# Design Brief

**School** : MESA Community Based Team - TechnoStar

**State** : Maryland

**Division** : Middle School

**Team Members' Names:** Pavithraa Saravanan and Neha Parepally

| **Project Title:** Readers should have a glimpse at what the project is about and want to read more. (25 word maximum) |
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| The title of our project is<br>"Vital Vow: A promise to your health." |
| **Project Purpose:** In one or two sentences explain what this project intends to do. (50-word maximum) |
| Our project intends to assist elderly individuals, individuals who cannot secure health care, and also the health care system with vital measurements during the ongoing pandemic situation. Hospitals are currently advising that individuals check their vitals at home due to full and/or unsafe hospital conditions. |
| **Abstract:** Briefly describe the people who will benefit from the project and the challenges they face. Include any inequity that the project hopes to address. *(100 Words Maximum)* |
| The individuals that will benefit from our project are the elderly, low-income families, and individuals who cannot procure health care due to other reasons. These individuals don't get the equality they deserve because they cannot afford or visit a hospital due to hospital crowding or the risk that it would pose in certain populations. We have to address this impending health issue and come up with a solution that would benefit the individuals and the hospitals. This device will help those individuals in need of checking, logging and tracking their health vitals and stay aware of their health. |

**User Research:** Discuss key information about the users gathered through your research, interviews, and ongoing discussion with the user throughout the project. What did you learn about the user and the barriers they face? (200 word maximum)

We interviewed Mr. Sanmugavel, the grandpa of our team member Pavithraa with a set questionnaire in understanding the problems faced by elderly during this pandemic situation. He expressed his concern of risk due to underlying health conditions to visit a hospital during this pandemic. The first determining factor if one needs to be hospitalized are key vitals including temperature/abnormal pulse or oxygen levels. These can be easily monitored with a device. He explained that it would be helpful to have a low-cost on-the-go device to monitor vitals. We also interviewed a physician (Dr. Madhavi Karanam) and an asymptomatic covid positive patient to get their perspective as well. Our continued discussions with Sanmugavel and the physician helped us with improving and balancing the design aspects pertaining to simplicity, accuracy and cost. The physician expressed her view about how it would be easier to admit critical patients based on the graphs based on historical data/ worsening trends that the device outputs. Asymptomatic covid positive individuals expressed how the device could help with better rest and healing while quarantining at home and seeking medical attention when needed.

**User Insight:** Discuss your team's understanding of the experiences, emotions, and motivations of the users. This insight should inform the rest of the project and help the reader have a deeper understanding of the inequity of the user. What did you learn about how the barriers affect the user? (200 word maximum)

Our users started sharing all the challenges they faced. They expressed the difficulty in scheduling a hospital appointment. Concerns were expressed for long wait times and overcrowding and risk of infection due to COVID-19 exposure. The elderly particularly find it difficult to travel to the hospital without any assistance. One of our users was in a situation where they might not be able to safely get to a hospital if they wanted to check their vitals. They are a part of the high-risk category and very susceptible to infection. Our device might help them become aware of unusual vitals and if necessary visit a hospital because of any worsening trends. Similar fears were expressed by asymptomatic covid positive patients of their anxiety in healing of when they would need medical attention. Hospitalists also expressed their concern of not being able to cater to the actual needy individual if they start to admit every covid positive patient. However if vitals are monitored for unusual trends, not every covid patient has to be admitted, since many recover without the need for hospitalization.

**User Needs:** Develop a specific list of the user's needs produced from the user insight. What does the user want to help them with the barrier? (100 word maximum)

- Remote access: The device can be accessed remotely without the need to visit a hospital unless medical attention is needed.
- Checking vitals and graph: vitals like pulse and oxygen levels will be measured and recorded and plotted as graph using IOT remote app.
- Quick results: Results are rapid within a few seconds, digitized and recorded for graphical interpretation.
- Cost effective: The device is affordable and costs <$30.
- Easy to use: The device is easy to use with one touch.
- Easy sharing of vitals: Physicians and family members can log in to view results.

**Project Goals:** List project goals and describe how they are linked to and will adequately meet the user's needs and address inequities and/or barriers faced by the user. What do you want the project to do to help the user? (100 word maximum)

Our project goal is to create a device that meets our user's needs, for individuals to get the health equity they deserve. It helps the elderly to check their vitals at home without the need to visit hospital, thereby saving money and avoiding the risk of being in public. Our device would also benefit the health care system by identification of actual patients who would need immediate care. This device would be an asset to all the covid positive asymptomatic patients who can heal and rest by keeping a track of their pulse and oximeter readings without being anxious.

**Key Features of Design:** List key features, illustrating that the design will adequately meet project goals. How will the project help the user? (200 word maximum)

One of our key features is the Oximeter with logging and remote access feature. It helps to keep track of oxygen level. Dipping oxygen levels, an indicator of breathing issues, is one of the key characteristics which needs hospitalization during this pandemic, so it is good to be aware of one's oxygen level. Another key feature is the Heart Monitor, which helps to check the Pulse. The device has an easy to access sensor which needs the individual measuring the values to place their finger on the sensor. The device has a screen that displays a numeral value making it easy to read. One of the important features of our project is the online app (IOT Remote) which would allow the users, family members or physicians to view the graph of historical data through the length of subscription. The device meets the goals of the user in saving money by being cost effective, by being easily accessible and avoiding hospital overcrowding and test vitals at home. The device also helps the hospital system including primary care physicians with accessing patient's vital report remotely.

**Impact:** Discuss how design addresses inequities for the user and/or removes barriers. Input from users should be included. Does the project help the user? How? (200 word maximum)

The device is designed to address inequity as it applies to the elderly population, hospital system and to asymptomatic covid positive patients who are not able to seek the medical attention they need.

The project is an easy-to-use on-the-go device used to measure pulse and oxygen levels and output as a graph for medical practitioners to look at it for needed intervention from remote places as well.

Sanmugavel stated that this would be useful without the need to go to the hospitals, especially with the risk of contracting Covid in a crowded atmosphere. The graph option especially helps to track for any changes in the pulse and oxygen levels measured for quick input from the practitioners and for medical intervention when needed.

Dr. Madhavi Karanam also stated that the device would help the hospital system from overcrowding since physicians can analyze the report remotely and admit only the patients with abnormal vitals.

Few of the interviewed covid positive patients also expressed the relief they would have in monitoring their levels while quarantining at home.

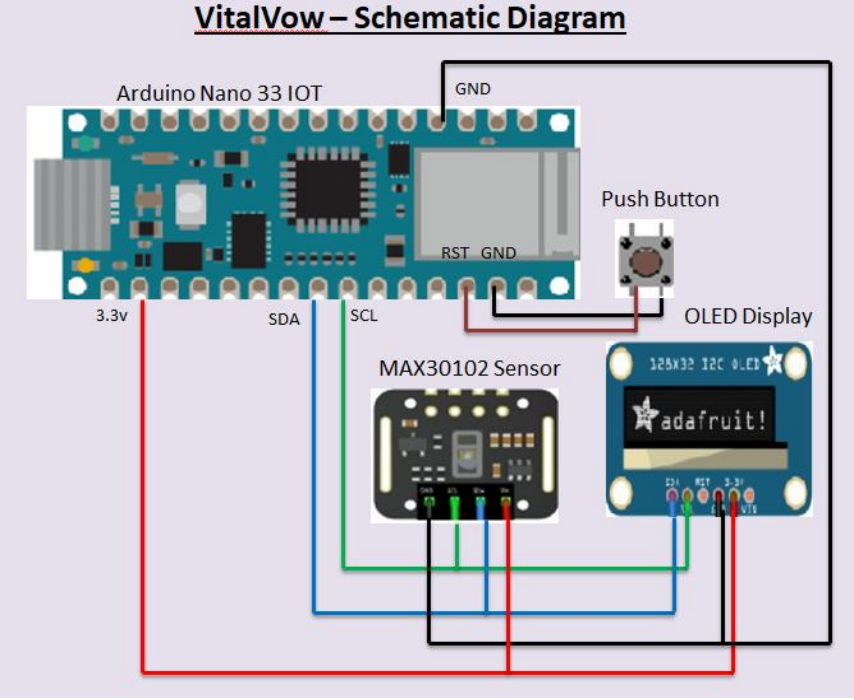
**Status of Project:** Describe the current status of the project, including feedback from users, and discuss potential next steps. What does the project do now? What would you like to work on in the future? (200 word maximum)

We have completed the goal of creating the Oximeter and the Heart Monitor. The device is integrated with a mobile app which can log the historical data of the user's oxygen level and pulse along with a graphical display. Individuals can check their levels remotely thereby minimizing the risk of exposure by avoiding trip to hospitals. In the current version, multiple users can share the device but the logging is not user specific. In the future version of the device, we plan to add a feature which will allow switching between users and get user specific reports using a single device. We have tested the device with potential users and physicians. The users found this device helpful to monitor vitals in the current pandemic and seek medical attention when needed. The doctor that we interviewed mentioned that this device is helpful and it would reduce the burden on the ER and the entire health care system. The doctor also advised that this device could further be used to monitor other disease conditions including asthma, obesity and sleep apnea where oxygen saturation fluctuates during the day and night. Additional oxygenation could be provided to these patients with monitoring.

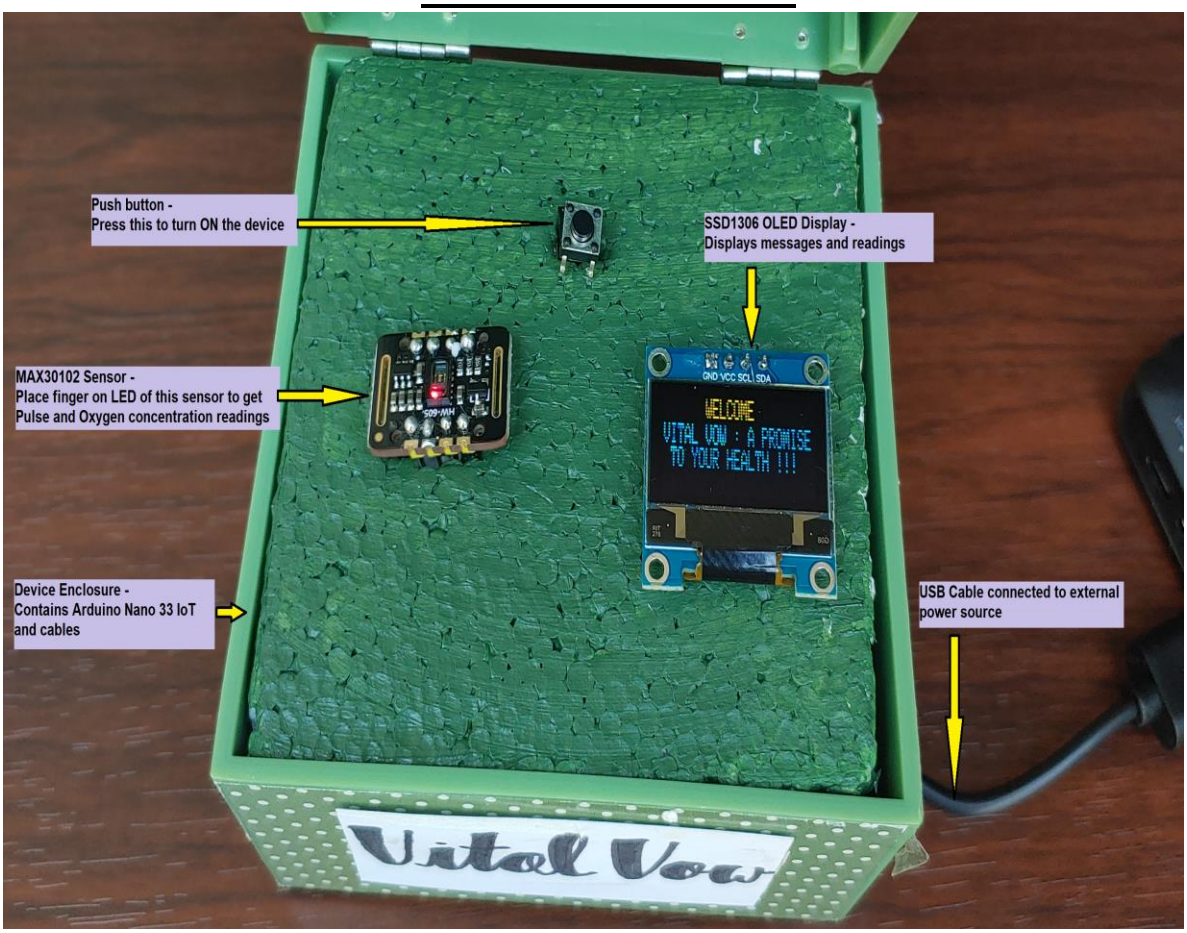
**Reflection:** Show that the team has an increased understanding of human-centered design. Examples of personal growth and insights gained about designing for others and helping them overcome challenges should also be included. What did you learn during this project? (200 word maximum)

We have increased our understanding of the inequity for health in certain populations especially the elderly and how suffering increased across the world during this pandemic. By interviewing elderly, hospitalists and covid positive patients who were not accessible to health care, we learnt more about the emotions that these individuals were experiencing. We wanted to help these individuals by developing an easy and affordable way to monitor the vitals. Our project is a clear example of human centered design since we interviewed individuals to understand their needs and their perspective even before we designed our project. While our main focus was to identify the inequity and help the elderly, we have also considered the effect it is having on the health care administration under this pandemic situation. We have identified the needs, brainstormed ideas, designed a prototype, tested our design and interviewed the same individuals again with our design and implemented their feedback in improving our design. Personally we learnt that in order to address a problem in the society, we have to feel the emotions of the individuals facing the problem. Interviewing these individuals helped us develop a patient centric device.

**Prototype Graphic:** A single graphic with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic.



# Vital Vow Device



# VitalVow Dashboard from Mobile App