EML4551L-2

Device to Stop Human Trafficking

Team 523

Virtual Design Review 2

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Engineering

Team Introductions

Abraham Barron
Prototyping Engineer

Alina Montoto
Design Engineer

Mafuor Tanji
Computer Engineer

Melanie Munroe
Project Manager Test Engineer

Oswaldo Machado
Electrical Engineer

D'Angelo Senat
Industrial Engineer

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Sponsor

FAMU FSU College of Engineering Dean's Office

Engineering Advisor
Dr. Shayne McConomy

Entrepreneurship Advisor
Dr. Michael Devine

Alina Montoto

Objective

The objective of this project is to save an adolescent from trafficking by employing the use of engineering tools

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Background

A recurrent, prevalent theme amongst children who are trafficked is having parents who traffic them to support their drug habit

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Key Goals

- Rescue an adolescent from a dangerous situation
- Prevent false alarms
- Design a device that is user friendly and discrete to the public eye
- Spread awareness around Tallahassee, FL

Assumptions

- The adolescent is of able mind and body

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Markets

Nurse Practitioner Student Creates Screening To Identify Human Trafficking Victims

Primary Market

✋ Adolescents in dangerous situations

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Markets

Secondary Markets

- Tallahassee Police Department
- Non-Profits related to Human Trafficking
- Individuals whose safety feels compromised

Nurse Practitioner Student Creates Screening To Identify Human Trafficking Victims

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Targets and Metrics

NOT FOR SALE

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Targets

Function	Metric	Target
Attract	Percentage of people within the age 12-15 who can see the sign (%)	75% of potential victims aged 12-15 can see the lenticular sign
Surveillance	Size of footage recorded during altercation (GB)	2.25 GB, at 480p resolution, recorded for 5 min
Communication	Time taken to initiate communication (sec)	Communication achieved in 3 seconds
Avoid False Alarms	Percentage of valid alarms (%)	98% of the time the device is used, there is a valid emergency
Alert	Time taken for information to be transmitted from device to authorities (sec)	Transmission time of data: 2 seconds
	Response time of Authorities (min)	Response time of 6 minutes
Location	Location in feet	Accurate within 16 feet

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Concept Generation
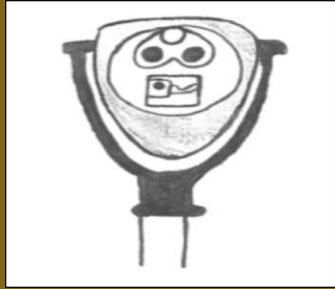
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Tools Used
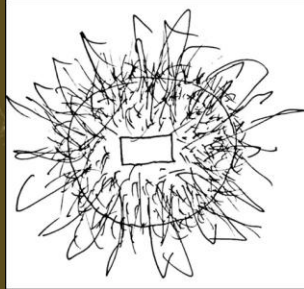
- ✋ **Biomimicry**
- ✋ **Anti-Problem**
- ✋ **Forced Analogy**
- ✋ **Battle of Perspectives**
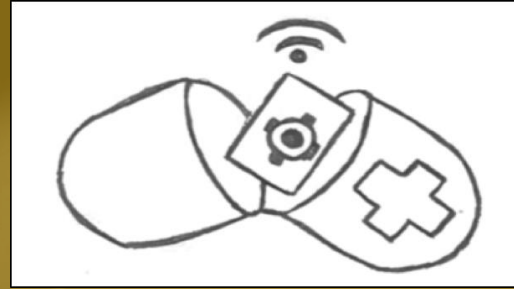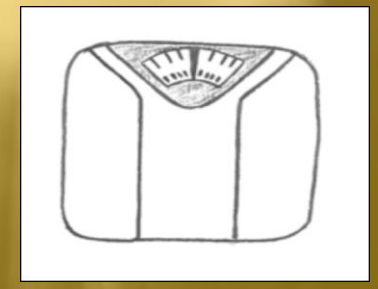- ✋ **Morphological Chart**

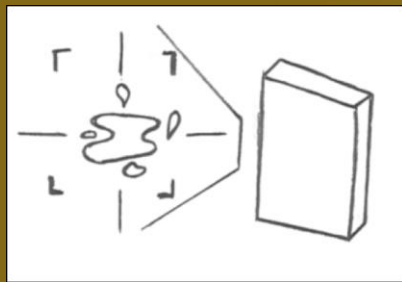Oswaldo Machado

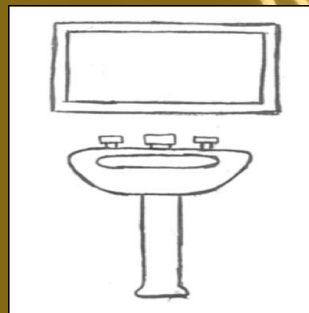FAMU-FSU
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Concepts

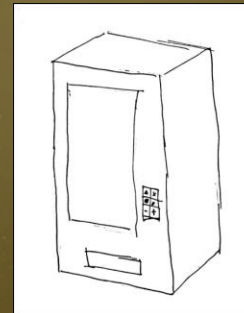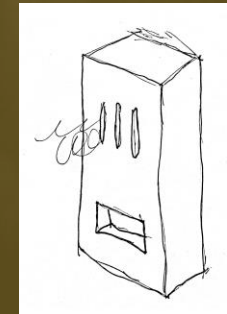Smart Binoculars

GPS Burr

GPS Pill

Smart Scale

Fluid Scanner

Two-Way Mirror

Vending Machine

Breathalyzer

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High Fidelity Concept 1

Vending machine

Finger tip reader/button

Dispenser of GPS Tacker

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High Fidelity Concept 2

GPS Burr

GPS Tracker

Hooks & Latches

0.20 inches
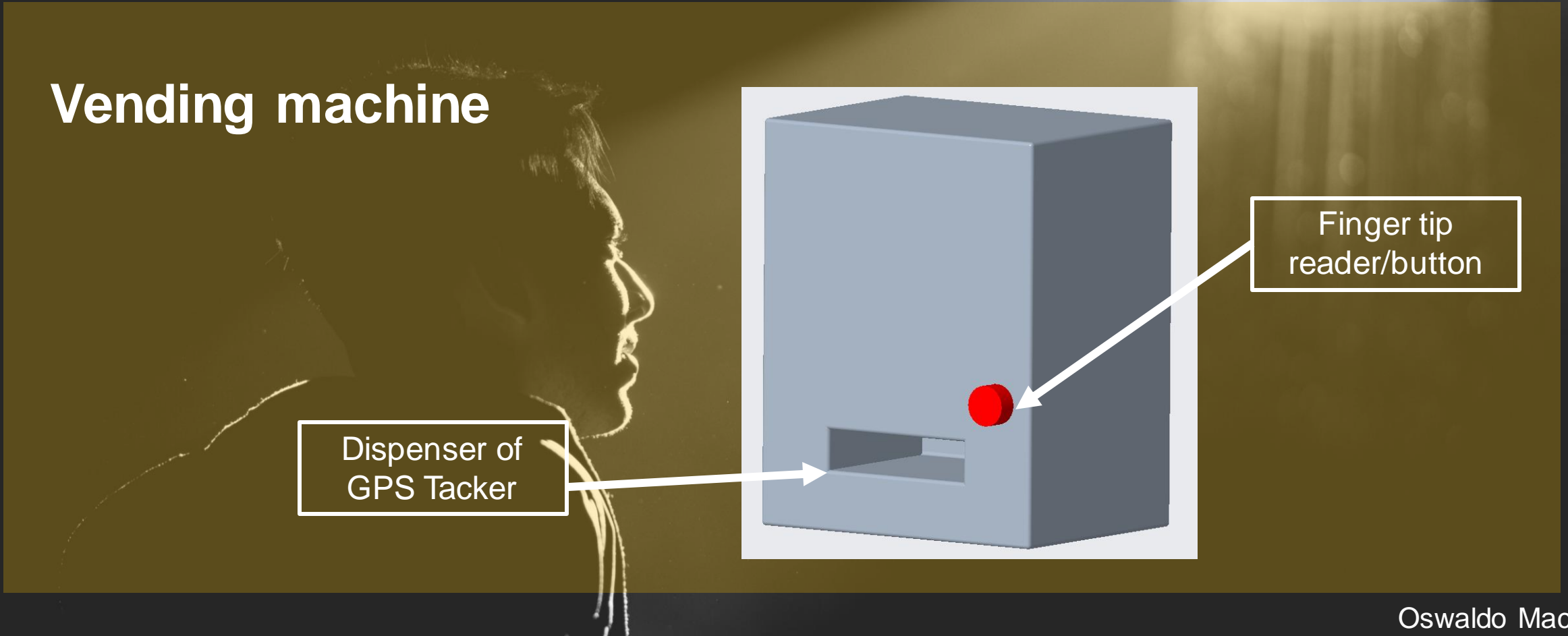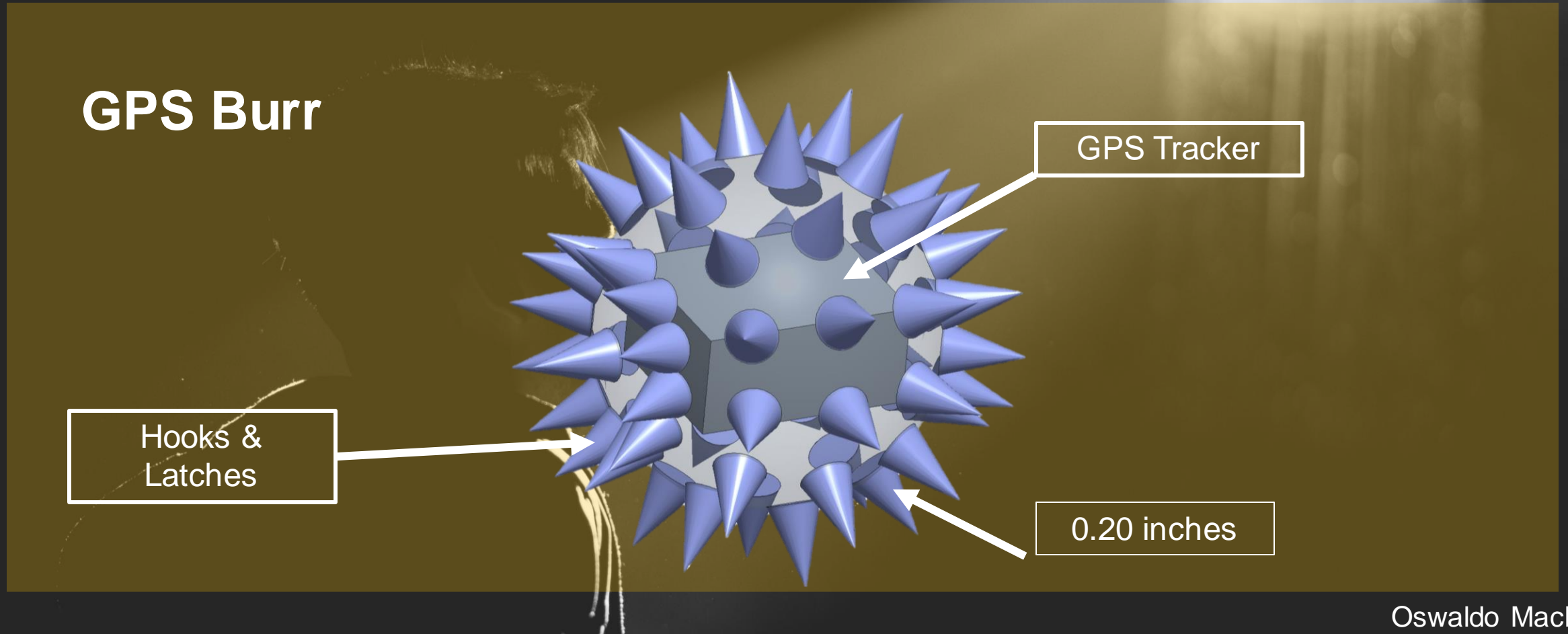
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High Fidelity Concept 3

Breathalyzer

Breathalyzer

Dispenser

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Concept Selection

☝Analytically evaluate the top concepts to determine the most suitable concept to meet the scope

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Importance Weight Factor

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House of Quality

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Pugh Chart

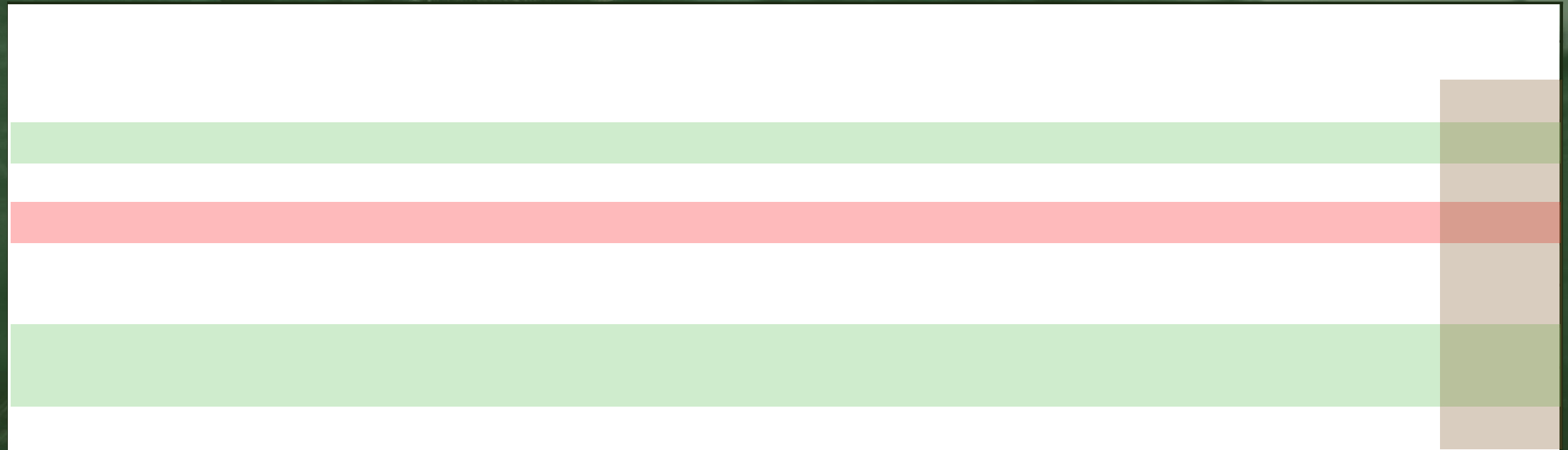| Engineering Characteristics	Datum: ANAR Sign	Concept 1: Vending Machine	Concept 2: GPS Burr	Concept 3: Breathalyzer	Concept 4: GPS Pills	Concept 5: Two-Way Mirror	Concept 6: Park Binoculars	Concept 7: Weight Scale	Concept 8: Fluid Scanner
Percentage of People Who can See the Sign	Datum	S	S	S	S	+	+	+	S
Time Taken to Initiate Communication		+	+	+	+	+	+	+	-
Percentage of Valid Alarms		+	+	-	+	+	-	-	-
Accuracy Associated with GPS Tracker		+	+	S	+	S	S	S	S
System Memory for Images and Videos		+	S	S	S	S	+	+	+
Output Response Time to Notify Authorities		+	+	+	+	+	-	+	-
Duration of Video Recording		+	+	+	+	S	+	+	+
Required Comprehension Level		+	+	S	-	+	S	S	+
Height of Sign Asking if the Victim Needs Help		S	S	S	S	+	+	+	S
Response Time of Authorities		+	+	+	+	+	+	+	-
Sum of Pluses		8	7	4	6	7	6	7	3
Sum of Minuses		0	0	1	1	0	2	1	4
Rank		1	2	7	5	2	5	2	8

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Pugh Chart

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Analytical Hierarchy Process

Development of Candidate Set of Criteria Weights {W}								
Criteria Comparison Matrix [C]								
Engineering Characteristics	Percentage of People Who can See the Sign	Time Taken to Initiate Communication	Percentage of Valid Alarms	Accuracy Associated with GPS Tracker	System Memory for Images and Videos	Output Response Time to Notify Authorities	Duration of Video Recording	Required Comprehension Level
Percentage of People Who can See the Sign	1.000	0.200	0.333	0.143	3.000	0.111	3.000	0.200
Time Taken to Initiate Communication	5.000	1.000	3.000	0.333	7.000	1.000	5.000	1.000
Percentage of Valid Alarms	3.000	0.333	1.000	0.200	7.000	0.333	5.000	0.143
Accuracy Associated with GPS Tracker	7.000	3.000	5.000	1.000	5.000	3.000	9.000	3.000
System Memory for Images and Videos	0.333	0.143	0.143	0.200	1.000	0.143	1.000	0.200
Output Response Time to Notify Authorities	9.000	1.000	3.000	0.333	7.000	1.000	7.000	0.333
Duration of Video Recording	0.333	0.200	0.200	0.111	1.000	0.143	1.000	0.200
Required Comprehension Level	5.000	1.000	7.000	0.333	5.000	3.000	5.000	1.000
Sum	**30.667**	**6.876**	**19.676**	**2.654**	**36.000**	**8.730**	**36.000**	**6.076**

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Analytical Hierarchy Process
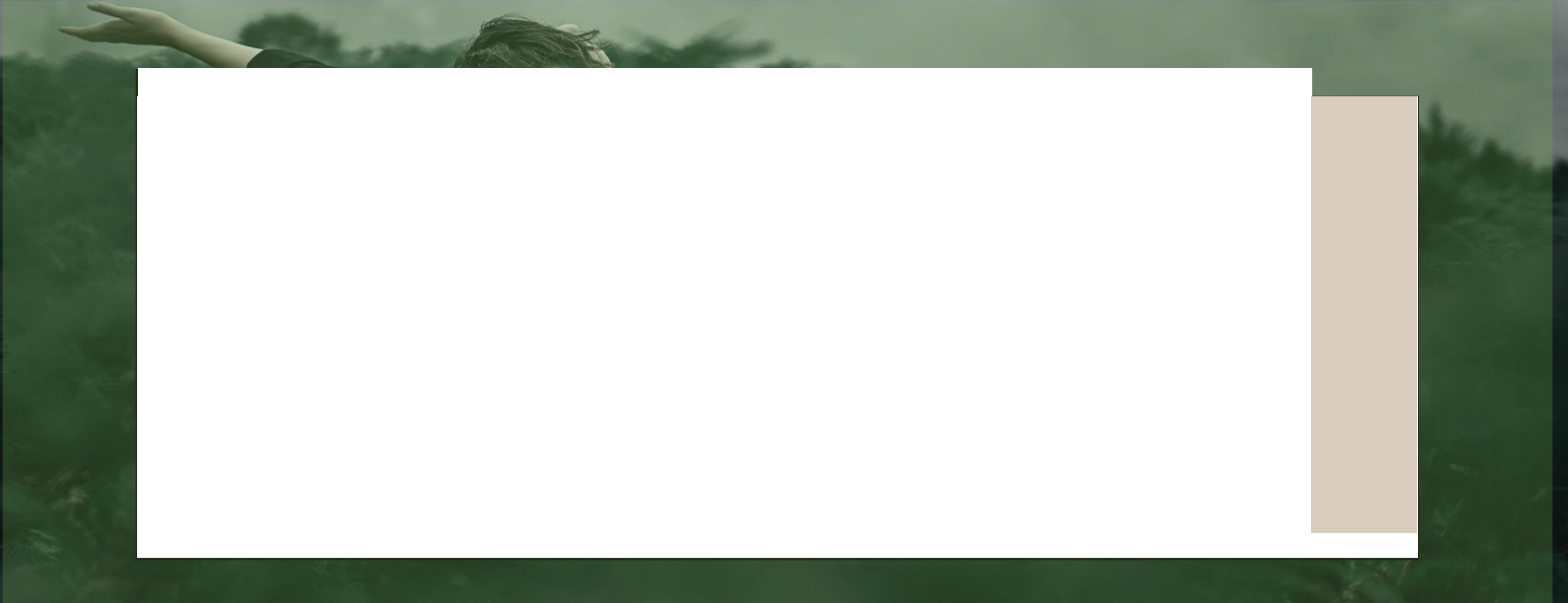
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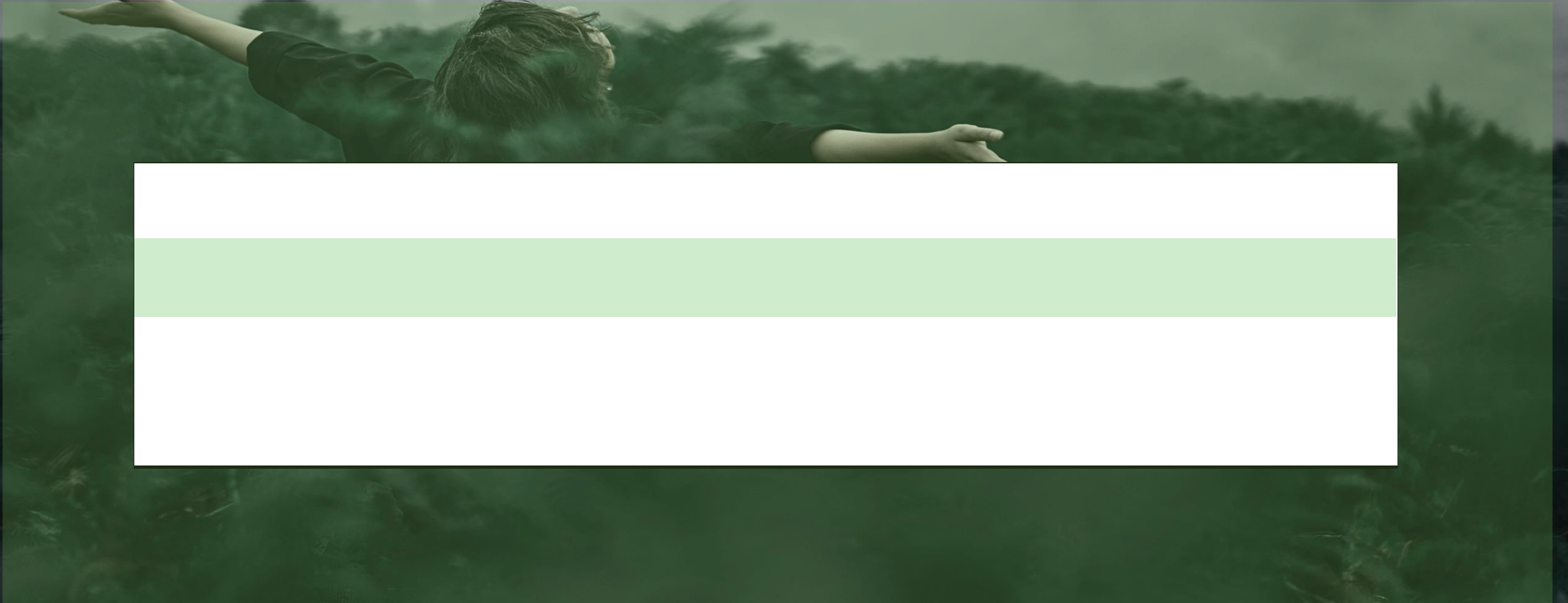# Analytical Hierarchy Process

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Analytical Hierarchy Process
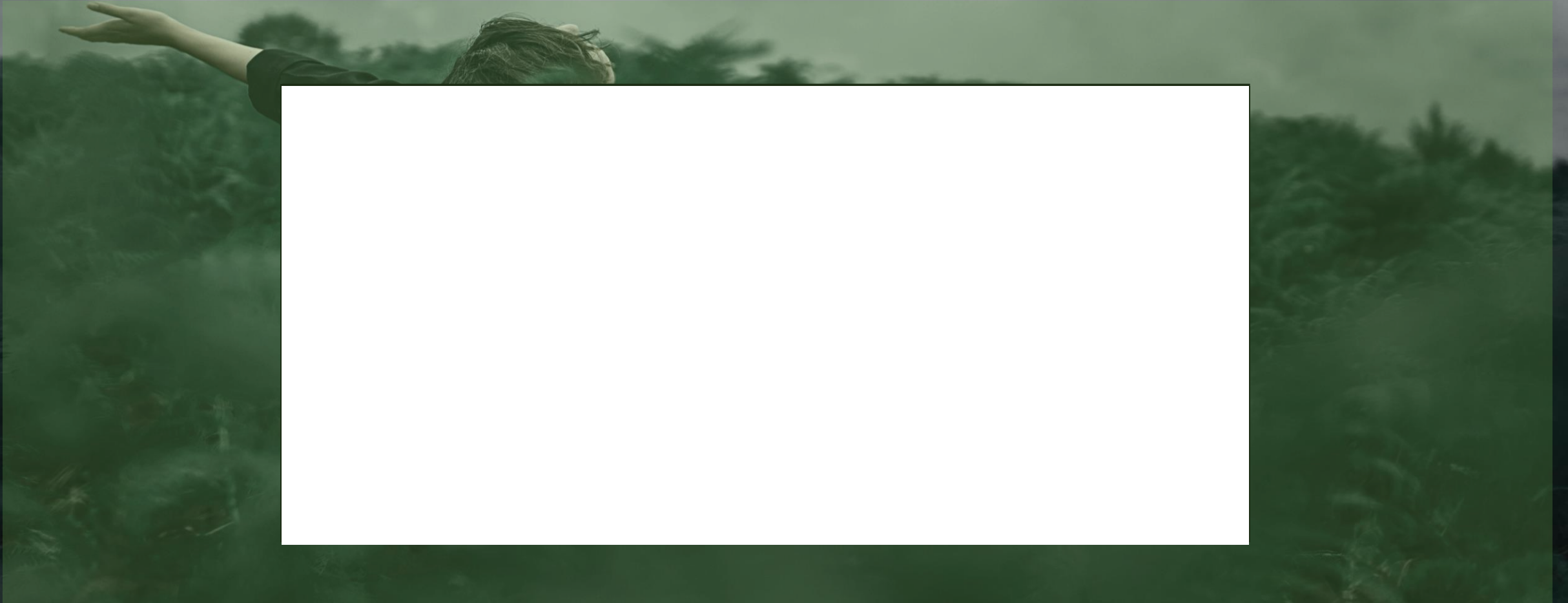
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Analytical Hierarchy Process

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Final Selection

Pugh Charts identified the **Vending Machine** as the most suitable concept for the scope

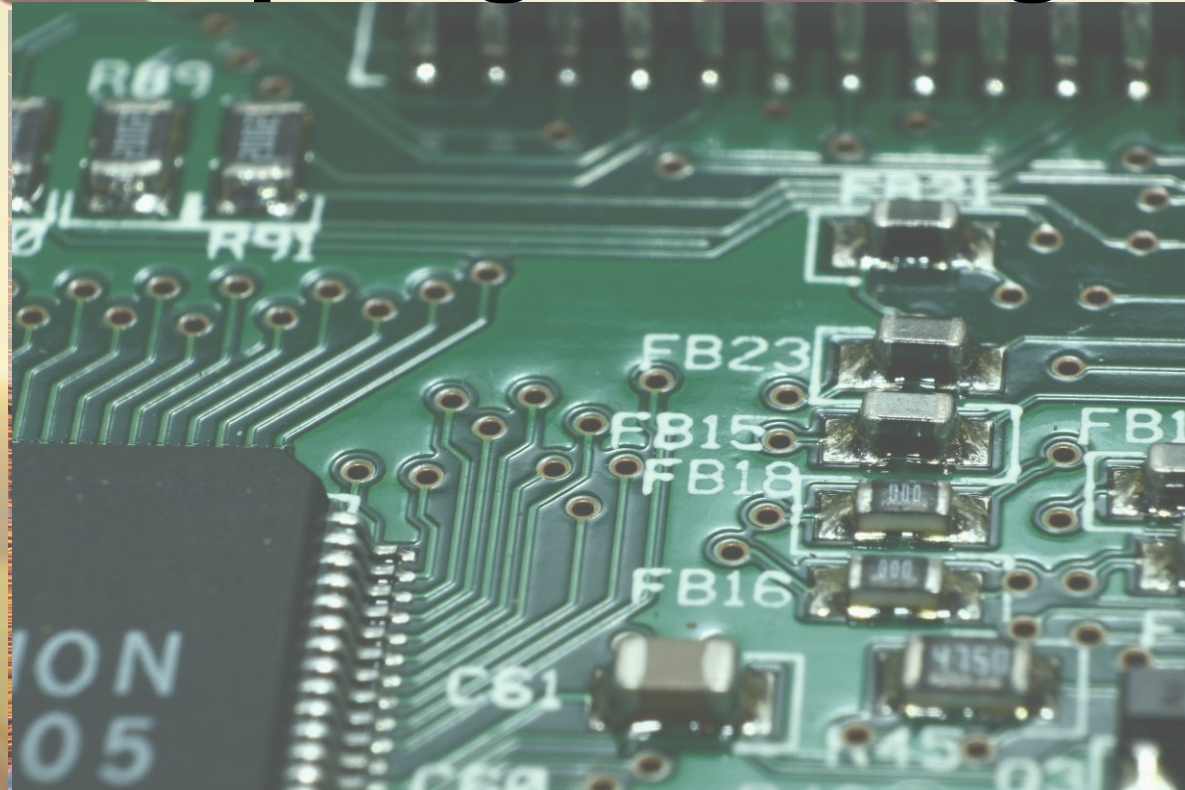Analytical Hierarchy Process analytically verified that the **Vending Machine** concept is the most suitable concept for the scope

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Future Work

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References

- Title page: https://www.pexels.com/@emre-kuzu-1112138
- Arms outspread background image: https://www.pexels.com/@kqpho
- Machining image: https://www.pexels.com/@rezwan
- Circuit board image: https://www.pexels.com/@pixabay
- Free from Chains image: https://www.youtube.com/watch?v=jqNB7eSBDSE
- Girl in Markets Slides: https://www.npnow.com/nurse-practitioner-student-creates-screening-to-identify-human-trafficking-victims/
- Hand to the face and arm extending: https://www.mobileodt.com/blog/human-trafficking-in-the-er-how-to-recognize-it/
- Helping hand: https://alabamanewscenter.com/2019/03/20/can-help-fight-human-trafficking/
- Note for sale: https://inpublicsafety.com/2019/02/the-need-to-combat-human-trafficking-worldwide/
- Questions slide: https://www.pexels.com/@daniel-reche-718241

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Questions

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