

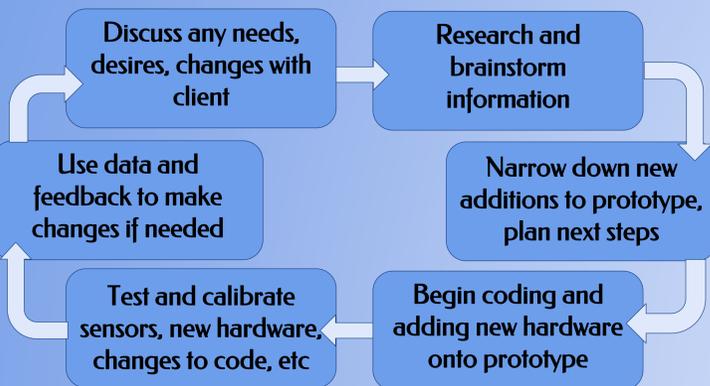
MonitorMe

A Vital Signs Monitor

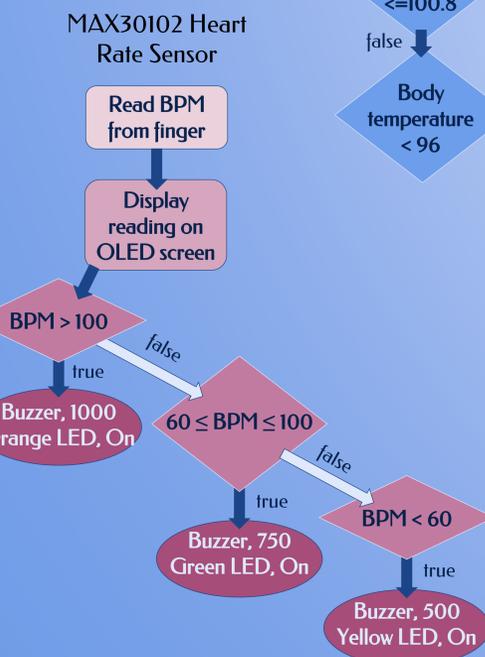
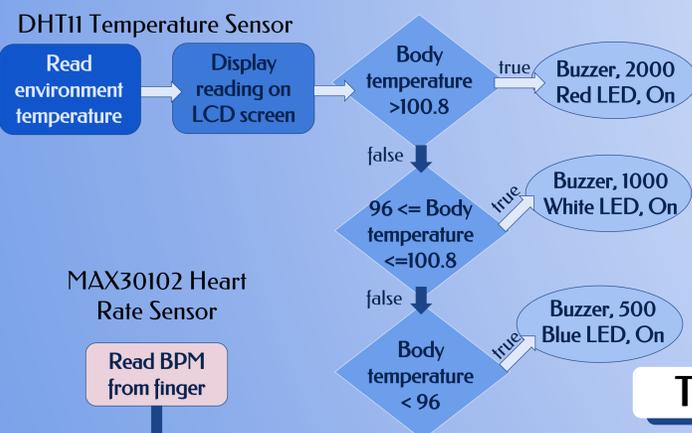
PROBLEM STATEMENT

Low-income communities lack access to doctors due to wealth and racial inequities present in healthcare today. Greater resources must be provided to catch health problems before they become worse.

DESIGN PROCESS



VISUAL ELEMENT: SENSOR CODE FLOWCHARTS



PRIMARY OBJECTIVES

- Detect vital signs (ex: heart rate and temperature) to monitor health.
- Displays information clearly and concisely for easy use.

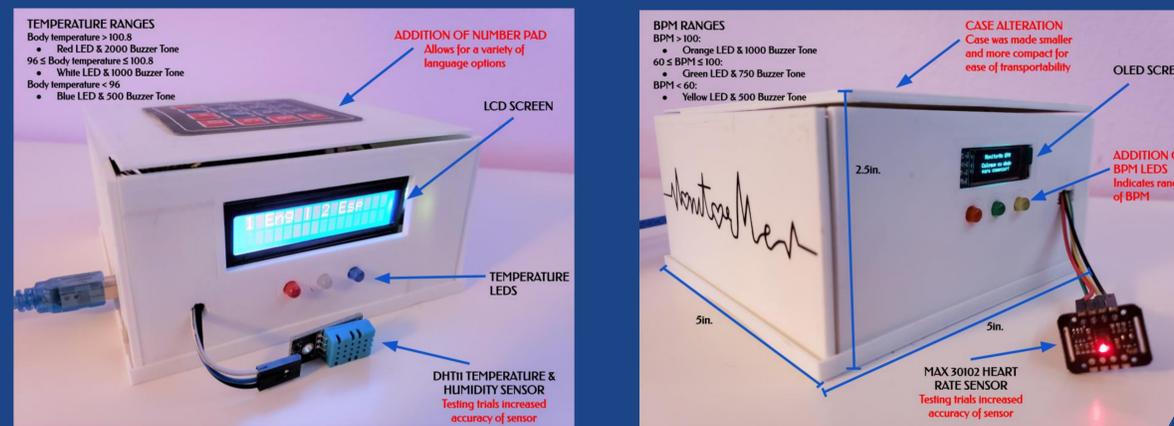
SECONDARY OBJECTIVES

- Ability to streamline diagnosis information that can be communicated to a doctor via a virtual/contactless appointment.
- Accessibility features for the hard-of-hearing and visually impaired.
- Providing other language options (i.e. Spanish).

USER REQUIREMENTS

- Explicit requirements:**
- Monitors vital signs
 - Easy-to-read format using digital displays
 - Affordable (under \$50)
 - Portable and durable → encased in protective shell
- Implicit Requirements:**
- Used in lieu of doctor → accuracy
 - Serve whole communities → increase accessibility via accommodations for visually and hearing impaired, add languages

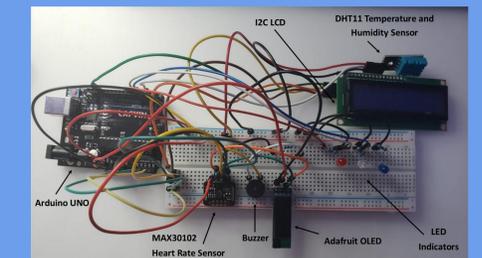
PROTOTYPE



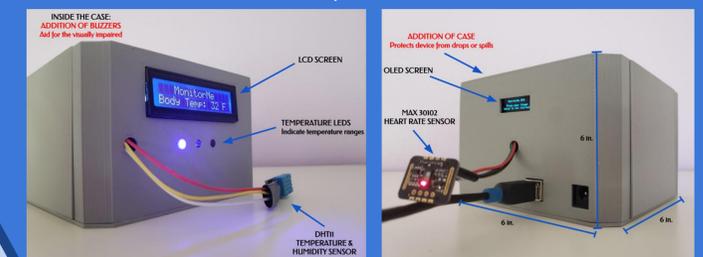
INSIDE THE CASE:
Arduino MEGA (microcontroller)
Buzzers for the visually impaired

PREVIOUS DESIGN ITERATIONS

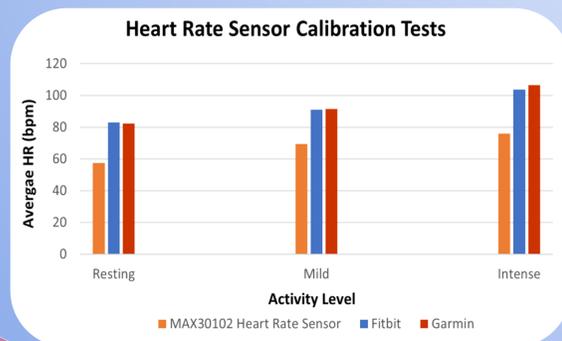
First Iteration: Heart monitor w/OLED display, temperature sensor w/LCD display



Second Iteration: Addition of a buzzer indicating BPM changes, LED indicators for ranges of temperature and a 3D printed case



TESTING PROCESS & CALIBRATION DATA

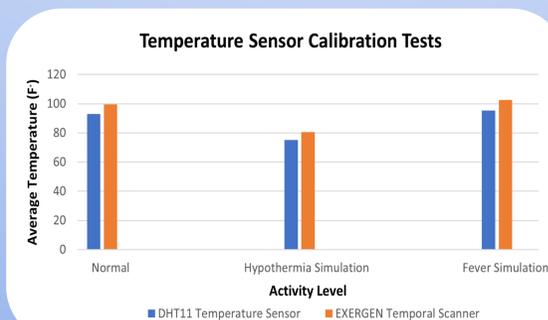


MAX30102 TESTING PROCESS:
To calibrate our MAX30102 heart rate sensor, we compared results to a Fitbit and a Garmin smartwatch through 5 trials of:

1. Control (resting BPM) - test on sedentary individual
2. Mild Activity - individual walks for 1 min. before testing
3. Intense Activity - individual jogs for 1 min. before testing

DHT11 TESTING PROCESS:
To calibrate the DHT11 temperature sensor (placed under armpit), we compared its results to those of an EXERGEN Temporal Scanner (forehead thermometer) through 5 trials of:

1. Control (healthy patient) - test on healthy individuals
2. Fever Simulation - heating pad placed for 1 min. on area
3. Hypothermia Simulation - cold pack placed for 1 min. on area



CONCLUSIONS

Calibration of sensor allows for greater accuracy, which can be shown in the data tables. By making certain features optional, prices can reduce even further to reach more people.

RESULTS

MonitorMe is an economically accessible device measuring heart rate and temperature with a \$30 base cost. The 3D printed case allows for protected portability, and thus communal usage. It reduces barriers for the hearing impaired with options of adding LEDs to indicate extremes and buzzers for the visually impaired.

FUTURE IMPLEMENTATIONS

In the future, we would like to incorporate Bluetooth connection to a mobile app to record data and streamline sharing of information. We would also like to add more vital signs such as blood pressure, oxygenation and respiration rate. Finally we would like to customize it based on age, activity level, etc. and add a speaker to read off vital signs for visually impaired.