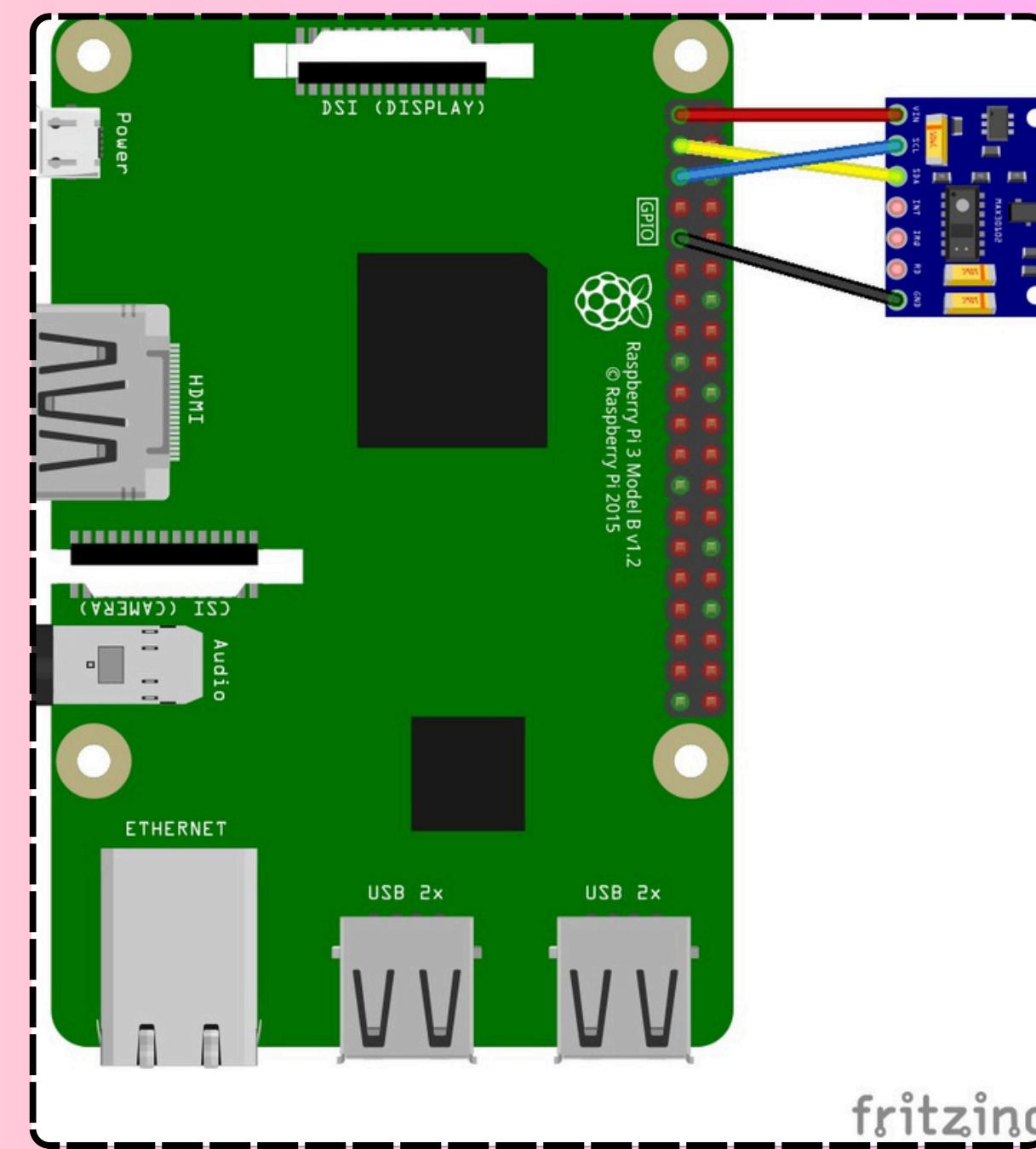
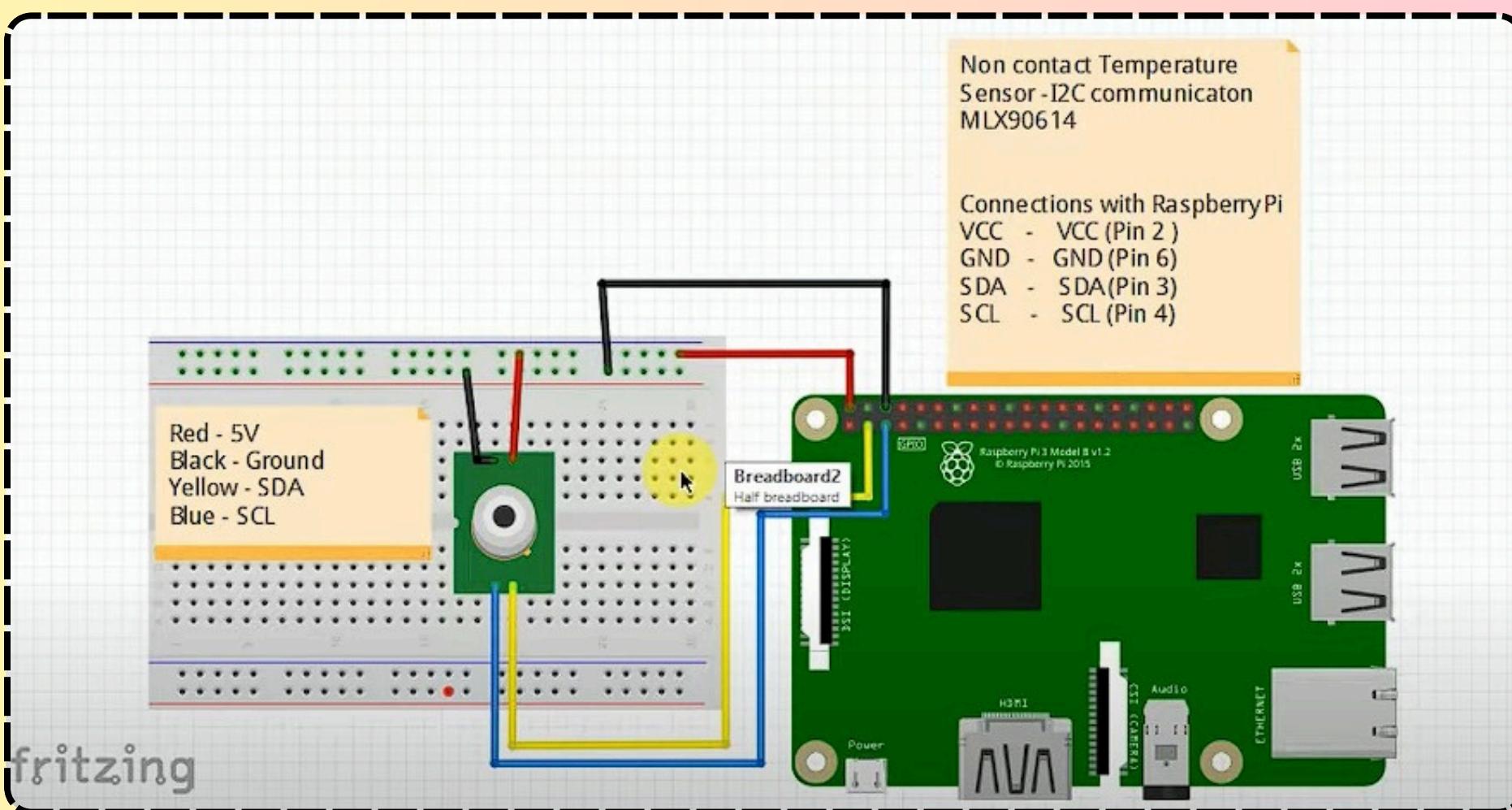


5. ADS1115

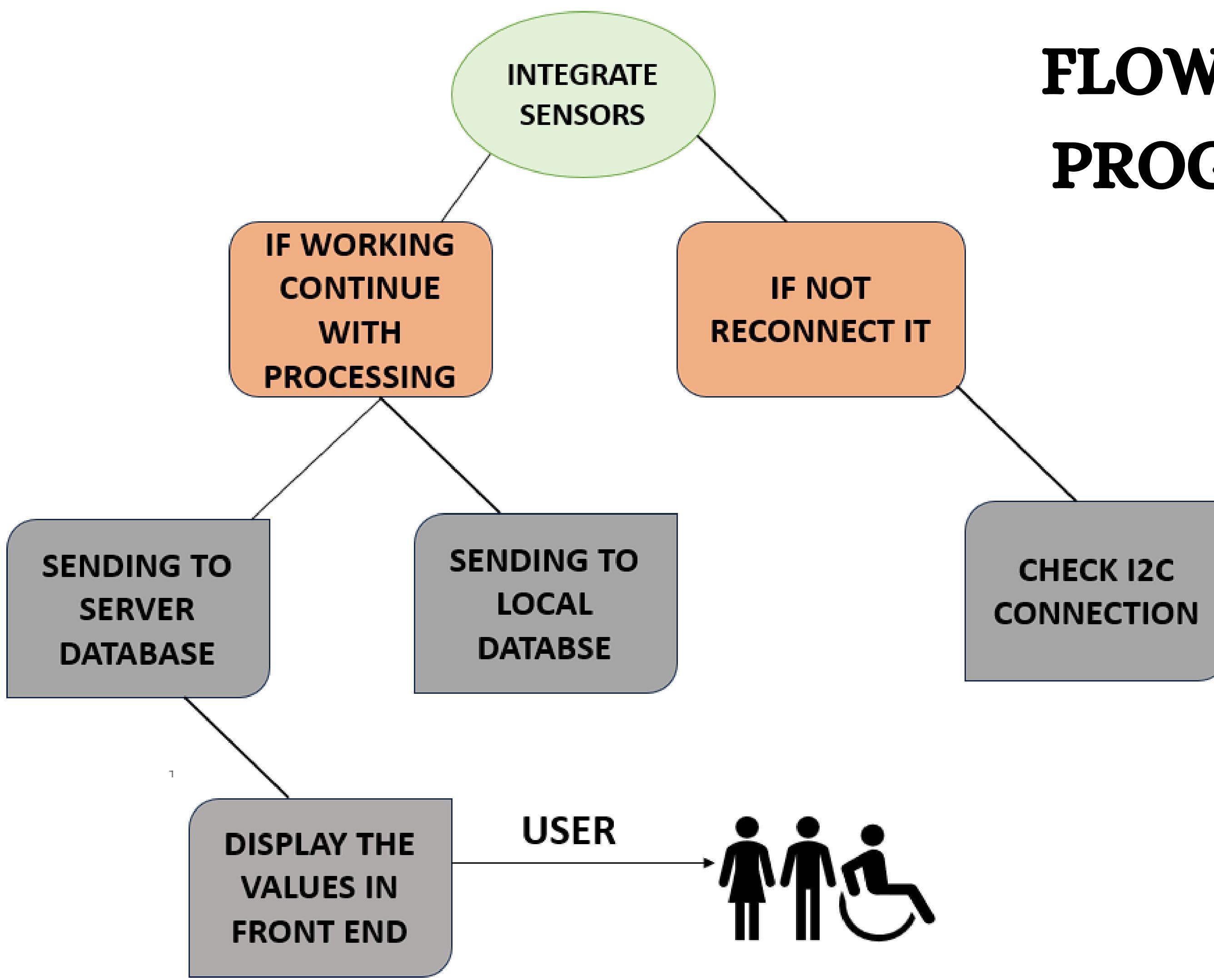
- Resolution: 16 - bit
- Interface: I2C
- Number of Input Channel: 4
- Operating Voltage: 0-5.5V



Physical Connections



FLOW CHART OF PROGRAM USED



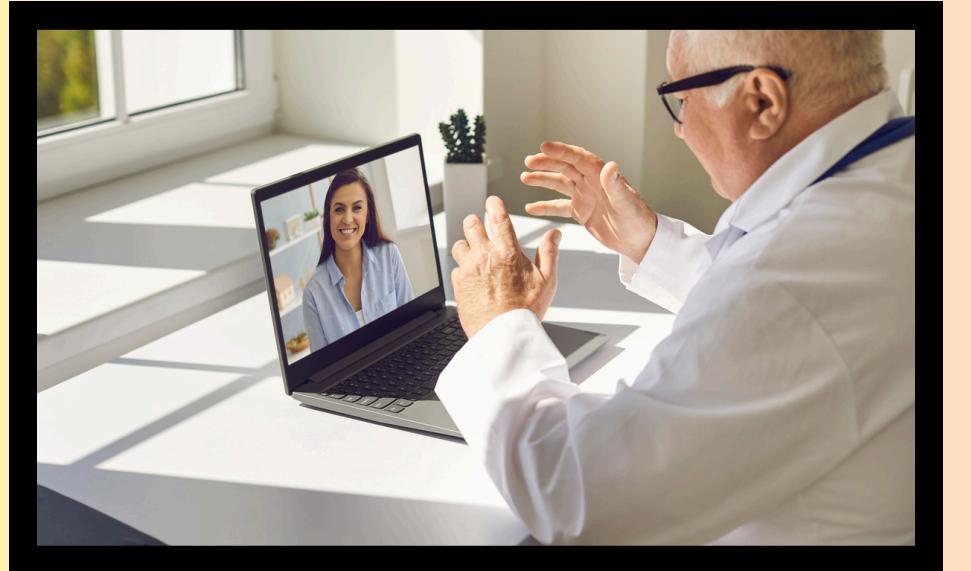
Real life application:

1. Remote Health Monitoring in Tribal & Rural Areas
2. Telemedicine & Virtual Consultations
3. Pandemic & Quarantine Management:
4. Maternal & Child Health Monitoring:
5. Preventive Care & Health Awareness:
6. Government & NGO Health Initiatives:

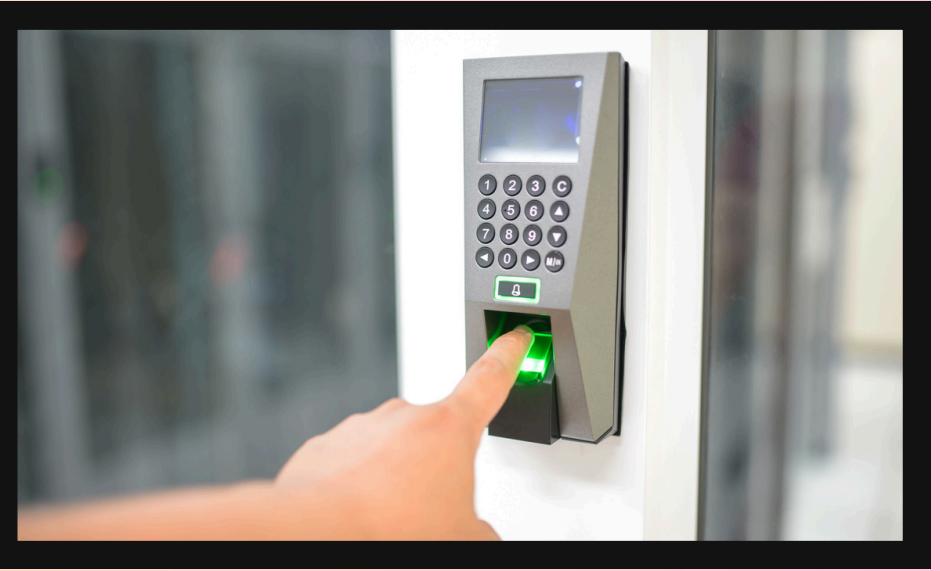
Advantages

- Real-Time Monitoring
- Improved Accuracy and Decision Making
- Remote Monitoring
- Cost Efficiency
- Data Security and Backup

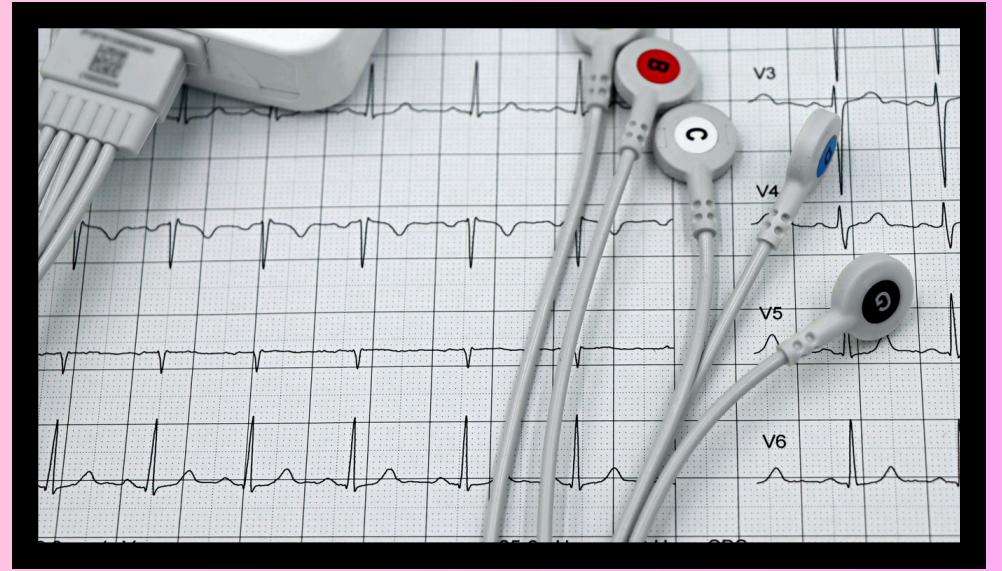
SCOPE



Telemedicine



**Biometric
authentication**



More sensors like ECG..

CONCLUSIONS

This project aims to enhance healthcare delivery through a mobile kiosk that enables early disease detection, facilitates data collection in a unified database, and provides valuable support in quarantine settings, ultimately improving patient care and public health outcomes.

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THANK YOU!