Cardiopulmonary Resuscitation Guide Glove

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Background

Cardiac arrest is a leading cause of death, in which approximately 395,000 cases occur outside the hospital per year. Immediate and high-quality CPR can increase the probability of surviving sudden cardiac arrest. However, some bystanders may avoid performing CPR on victims for reasons such as lapse in CPR training or fear of making a mistake.

Proposed Solution

Our device targets proper CPR technique by providing feedback for the 3 primary components of high-quality CPR: compression depth, compression pace, and hand placement.
We aim to create a device affordable enough to attract corporations in need of emergency response kits, while maintaining an effective and user-friendly design.

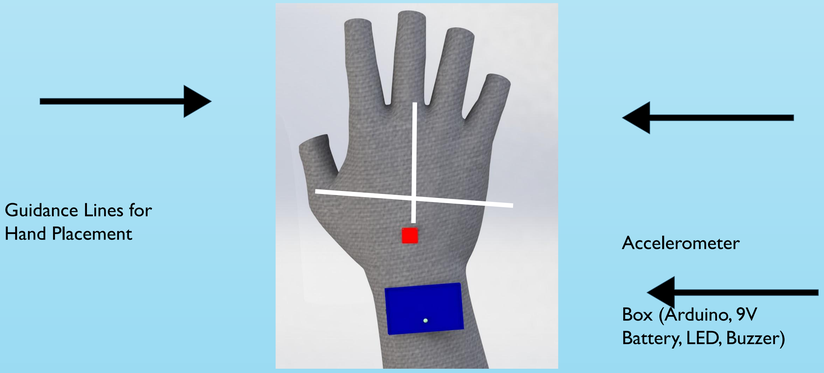


Figure 1: Solidworks Model of the CPR Guide Glove

CPR Guide Glove provides guidance for high-intensity situations by:

- Instructing the user when deeper compressions are needed
- Providing an audio signal via a beeper to convey the pace at which compressions should be performed
- Providing a quick and simple method for obtaining a general position on the victim's chest

Acknowledgments

We would like to thank Dr. Vasileios Christopoulos for guiding our team in the design and execution of this device.

Device

Size setting: **O** is off
I is average person
II is obese person

Pace:
A metronome & beeper will produce an audio signal with a pace of 120 beats/minute

Depth:
Acceleration measurements will be collected and refined.

Displacement will be calculated using a double integration.

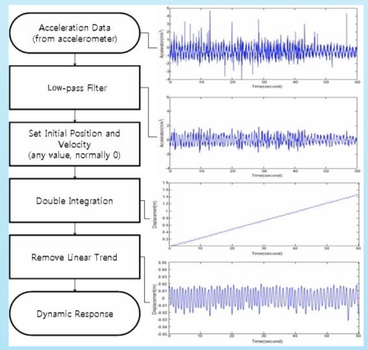


Figure 2: The process from acceleration measurement to position

Hand placement:
A general position for the hand is provided by an extension tool that goes from the collar bone to the sternum

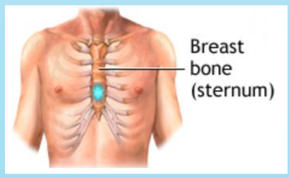


Figure 3: Proper Hand Placement for CPR

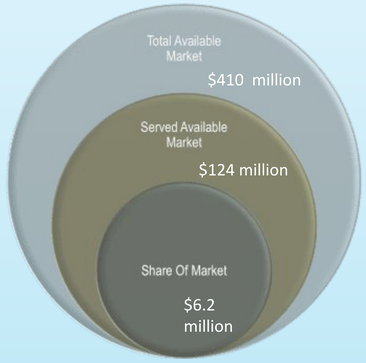
Testing

To determine the noise level of the accelerometer, we will perform 3 controlled tests:

(1) We will obtain acceleration data as we move the device over known distances ranging between 1 inch and 5 inches.
(2) We will also test our device over longer distances ranging between 2 feet and 10 feet.
(3) We will then repeat the test while pressing down on an elastic material.

We will convert acceleration data to displacement data to calculate error and then adjust filters accordingly.

Market Value



TAM: First Response Industry

SAM: CPR Assist Device Industry

SOM: 5% of SAM

Target Customers:
Corporations, Large Events

	CPR Guide Glove	CPR RsQ Assist	TrueCPR	Mechanical CPR devices
Cost	$300	$87.65	$1990.90	> $10,000
Customer	Bystander	Bystander	First responders	First responders
Hand Placement	✔	✘	✘	✘
Compression Depth	✔	✔	✔	✔
Compression Rate	✔	✔	✔	✔
Size Adjustment	✔	✘	✘	✔
Requires User Action	✔	✔	✔	✘

Table 1: Analysis of Competitors in CPR Assist Devices Market

Future Work

To test the compression pace and depth aspects of our device:

- We will ask 15 people to perform CPR on a training dummy using the CPR Guide Glove.
- We will record the length of time it takes each individual to achieve correct form with each compression.
- We will also request that they fill out a short survey regarding how helpful they feel the device is in order to make the necessary adjustments to our device.

We will incorporate EKG modality to assess/evaluate patient.

References

[1] CPR - adult - series-Chest compressions: MedlinePlus Medical Encyclopedia. (n.d.). Retrieved from https://medlineplus.gov/ency/presentations/100219_2.htm

[2] CPR Statistics. (n.d.). Retrieved from https://cprblog.heart.org/cpr-statistics/