



NiCa Bell

Team A2:

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Client Meeting + Customer Needs

Ranked Needs

Rank	Need	Metric	Units
1	Device is sensitive to sound/voice, but is quiet	8	dB
1	The device simply notifies the staff - no complicated commands	9, 10	dB, s
1	The device works independently of external equipment		
1	The device effectively notifies the staff	9, 10	dB, s
1	The device recognizes the words "hey" and "help"	8	dB
1	The device can be operated by one person alone		
1	The device has to be plugged into the wall, limits any complications with battery and charging	6	Amps, Volts, Kw
1	Device needs to be easy to use and multiple different workers come in and out		
2	Device interacts solely with the client and her staff	9	dB
2	The device is wearable and portable	3,4	mm ³ , g
2	The device uses lights to notify clients	11	cd
2	Device needs a light so fran can be noticed help is coming	11	cd
3	The device is small, similar to a tissue box, and fits on a side table.	2	cm ³
3	Device is hot pink		
4	Device needs to be the size of a tissue box if on a side table, device on wall mount has to be light in weight.	1,2	cm ³ , kg
5	The device can be connected to the internet		

- Physical disability
- Difficulty projecting their voice
- Purely voice activated
- Low maintenance



Problem Statement

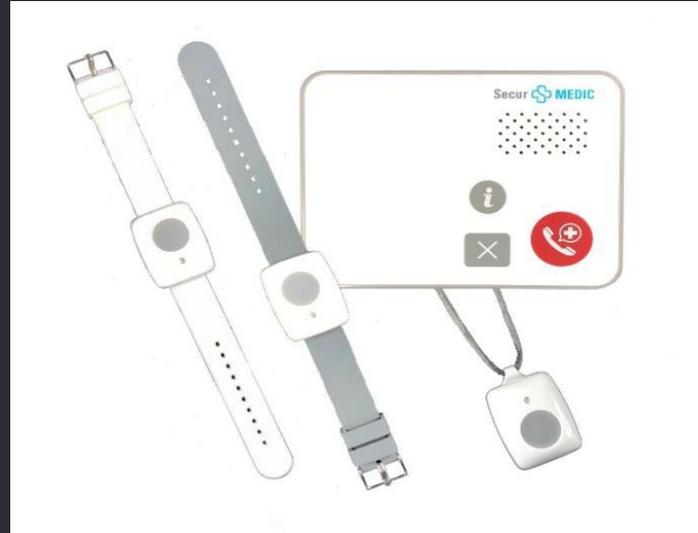
Our client requires a set of devices that can discreetly and effectively communicate with each other, thus, notifying her support staff through voice activation. The device should be low maintenance and function over a variety of distances.

Benchmarking

BoomER Alert Device



SecurMedic



Benchmarking

Philips HomeSafe



Philips GoSafe



Metrics and Target Specifications

Metrics number	Metric	Unit	Value
1	Mass (Main device)	Kg	0.25 - 0.50
2	Volume (Main dev.)	cm ³	65.5
3	Mass (Support dev.)	g	30 - 50
4	Volume (Support dev.)	cm ³	4
5	Cost	CAD \$	100
6	Power (Main device)	Amps, Volts, Watts	15, 110-120, 1800
7	Power (Support device)	Amps, Volts, Watts	15, 110-120, 5
8	Sound sensitivity	dB	30
9	Ind. Sound volume	dB	60
10	Notification duration	s	30
11	Indicator brightness	cd	110

Solution Options

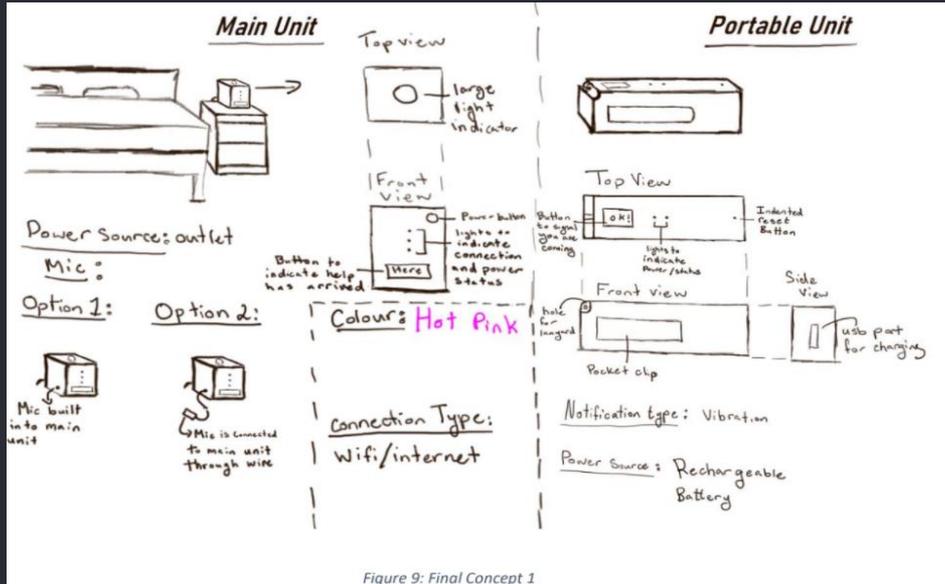


Figure 9: Final Concept 1

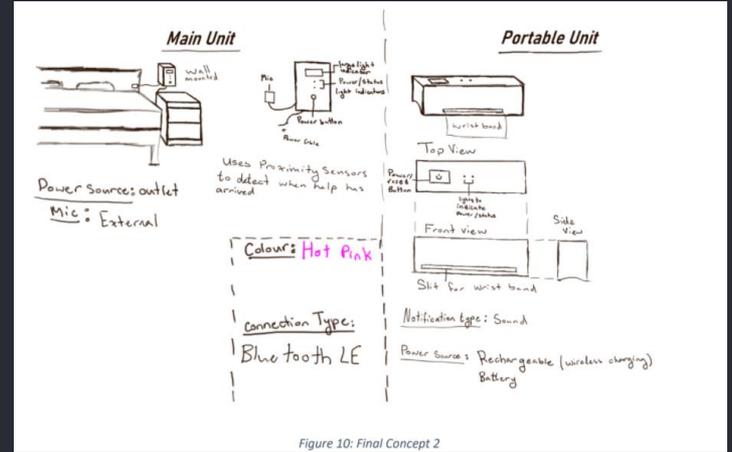


Figure 10: Final Concept 2

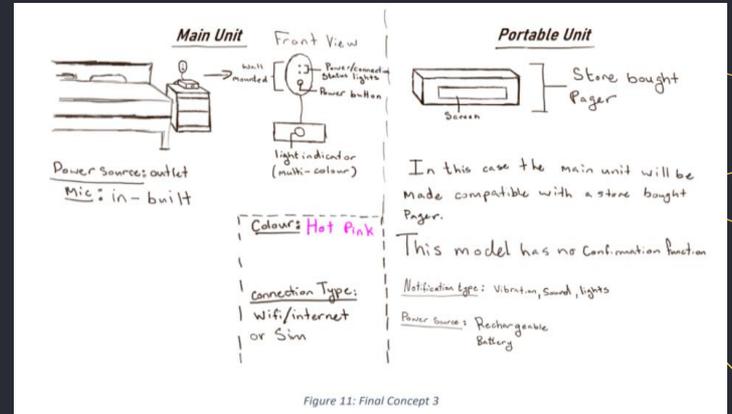


Figure 11: Final Concept 3

Chosen Concept

- Offers the most while requiring the user to change the least.
- Encompasses all of the clients wishes

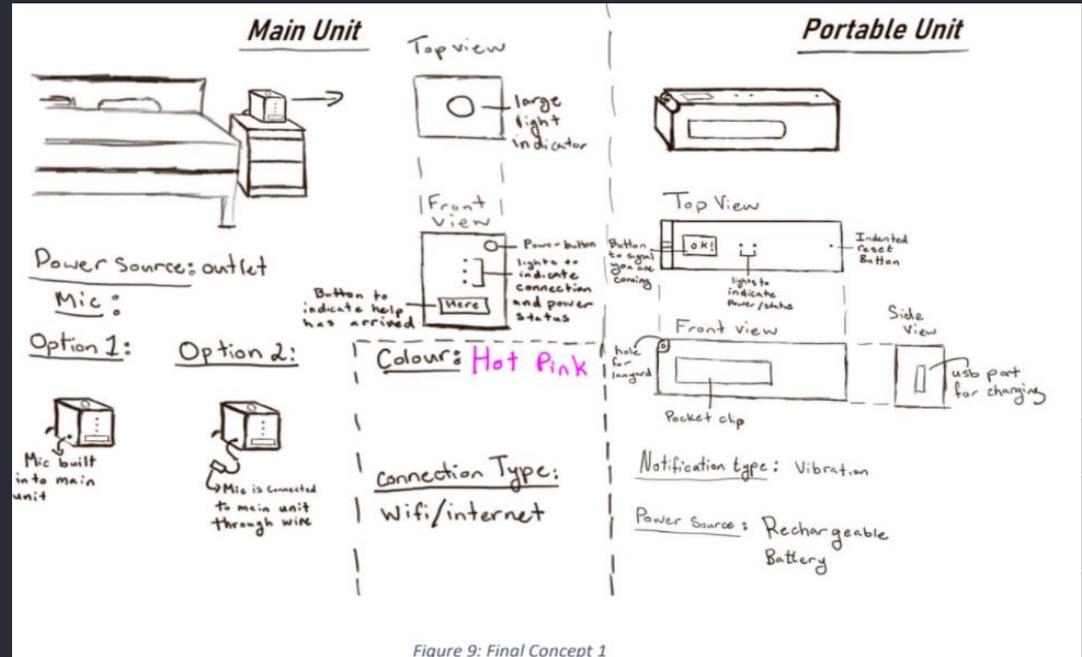
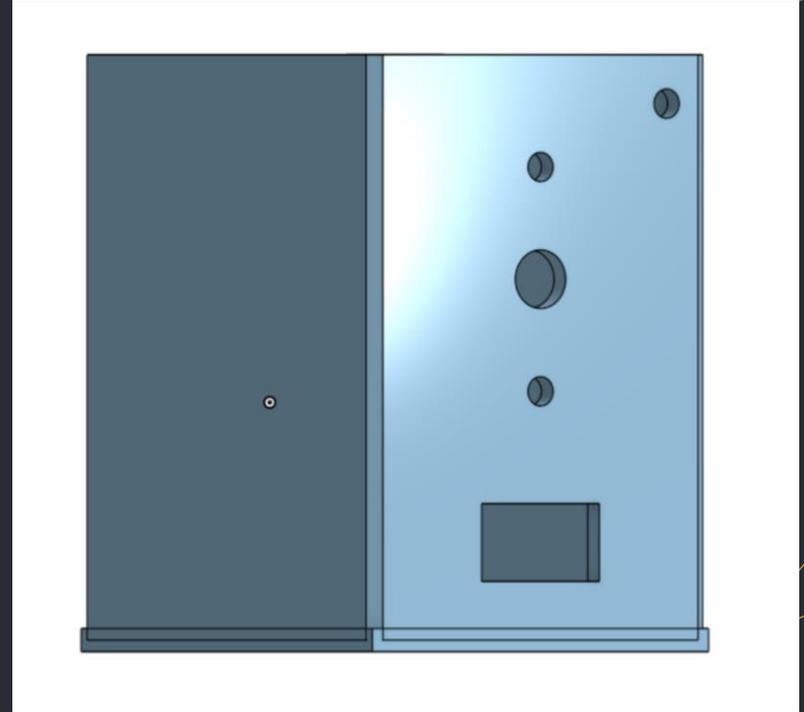
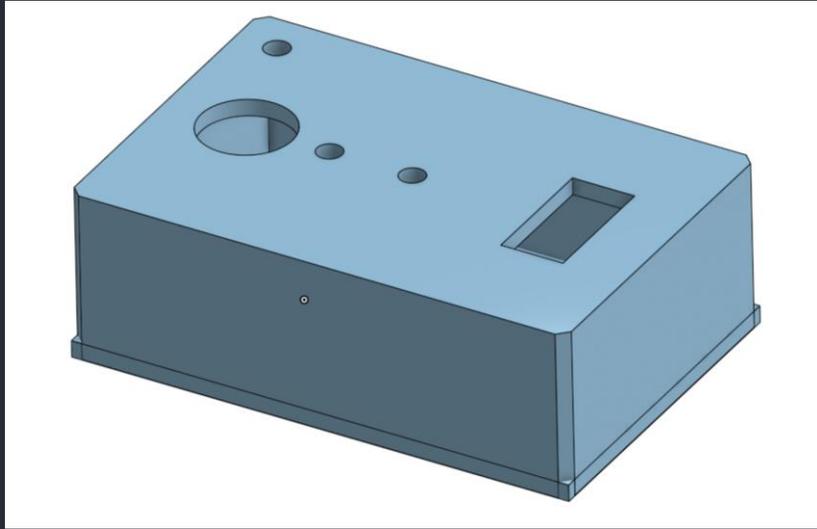


Figure 9: Final Concept 1

Prototype 1



Prototype 1

```
tempaudio.py - D:\Programs\Python\Python37-32\tempaudio.py (3.7.0)
File Edit Format Run Options Window Help
import speech_recognition as sr

r = sr.Recognizer()

with sr.AudioFile('D:/Users/Ethan Chan/AppData/Local/Google/Cloud SDK/sf_test.fl
    audio = r.record(source)

a = r.recognize_google(audio, language='en-US')
print(a)

Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:06:47) [MSC v.1914 32 bit (Inte
l)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:\Programs\Python\Python37-32\tempaudio.py =====
hey
>>>
===== RESTART: D:\Programs\Python\Python37-32\tempaudio.py =====
testing 1 2 3
>>>
```

```
Neglect Function
Check if "Stop signal" received:
While Situation 2 == false

If "ok button" & "Stop signal" == false
    safecount = safecount + 1
    audiocount = safecount/3
    If safecount > 3 and audiocount < 3
        Increase motor1 by 1 factor
    Else
        Play sound

Else if "Stop signal" == false and "ok button" == true
    safecount = safecount + 1
    audiocount = safecount/3
    If safecount > 3 and audiocount < 3
        Increase motor1 by 1 factor
    Else
        Play sound

Else if "Stop signal" == true and "ok button" == false
    safecount = safecount + 1
    audiocount = safecount/3
    If safecount > 3 and audiocount < 3
        Increase motor1 by 1 factor
    Else
        Play sound

Else if "ok button" & "Stop signal" == true
    Stop Motor1, sound and indicator
    Situation2 = true
    Call Connection Function
```

```
Call Connection Function

Server Function:
systemcount = systemcount + 1
While systemcount < 3:
    While Flag = False and count < 3:
        Check if connected to portable unit:
            If yes:
                Call Audio function
            If not:
                count = count + 1
                Flag = False

Turn large indicator red
Red small indicator beings blinking every 5 seconds

Audio Function:
While Flag1 = False
    Check if there is noise:
        If yes:
            Is the noise = "hey" or "help"?
                If yes:
                    Call Server Function
                If not:
                    Flag1 = False
            If not:
                Flag1 = False
```

Prototype 2



Main Unit Code

```
from gpiozero import Button
from gpiozero import LED
from gpiozero import RGBLED
```

```
hereBut = Button(17)
powerBut = Button(22)
resetBut = Button(18)
```

```
largeLED = LED(18)
largeLED.red = 1
Flag4 = False
Flag3 = False
```

```
# insert code for server
# insert code for audio recognition
```

```
def Confirm():
    while Flag3 == False:
        if recieve is "ok signal":
            largeLED.red.on()
            Arrived()
        else:
            Flag3 = False
```

```
def Arrived():
    while Flag4 == False:
        if hereBut.is_pressed:
            largeLED.off()
            signal = str.encode("Stop Signal")
            send(signal)
            recognize()
        else:
            Flag4 = False
```

Portable Unit Code

```
from gpiozero import Button
from gpiozero import RGBLED
from gpiozero import LED
from time import sleep
from gpiozero import Motor

# Call Connection Function
led = RGBLED(red=0, green=10, blue=11)
motor = Motor(forward=4, backward=14)
led.color = LED(18)
okBut = Button(4)
motor = Motor(17)
sdfcount = 0
audiocount = 0
situation1 = 0
situation2 = 0
situation3 = 0

def connection(self, mainunitconn=0):
    if mainunitconn == True:
        # server(True):
        else:
            connectioncount = 0
            led.red.on()
            sleep(1)
            led.color = (0, 0, 0)
            sleep(1)
            connectioncount += 1

        if (connectioncount > 100):
            motor.forward()
            sleep(5)
            motor.backward()
            sleep(5)

        connection()

def server():
    situation1 = False
    while situation1 == False:
        signal = False
        if signal == True:
            motor.forward()
            sleep(5)
            motor.backward()
            sleep(5)
            led.color = (0, 1, 0)
            sleep(1)
            led.color = (0, 0, 0)
            sleep(1)
        else:
            Situation1 = False

server()

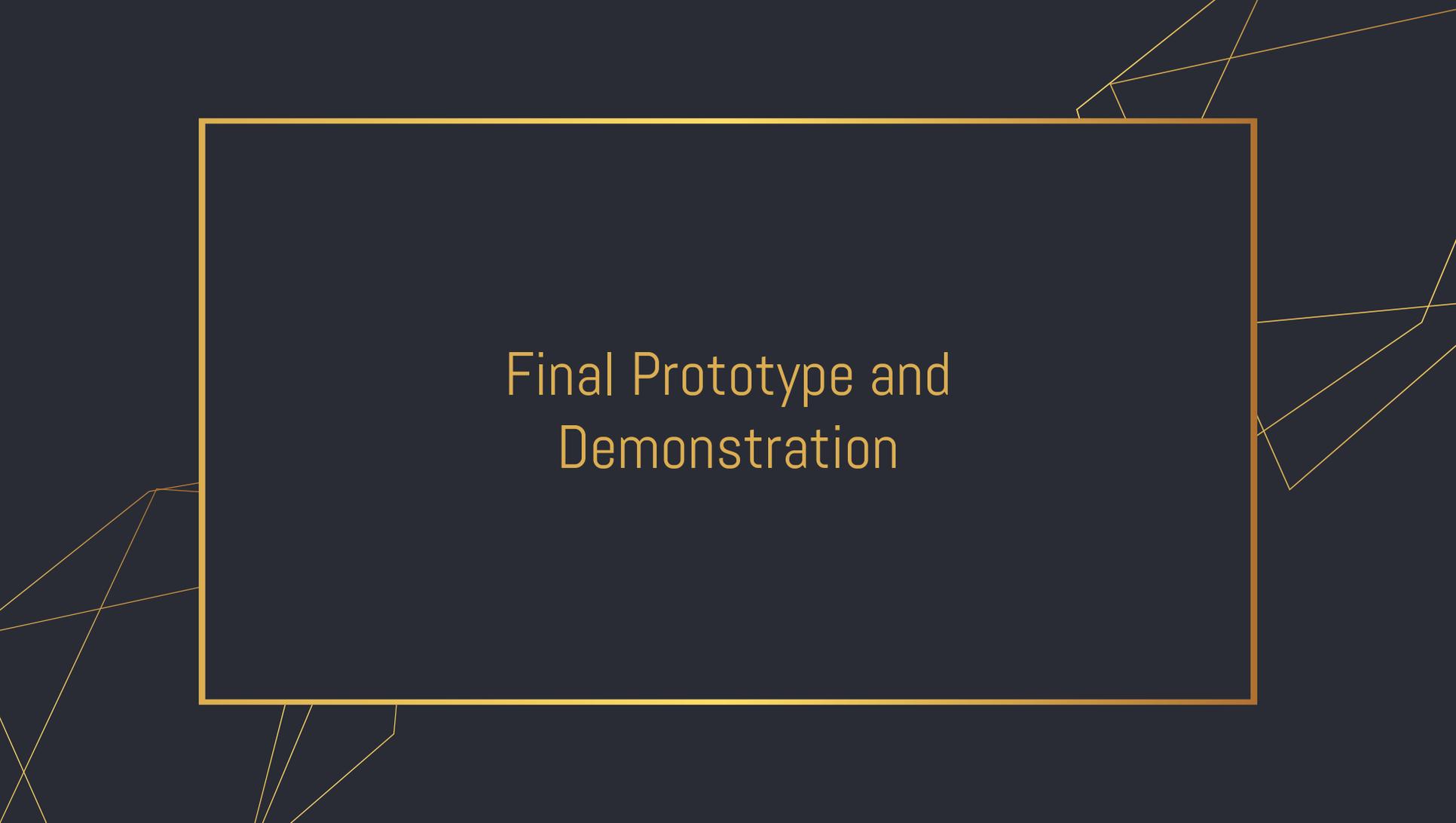
def confirm():
    situation2 == False
    while situation2 == False:
        if okBut.is_pressed:
            okSignal = str.encode("ok signal")
            # send(okSignal)
        else:
            # neglect()
            Situation2 = False

confirm()
```

Client Feedback

Client Feedback	Improvement
Vibration needs to be strong enough to wake up staff	Improvement on vibration idea as now having three different levels of vibration
Potential use of an alarm (sound notification on portable unit) - staff may be sleep	Improvement - the team hadn't considered that the staff may be sleeping
Option 2 of mic with wire is preferred	Neutral - provided clarification but didn't add to the concept
Wants a dramatic change in colour when signal is sent and when signal has been confirmed	Improvement - the team didn't specify the difference in colour.
No flashing lights, not too bright as well as calming colours is preferred	Improvement - this will help ensure that the device doesn't scare Fran
Vibration can not be strong enough to make the staff uncomfortable and encourage them to remove the portable unit	Improvement - the team didn't consider the staff's mental state.
Has no difficulty distinguishing colours from each other	Neutral - this provided clarification but did not change the design.
Side dresser is fairly big, no size constraints.	Neutral - This provided clarification but did not change the design.
If the main unit is small enough in size, it can be mounted on to the bed, as a solution for the mic.	Important Note - this created a new alternative for the mic option in case an external mic is expensive.
They suggested that the device be triggered based on noise level in the case that there are troubles distinguishing "hey" and "help" from other noise.	Important Note - the team has been given a new fallback option

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Final Prototype and Demonstration

Business Model

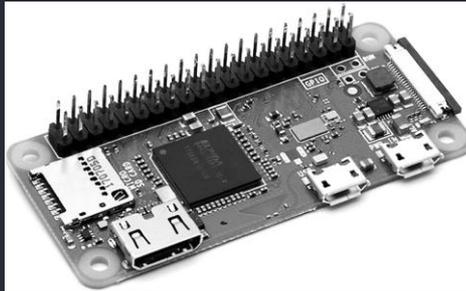


- \$99.99 with a manufacturing cost of ~\$40
- 77,257 long term beds
- All Direct costs

Feasibility



Trials, Tribulations and the Future



The background is a dark blue-grey color. In the corners, there are abstract, thin, light-colored lines forming geometric shapes. In the top right, there are several lines forming a complex, multi-sided shape. In the bottom right, there are lines forming a large, irregular polygon. In the bottom left, there are lines forming a smaller, simpler shape.

Thank You For Your Time

Feel free to contact us if you have
any questions.