**Project Documentation**

Problem Statement:

A method (device, application, etc.) which would allow an individual who is hard of hearing to reliably recognize that there is a fire alarm going off in the building. It must be a remote device that allows the individual to stay safe in the case of an alarm no matter where they are in the building and must be discrete.

Why is this a problem:

There is not a reliable way to allow people who are hard of hearing to reliably detect a fire alarm that doesn’t create other problems in the process.

Our benchmarking showed that there are the following products that are implemented in the market as well as their pros and cons.

|  |  |  |
| --- | --- | --- |
| Product | Pros | Cons |
| Visual Notification System | * Effective at notifying people of an alarm * No need for any personal devices | * The flashing lights can induce seizures for people with epilepsy or headaches * Expensive and difficult to implement into buildings |
| The Clip (Previous design in GNG 2101) | * All in one small personal device * Is easy to carry around and isn’t restricted to just one building | * Higher risk of detecting a false alarm since the sensor is move a lot * Might not even detect the alarm in the event of a fire/emergency if the microphone is accidentally covers, or the wearer is in a place where the alarm can’t be well heard. |
| DeafCall Fire Paging System | * Easy to use device that is small and discrete * Low possibility of false alarms | * Seems difficult to implement * Has limited marketing to Canada |

Why our product is better?

Our idea is like the Deaf Call Fire Paging System our product is extremely easy to implement in a building and does protect against fire alarms. Furthermore, with proper permissions and patents, our product can be attached to the actual fire alarms so that the risks of false alarms are even lower.

Suitability of the device in the environment that it will be used in

Conclusions and next steps

Customer Needs:

|  |  |  |
| --- | --- | --- |
| No. | NEED | Imp |
| 1 | The pager is discrete | 4 |
| 2 | The pager’s vibrations can easily be felt | 5 |
| 3 | The pager is small | 4 |
| 4 | The pager is lightweight | 3 |
| 5 | The pager lasts for a long time | 4 |
| 6 | The pager is portable | 4 |
| 7 | The pager is durable | 4 |
| 8 | The alarm detector transmits the signal to the pager fast | 5 |
| 9 | The alarm detector detects the sound of the fire alarm | 5 |
| 10 | The alarm detector is durable | 3 |

Metrics:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Need # | Metric | Imp | Units |
| 1 | 1 | The color of the pager | 4 | color |
| 2 | 2 | Minimum vibration frequency of 300 Hz | 5 | Hz |
| 3 | 3,6 | Dimensions of pager | 4 | cm |
| 4 | 4,6 | Mass of pager | 3 | g |
| 5 | 5 | Battery lifespan | 4 | days |
| 6 | 7 | Force required to break case | 4 | N |
| 7 | 8 | Time taken for signal transmission | 5 | s |
| 8 | 9 | Minimum sound magnitude detected | 5 | dB |
| 9 | 9 | Maximum sound magnitude detected | 5 | dB |
| 10 | 10 | Force required to break case | 3 | N |

Target Specifications vs Actual Specifications

|  |  |
| --- | --- |
| Target Specs | Actual Specs |
| Microphone reads 75dB. | Microphone reads 60dB. |
| Signal Range is 20m. | Signal Range is 32m. |
| Pager size is (3 x 3 x 1) cm. | Pager size is (10 x 8 x 5) cm. |
| Secondary device size is  (10 x 13 x 4) cm. | Secondary device size is  (9.4 x 11 x 2.4) cm. |
| Weight of pager is 0.2kg. | Weight of pager is 0.16kg. |
| Cost of devices: $75 or less. | Cost of devices: $100 or less. |

Bill of Materials

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Device Name | Item No. | Part Name | Description | Quantity | Unit Cost | Extended Cost |
| Pager |  |  |  |  |  |  |
|  | 1 | NodeMCU microprocessor | (4.8 x 2.3 x 0.5) mm microprocessor with WIFI connectivity | 1 | $9.99 | $9.99 |
|  | 2 | Diodes | Indicates battery level | 6 | $0.40 | $2.40 |
|  | 3 | Tactile Button Switch | 6mm switch for the pager device | 1 | $0.26 | $0.26 |
|  | 4 | Pack of Resistors | 150 pack of resistors used in pager device | 150 | $0.03 | $4.99 |
|  | 5 | Vibrating Motor | 10mm Ø vibrating motor (183 Hz) | 8 | $2.64 | $21.12 |
|  | 6 | Casing | 3D printed plastic | 1 | Free | Free |
| Alarm Detector |  |  |  |  |  |  |
|  | 1 | Speaker | 29mm Ø, 21.5mm ↧ speaker. | 1 | $3.41 | $3.41 |
|  | 2 | Sound sensor | (3 x 2 x 1) cm sensor module that can act as a microphone. | 1 | $7.99 | $7.99 |
|  | 3 | Arduino Uno | (77.4 x 53 x 15) mm microprocessor | 1 | $6.40 | $6.40 |
|  | 4 | Adafruit WIFI board | Board connects Item 2 to WIFI | 1 | $16.60 | $16.60 |
|  | 5 | Case | (126 x 49.5) mm plastic case | 2 | Free | Free |