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# SIHMON

— Smart Infant Health Monitor —

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# Agenda

Introduction

Hardware Components

Software Development

Integration

Testing

Conclusion



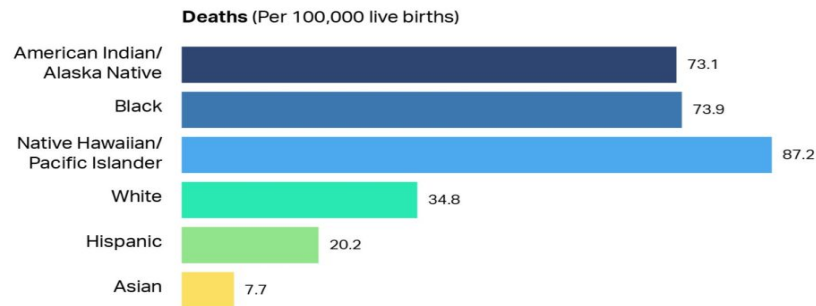
# INTRODUCTION

# Problem Domain

- SIDS causes 2500 infant deaths per year (US).
- Gastrointestinal issues: leading cause of deaths of kids 5 and under (US).
- Respiratory infections: cause 5/1000 live births (US).
- 1 million deaths due to parents being unaware of prematurely born babies health (WHO).

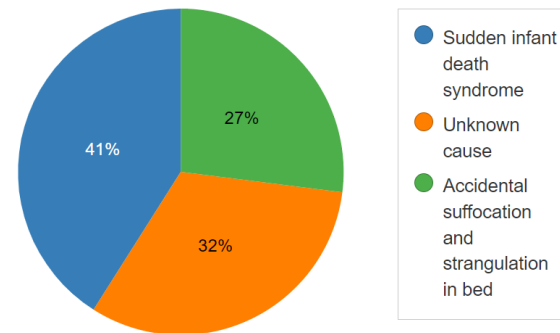
## SIDS Deaths, 2015 to 2019

Sudden infant death syndrome (SIDS) has had a disproportionate impact on babies of color in the United States.



Source: Centers for Disease Control and Prevention

## Breakdown of Sudden Unexpected Infant Deaths by Cause, 2020



# Solution

## SMART INFANT HEALTH MONITOR

- Advanced Health Monitoring
- Real-Time Alerts
- Data-Driven Insights: based on data.
- Empowering Caregivers.



Firestore

# Hardware Components: Sensors

## ADXL345

- High - Resolution 3-Axis Accelerometer
- Compact and Low Power
- Sensitive Motion Detection
- Versatile Application



## MAX30102

- Pulse Oximetry and Heart-Rate Monitoring
- Integrated LED and Photodetector System
- Non-Invasive SpO2 and Heart Rate Tracking
- Suitable for Infant Health Applications



## LM393

- Sound Detection Capability
- Microphone and Comparator Integration
- Digital Output for Sound Levels

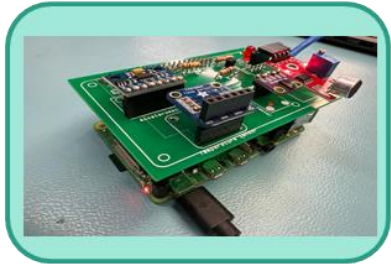
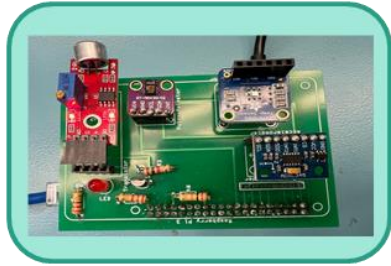
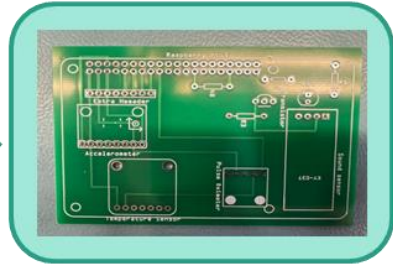
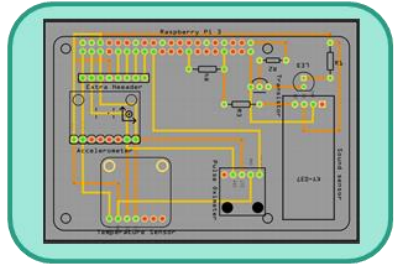


## TMP006

- Non-Contact Infrared
- Thermopile Sensor
- Infrared Energy Detection from Skin
- Continuous Monitoring Capability



# Assembly



- Created PCB layout and circuit schematic using Fritzing.
- Addressed design challenges and utilized Fritzing tools for layout and connections.

- Translated digital design to a physical board through manufacturing or fabrication.
- Noted any differences or unexpected observations from the original Fritzing design.

- Used soldering techniques to connect components like LEDs, PNP transistors, resistors, and all four sensors onto the PCB board.
- Ensure precision and accuracy in soldering each component onto the designated spots on the board.

- Established connections between the completed PCB board, which includes soldered components such as sensors, LEDs, transistors, etc., and the Raspberry Pi.
- Ensured proper alignment and secure connections between the PCB board and the Raspberry Pi's GPIO pins or other interfacing methods.

# Firestore

InfantHealthMonitor-humber ▾

## Cloud Firestore



Real time readings from all the sensors

User information and authentication

Feedback from the app

Profile data for the user

InfantHealthMonitor-humber ▾ Cloud Firestore		
🏠 > Sensors > KbCzg0OKexlcu		
(default)	Sensors	KbCzg0OKexlcuGla4Am7
+ Start collection	+ Add document	+ Start collection
Feedback	KbCzg0OKexlcu >	+ Add field
Movement_re...		Temperature: 36.5
Profile		Movement: 2
Sensors >		Oxygen: 98
Sound_recor...		Pulse: 110
Temperature...		Sound: 50
oxygen_reco...		timestamp: November 2, 2023 at 3:09:07 AM UTC-4
pulse_recor...		
users		

InfantHealthMonitor-humber ▾ Cloud Firestore		
🏠 > users > mgNwE9HS02Q		
(default)	users	mgNwE9HS02QapqvJUyL4hikczpv2
+ Start collection	+ Add document	+ Start collection
Feedback	4ELK3K5Xeed...	+ Add field
Movement_re...	65xz8IcMWZa...	Full Name: 'Eshan Salwan'
Profile	92uHhN7ckMR...	Phone Number: '421-534-5543'
Sensors	LAAB80p2UFZ...	
Sound_recor...	chMBEUyjeKe...	
Temperature...	mgNwE9HS02Q...	
oxygen_reco...		
pulse_recor...		
users >		

Feedback > dwSIW40BAjrkA		
(default)	Feedback	dwSIW40BAjrkAC63ugMy
+ Start collection	+ Add document	+ Start collection
Feedback >	10pKdVcpbDx...	+ Add field
Movement_re...	1ZvUvzbI1t1...	comment: 'I am checking if it goes to data base'
Profile	TjAIFQFMKaZ...	
Sensors	X2Aj8Q9Gw0X...	email: 'zoyebatesting@feedback.com'
Sound_recor...	dwSIW40BAjrk...	name: 'Zoyeba'
Temperature...	pBU4yHc6CPN...	phone: '123456'
oxygen_reco...	pclUYG5da32S...	phone model: 'Android SDK built for x86'
pulse_recor...	r9zxoGvnrQ9...	rating: 5
users	uI3ZyDkZ4n2...	
	zWf1YhY11vj...	

InfantHealthMonitor-humber ▾ Cloud Firestore		
🏠 > Profile > mgNwE9HS02Q		
(default)	Profile	mgNwE9HS02QapqvJUyL4hikczpv2
+ Start collection	+ Add document	+ Start collection
Feedback	65xz8IcMWZaG2REuTEH4b4juC...	+ Add field
Movement_records	JE3TFzwHvU8GvrsdLlJg1g1W...	Age: '2'
Profile >	QBUK7Ap8ckvns8b1s1FqvqXX...	Allergies: 'NA'
Sensors	mgNwE9HS02QapqvJUyL4hikczpv2 >	Baby Name: 'Zyber'
Sound_records		Birth: '2023-11-02'
Temperature_records		Blood: 'negative O'
oxygen_records		Condition: 'NA'
pulse_records		Gender: 'male'
users		Height: '2.2'
		Medication: 'NA'
		Weight: '22'

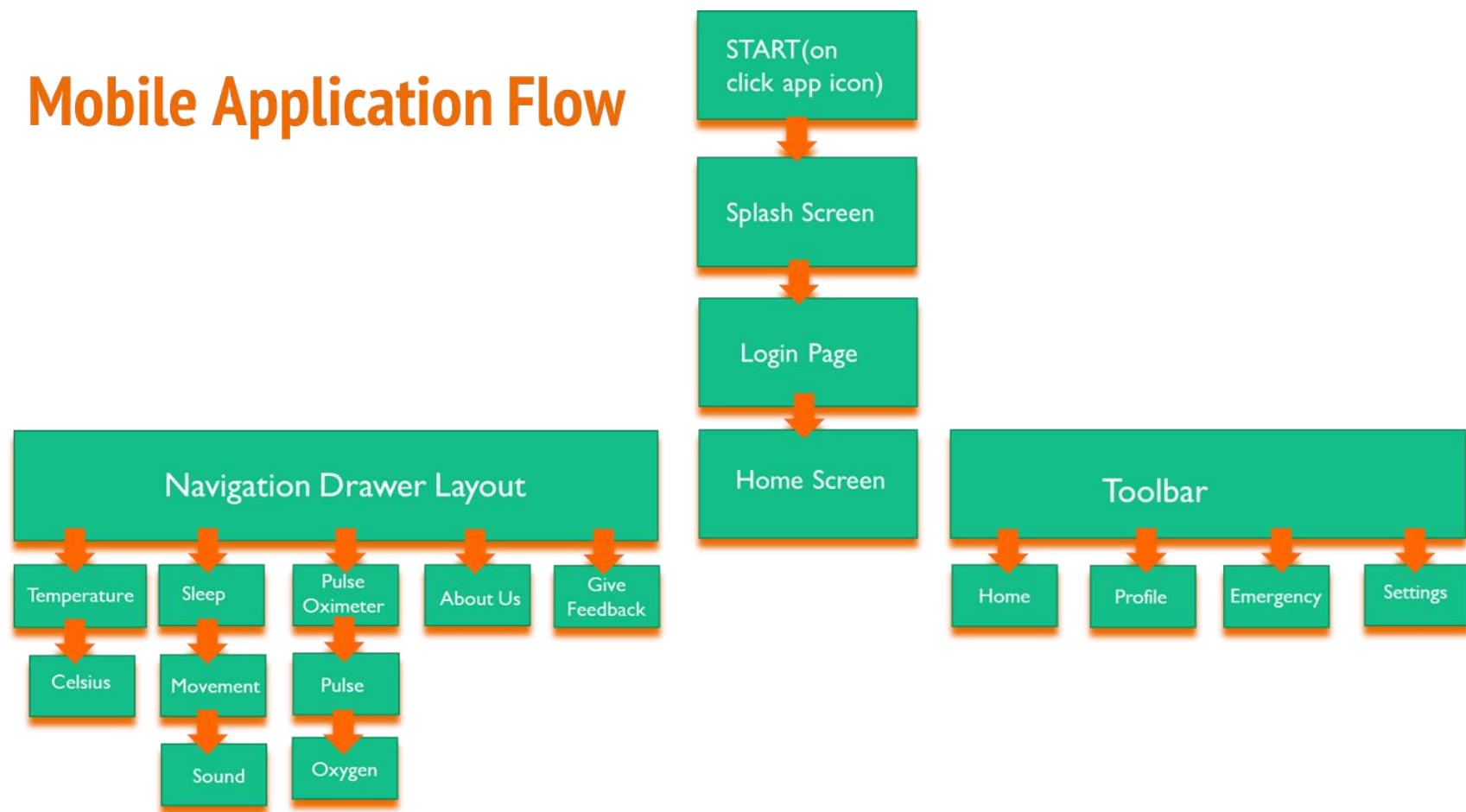


# Mobile Application : Features

- **Login authentication**
- **Profile screen for emergency information**
- **Home Screen with all the real time readings**
- **Notification alert**
- **Emergency call to 911**
- **Individual sensor screens for daily statistics**
- **Feedback**
- **Offline feature**
- **About us and settings page**



# Mobile Application Flow

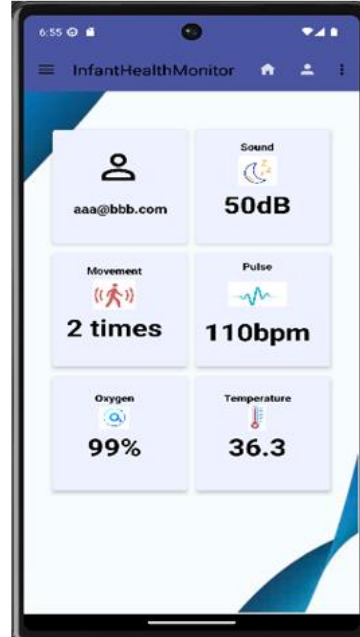


# Screen Flow

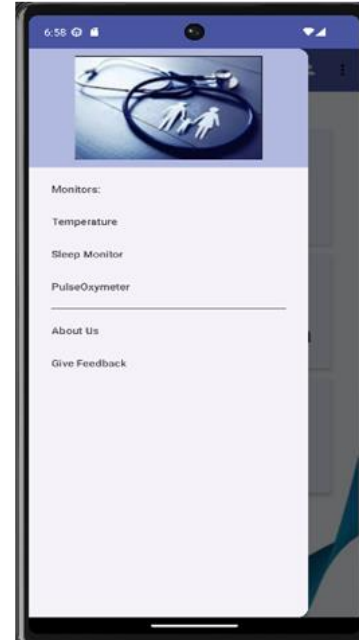
## Login Screen



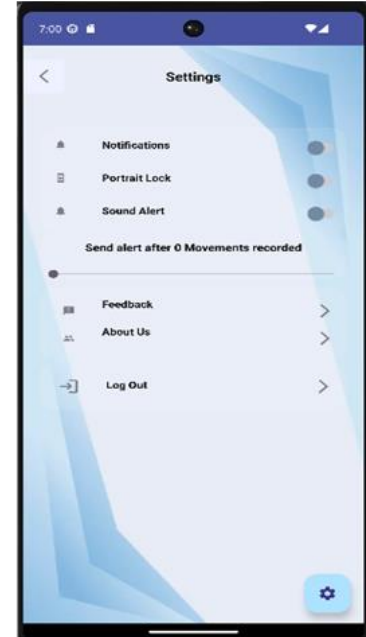
## HomePage Screen



## Navigation Drawer



## Settings Screen



# Screen Flow

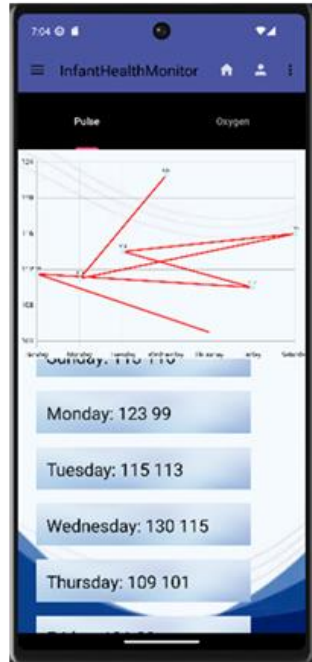
## Temperature Screen



## Movement Screen



## Pulse Oximeter Screen



## About Us Screen



## Feedback Screen

The Feedback Screen displays a form for customer feedback.

**Customer Feedback**

Full Name

Email

Phone Number

Comments

Submit Feedback

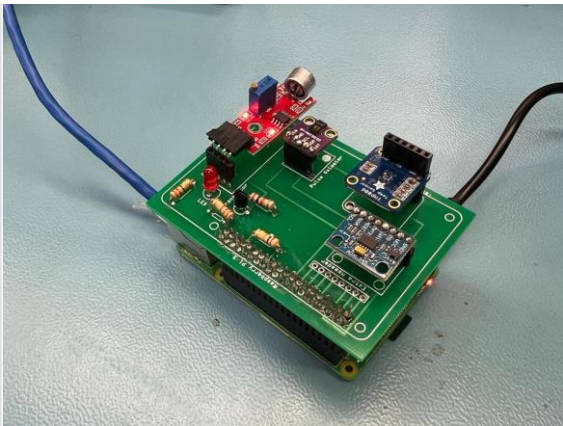
# Testing and results

Assembly with Raspberry Pi, PCB, and sensors, data is visible on Firebase.

Data and graphs updated on the app.

App analyzes data and shows insights.

🏠 > Sensors > KbCzg00Kexlcu. <a href="#">More in Google Cloud</a> ▾		
⌵ (default)	📁 Sensors	📄 KbCzg00KexlcuGla4Am7
+ Start collection	+ Add document	+ Start collection
Feedback	KbCzg00Kexlcu >	+ Add field
Movement_re...		Temperature: 36.5
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Temperature...		Sound: 50
oxygen_reco...		timestamp: November 2, 2023 at 3:09:07 AM UTC-4
pulse_recor...		
users		



File Edit View Run Tools Help



Test.py ✕

```
1 import time
2 import board
3 import busio
4 import adafruit_adxl34x
5 import adafruit_tmp006
6 import RPi.GPIO as GPIO
7 import threading
8
9 # setup adxl i2c functions
```

Shell ✕

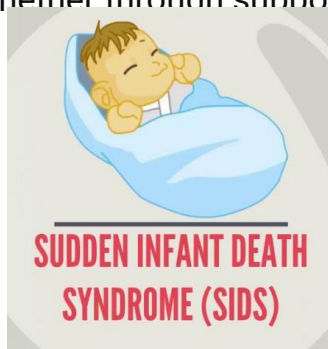
Python 3.7.3 (/usr/bin/python3)

>>> %Run Test.py

```
LED ON
-2.941995 0.392266 20.044793
Sound Detected
Object temperature: 37.10°C / 98.78°F
BPM: 77, O2: 98
-2.941995 0.392266 20.044793
No Sound Detected
Object temperature: 37.12°C / 98.82°F
BPM: 77, O2: 98
LED OFF
-3.726527 1.255251 20.044793
Sound Detected
Object temperature: 37.10°C / 98.78°F
BPM: 77, O2: 98
```

# Conclusion

- Advancing Infant Care: Our system is a leap forward in safeguarding infant health through advanced, non-invasive monitoring.
- Empowering Caregivers: We provide caregivers with the tools for peace of mind and the ability to respond swiftly to the infants' needs.
- Commitment to Innovation: We are dedicated to continuous improvement and innovation in the field of infant health technology.
- Join us to be part of this vital change, whether through support, adoption, or spreading the word.







*Thank you !!!*

For exploring our vision for a future where every infant is monitored ensuring proper care and a healthier society. Together, we can make this vision a reality.