



Element J

Problem Statement

One in six women are a victim of sexual assault. Women from the ages 18 to 24 who don't have the physical means to fight back are the ones most commonly attacked. The victims afterwards then suffer mentally, physically, and financially for something that they weren't responsible for.

Introduction & Background Information

The review of the product was done through two means. The first was contacting the expert from the beginning of the project, Vicki Hershberger. She was the Claremore School District Resource Officer and a teacher of self-defense, making her specially qualified to review the project. The second means of review was to consumers. We sent out a post to the same groups who had gave us justification for our project in the beginning. These people then got to tell us what they did and did not like about our project.

Juried Presentation Expert Credentials

We went back and talked to one of our previous experts named Vicki Hershberger. She's the Claremore Public School Resource Officer and her credentials are that she's a Rape Aggression Defense Instructor. Her main comments centered around that it was a pretty "genius idea" because it really was something that women could have on them all of the time that was easily accessible. Her judgement was pretty fair, she asked us a lot of questions like "Who would wear it?" and "How long will it take to take the cap off?" I think that this knowledge gave her the right to judge it fairly. Her only critique was that even though it's easily accessible, "3 seconds can be a long time in that situation, but I think that will sadly always be the case." We weren't able to get a follow up interview with our second expert Sylvia Starr.


Consumers/Users/Buyers

The information of consumer review was gained through a post with free comments. The commenting pool was approximately two hundred people. Everyone who reviewed the project loved it or the idea. They thought it would be very helpful and many said they would buy it. The only concerns the consumers had for the project where that a handful thought it was to bulky or


that it needed to look more fashionable. This is a fair critique because since the project was targeted towards women it is reasonable to assume they want it to be fashionable in order to wear it all the time. Almost a fifth of the people who gave feedback expressed concerns for the legality of the project. In many countries women are not allowed to have anything to fight back so therefore our project would be illegal in those places. Even in places close by like Texas the witchblade would be illegal. This was something we had not considered for the project and if we were to further develop the project we would make it more fashionable and potentially remove the lid in order to make it legal in more places. Overall the project was loved and many people would buy it if it was on the market.

PowerPoint, Project Display Board

Witchblade



Maya Rhoades
Emily Garrett
Evalynn Vierheller




Problem Statement

One in six women are a victim of sexual assault. Women from the ages 18 to 24 who don't have the physical means to fight back are the ones most commonly attacked. The victims afterwards then suffer mentally, physically, and financially for something that they weren't responsible for.

Scope of Purpose

Women and people in general in today's society are too much at risk for sexual assault and abuse. This is causing a lot of people to be afraid to just walk outside of their own homes. a lot of these cases, sexual assault can't be stopped because even if the women have something to defend themselves they can't reach it or it doesn't work. We wanted to create a product that can allow women to fight back.

Final Product



Justification



Technology: Inventor, a 3D printer, and Microsoft.
Engineering: Brainstorming, mock up, building.
Mathematics: Density, volume, area, tolerance.

- 1 in 6 women are sexually assaulted
- Annually in the U.S., rape costs more than any other crime totaling a staggering 127 billion dollars
- Just 13% of rapes result in a criminal conviction
- The victims suffer mentally, physically, and financially

Market Research



- The knife is very difficult to open, especially without given time to do so.



- The strap to carry it falls apart and is not secure.
- The alarm does not always work.

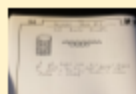


- It is easily activated by accident.
- The off button does not work and it is not loud enough.

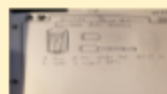
Concept Development



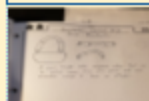
Product Concept Name: Hidden Blade Ring
Designer: Maya Rhodes and Evelyn Verheer
Product Description: A ring that contains a hidden blade.
Operation: The blade appears after pushing a small button.
Justification: Our survey indicated that people chose weapons over anything else.



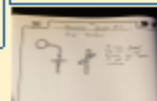
Product Concept Name: Cuff Bracelet Knuckles
Designer: Maya Rhodes
Product Description: A cuff bracelet with hand pyramid shapes.
Operation: The bracelet has finger holes in order to place it on your knuckles, to increase damage in punching.
Justification: Our survey indicated that people chose weapons over anything else.



Product Concept Name: Retractable Baton Necktie
Designer: Maya Rhodes
Product Description: Series of 4 cylinders that fold into one.
Operation: The cylinders swing open into a small baton.
Justification: Our survey indicated that people chose weapons over anything else.



Product Concept Name: PunishNun chucks
Designer: Maya Rhodes
Product Description: A punn with weighted handles.
Operation: The handles can be pulled away and used to harm an attacker.
Justification: Our survey indicated that people chose weapons over anything else.



Product Concept Name: Sharp Keychain
Designer: Emily Gerrit
Product Description: A sharp cross shaped keychain.
Operation: The keychain goes between your fingers to jab at someone.
Justification: Our survey indicated that people chose weapons over anything else.

Rank	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Total
Hidden Blade Ring	1	1	1	1	1	1	1	1	1	1	10
Retractable Baton Necktie	1	1	1	1	1	1	1	1	1	1	10
Cuff Bracelet Knuckles	1	1	1	1	1	1	1	1	1	1	10
PunishNun chucks	1	1	1	1	1	1	1	1	1	1	10
Sharp Keychain	1	1	1	1	1	1	1	1	1	1	10
Hidden Blade Ring	1	1	1	1	1	1	1	1	1	1	10
Retractable Baton Necktie	1	1	1	1	1	1	1	1	1	1	10
Cuff Bracelet Knuckles	1	1	1	1	1	1	1	1	1	1	10
PunishNun chucks	1	1	1	1	1	1	1	1	1	1	10
Sharp Keychain	1	1	1	1	1	1	1	1	1	1	10

Our final decision was the Hidden Blade Ring. It is harmful, but non lethal. It's also very compact/discrete, easily accessible, inexpensive, and is easy to use.

Prototype Development

Market Analysis

When looking at other weapons, most of them are not easily accessible, or they don't work. According to customer reviews of various products, the products broke easily as well.

Materials List

ABS Plastic: 52K
 Steel: 55K

How It's Made

Using 3D modeling software called Inventor, we created a three dimensional digital file of the ring. That file was then converted to STL and printed in a 3D printer.

Test 1



Summary

The tests indicated that our product is quick to use and easily accessible and cause enough damage to fend off an attacker.

Test 2

Test Results

	Test 1: 100% hit rate	Test 2: 100% hit rate	Test 3: 100% hit rate	Test 4: 100% hit rate	Test 5: 100% hit rate	Average
Test 1	1.00	1.00	1.00	1.00	1.00	1.00
Test 2	1.00	1.00	1.00	1.00	1.00	1.00
Test 3	1.00	1.00	1.00	1.00	1.00	1.00
Test Average	1.00	1.00	1.00	1.00	1.00	1.00



Test 3



Test 4

Mock Up



Expert Review

Officer Vicki Hershberger
 CPS Resource Officer

"It's a pretty genius idea, very easily accessible."




Witchblade


Engineering Design and Development
Northeast Technology Center
Ring Knife





Team Members





Maya Rhoades



Emily Garrett



Evalynn Vierheller


Problem Statement



One in six women are a victim of sexual assault. Women from the ages 18 to 24 who don't have the physical means to fight back are the ones most commonly attacked. The victims afterwards then suffer mentally, physically, and financially for something that they weren't responsible for.




Topic Selection




Brainstorming

- "What do I know?"
- "What do I love?"
- "Don't you hate it when..."


- Women's Issues
 - Feminine Products are too noisy
 - Hair ties break too easy
 - Sexual assault is a big issue




Attack Paths




- Health and Safety
 - PTSD
 - Death
- Economic
 - Loss of Income
 - Counseling Expenses
- Technical
 - 63.2% of women experience some form of sexual assault
- Education
 - Prevention is societal
- Legal
 - 3% of rape cases result in a conviction



Justification




63.2% of women experience some form of sexual assault




3% of rape cases result in a conviction

- Women in today's society are at a very high risk of sexual assault
- Every 98 seconds someone is sexually assaulted and more than half of those sexually assaulted don't report it.
- 81% of women say they have been the victim of some form of sexual assault



81% of women say they have been the victim of some form of sexual assault



Market Research



Runner Personal Alarm



Pink Key Knife



130 dB Personal Alarm



Fisher Defensive-Go Guarded Ring

STEM Applications



- Science: None
- Technology: Inventor, 3D printer, Microsoft
- Engineering: Design Process, Brainstorming
- Math: Area, Volume, Density

Design Requirements



- Compact/Discrete
- Easily Accessible
- Durable
- Harmful
- Non-Lethal
- In-expensive
- Easy to use

Decision Matrices


Table 1.1: Comparison of Design Solutions


Solution	Size	Cost	Weight	Material	Strength	Portability	Reliability	Usability
Runner Personal Alarm	2	2	2	2	2	2	2	2
Pink Key Knife	2	2	2	2	2	2	2	2
130 dB Personal Alarm	2	2	2	2	2	2	2	2
Fisher Defensive-Go Guarded Ring	2	2	2	2	2	2	2	2

Table 1.2: Comparison of Design Solutions



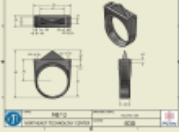
Solution	Size	Cost	Weight	Material	Strength	Portability	Reliability	Usability
Runner Personal Alarm	2	2	2	2	2	2	2	2
Pink Key Knife	2	2	2	2	2	2	2	2
130 dB Personal Alarm	2	2	2	2	2	2	2	2
Fisher Defensive-Go Guarded Ring	2	2	2	2	2	2	2	2

First Prototype Attempts





Technical Drawing

Materials used



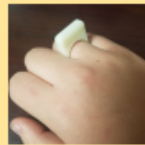
- Our detailed prototype was made out of ABS plastic (3D printed material). Each ring that we printed used 52¢ worth of material, so in all it has costed us \$5.20
- Our rough metal prototype was made out of steel and would cost about 55¢ worth of material to manufacture.



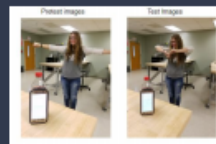
Testable Prototypes



Test 1 - Compact/Discrete



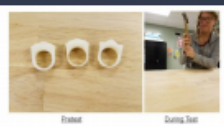
Test 2 - Easily Accessible



	Test 1 - points scored to video	Test 2 - points scored above threshold	Test 3 - points scored in package	Test 4 - points scored in hand	Test 5 - points scored in bag	Average
Session 1	1.18	1.81	2.37	1.88	1.88	1.755
Session 2	1.27	1.33	1.33	1.28	1.13	1.262
Session 3	1.58	1.88	1.33	1.88	1.25	1.552
						Test average



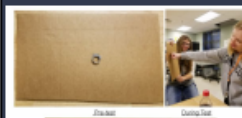
Test 3 - Durability



Post-test

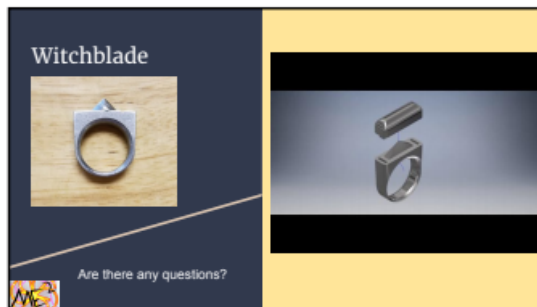
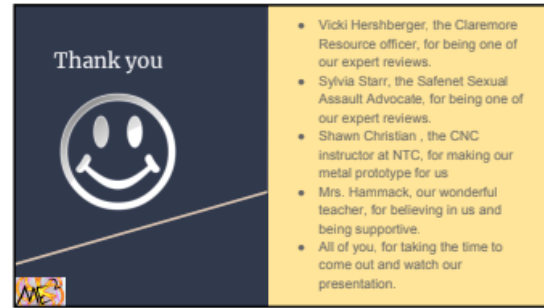


Test 4 - Harmful



Post-Test





Conclusion

The project got an overwhelming amount of positive feedback. All of the consumer feedback suggested that everyone loves the design and would love to have one for themselves. The design criteria of the witchblade being discrete was reinforced by the feedback because everyone said they would not notice it. This feedback shows that the project is effective because the consumer base that was target would buy the product and the ring can be used for self-defense. In moving forward with this project there might be a redesign in looks so the ring is more fashionable. This gives a basis for potentially patenting and distributing the product in the future.