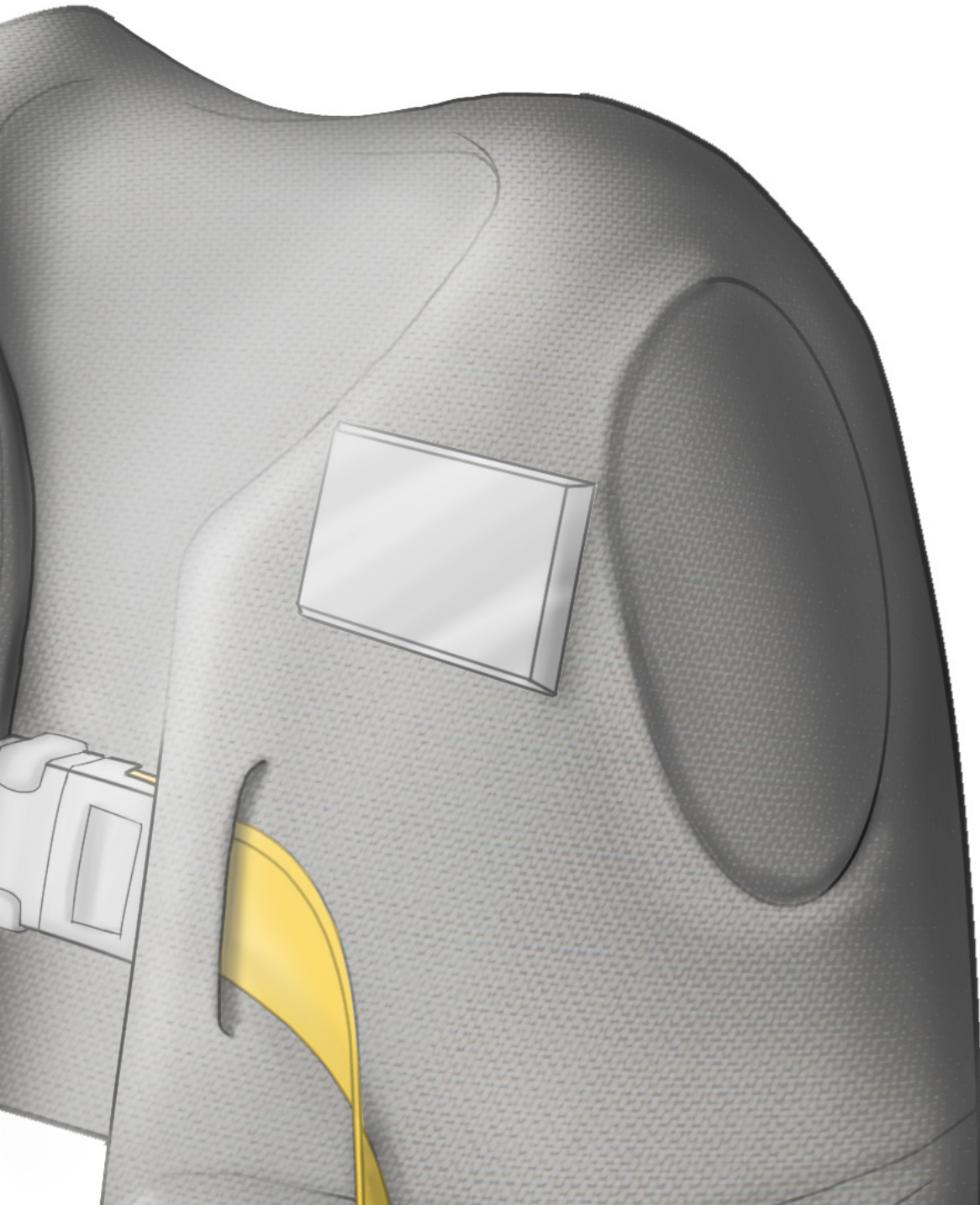# Vest Defibrillator Design (Professional Users)

By Matt Nouv

A.E.D. Introduction

What Is an A.E.D.?

A.E.D. = Automated External Defibrillator

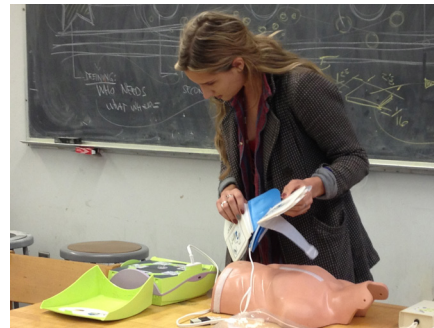*Use as an **EMERGENCY TOOL** for individual who is having a CARDIAC ARREST

How Is a Defibrillator Use?

*The Defibrillator temporarily **stun the patient's heart**, allowing the heart to resume **beating effectively**

Step 1: Remove cover and then press **POWER BUTTON**

Step 2: Remove plastic sheet from Adult pads and **APPLY PADS TO PATIENT**

Step 3: **APPLY SHOCK TO PATIENT** and wait for further vocal and visual instructions

Step 4: **APPLY CPR** and repeat cycle

A.E.D. Introduction

Who uses the A.E.D.?   Users such as:

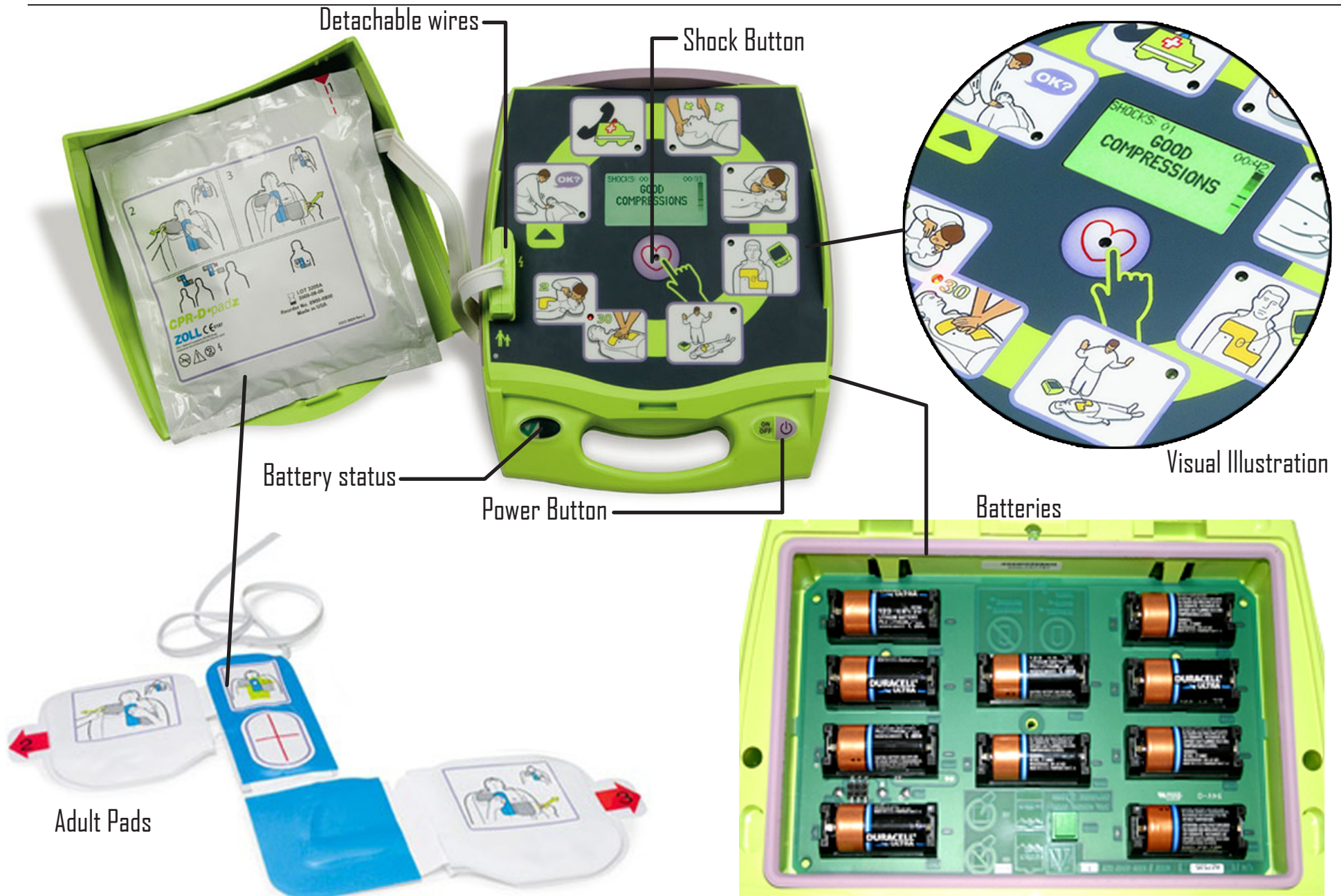Nurses at Retirement Community
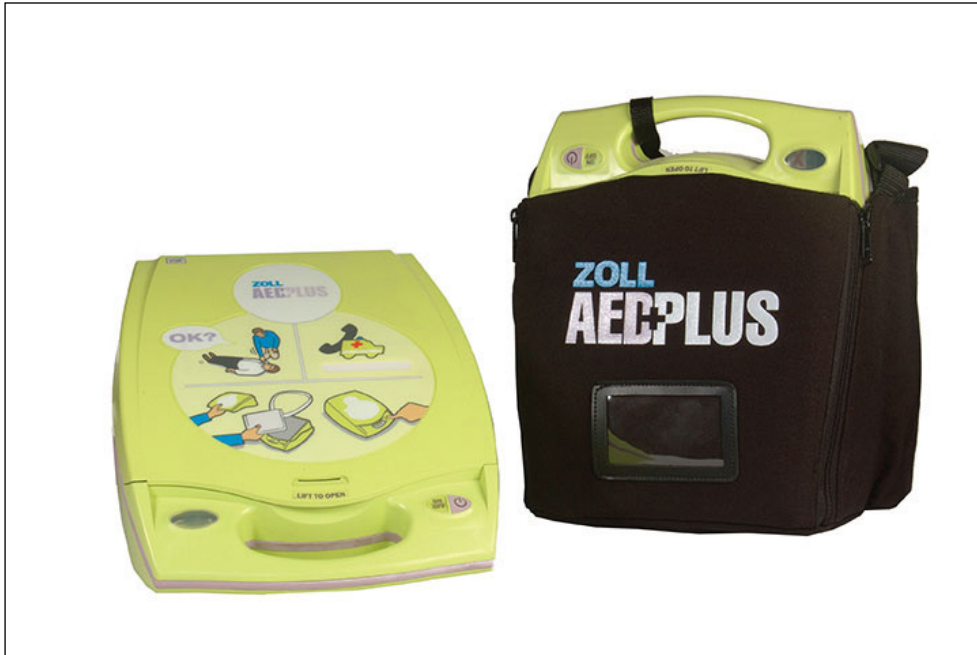

National Guards

State Troopers

Citizens

Zoll A.E.D. Plus main functions:

Detachable wires

Shock Button

Battery status

Power Button

Batteries

Visual Illustration

Adult Pads

SHOCKS: 00   00:00
GOOD
COMPRESSIONS

OK?

SHOCKS: 01   00:42
GOOD
COMPRESSIONS

OK?

30

Zoll A.E.D. Plus main functions:

Have a personal bag to carry around

Tools for emergency:

Oxygen Mask
Medical gloves
Trauma Scissors
Razor

Group Experiment

Zoll A.E.D. steps of procedure:

	Power Button	Lid Off	Peel off Plastic from Pads	Apply Pads	Apply Shock	Apply CPR
01	✗	✓	✓	✓	✗	✗
02	✗	✓	✓	✓	✓	✓
03	✗	✓	✗	✓	✓	✓

Heuristic Evaluation

Comments about steps of procedure:

- When taking off lid, the AED should automatically turn on without manually press power button

- The number 30 and 2 is confusing because I dont know CPR.

- The illustration of the pads has a different colour than the actually pads which is blue, not yellow.

- Lack of information

- Nervous of using a new product

      I think the most significant part of the problem of this particular AED design is the lack of clarity on visual and verbal context information of how the person should use an AED. But most people don't know what an AED is use for.

Against the heuristics of:

Users' control of the product

Reflect the users' workflow

Help users recover from errors

Keeping it simple, design for information clarity, follow accessibility guidelines, and readability.

Heuristic Evaluation
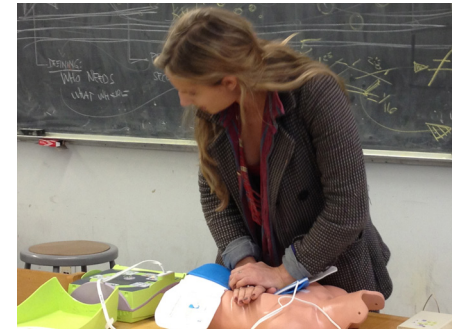
Fixed steps for Zoll A.E.D. PLUS :

UNPACKING	PAD PLACEMENT	SHOCK DELIVERY	CPR DELIVERY
Open Cover	Remove Plastic Tabs	AED analyzing	Stand by
Press Power Button	Remove Hair, Metal from Patient	Press Flashing Shock button	Apply 30 compressions
Support Patient with Cover	Place Pads on Chest + Ribcage	Repeat	Give 2 breaths

Heuristic Evaluation

Essential steps for Zoll A.E.D. PLUS :
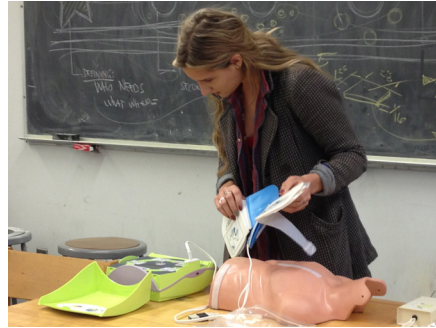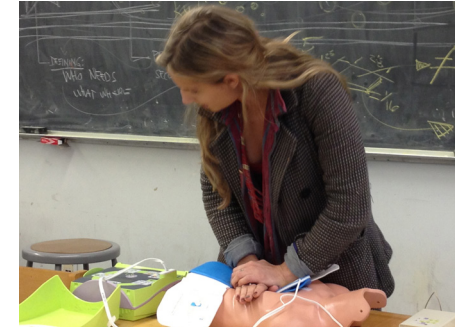
UNPACKING	PAD PLACEMENT	SHOCK DELIVERY	CPR DELIVERY
Open Cover (auto power on)	Remove Plastic Tabs	AED analyzing	Provide simple CPR instructions via vocal/visual
	Remove Hair, Metal from Patient	Press Flashing Shock button	Apply 30 compressions and 2 breaths
	Place Pads on Chest + Ribcage	Repeat	Repeat

Product Evaluation

Unpacking :

1   2   3

Causes delay and frustration
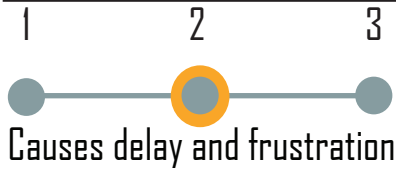
PROBLEM:

Require to PRESS power button

Prevent user to improve workflow and lack of visual communication with AED product during procedure.

SOLUTION:

Will AUTOMATICALLY turn on when open

Improve workflow and communication with AED product during procedure.
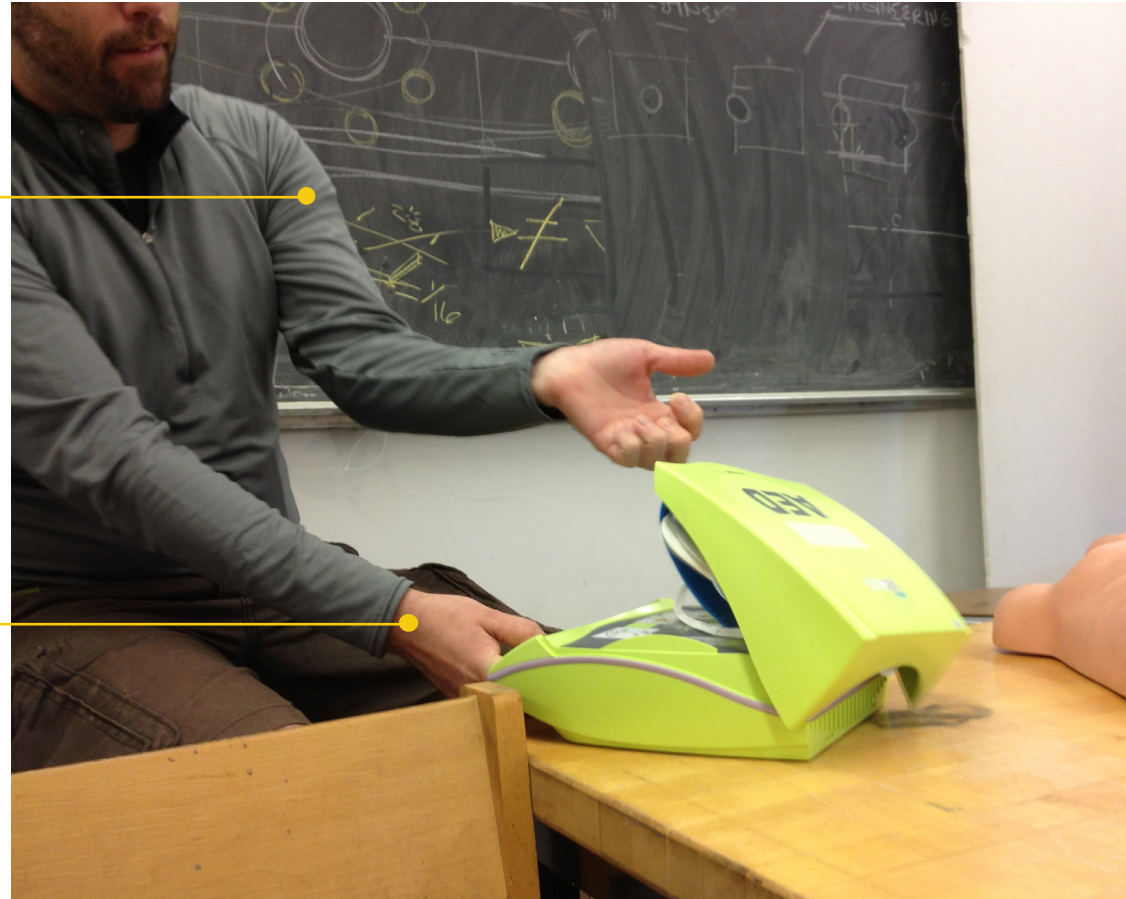
Product Evaluation

Pad Placement :

| 1 | 2 | 3 |
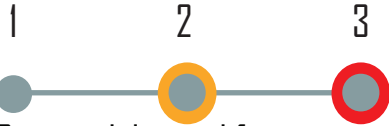
Causes delay and frustration
Prevents completion of a task

PROBLEM:

The illustrations have UNSPECIFIC COLORS

Confusing colors of visual instructions with the adult pads.

SOLUTION:

The Illustrations have CONSISTENT COLORS with product

Improve visual communication with user.
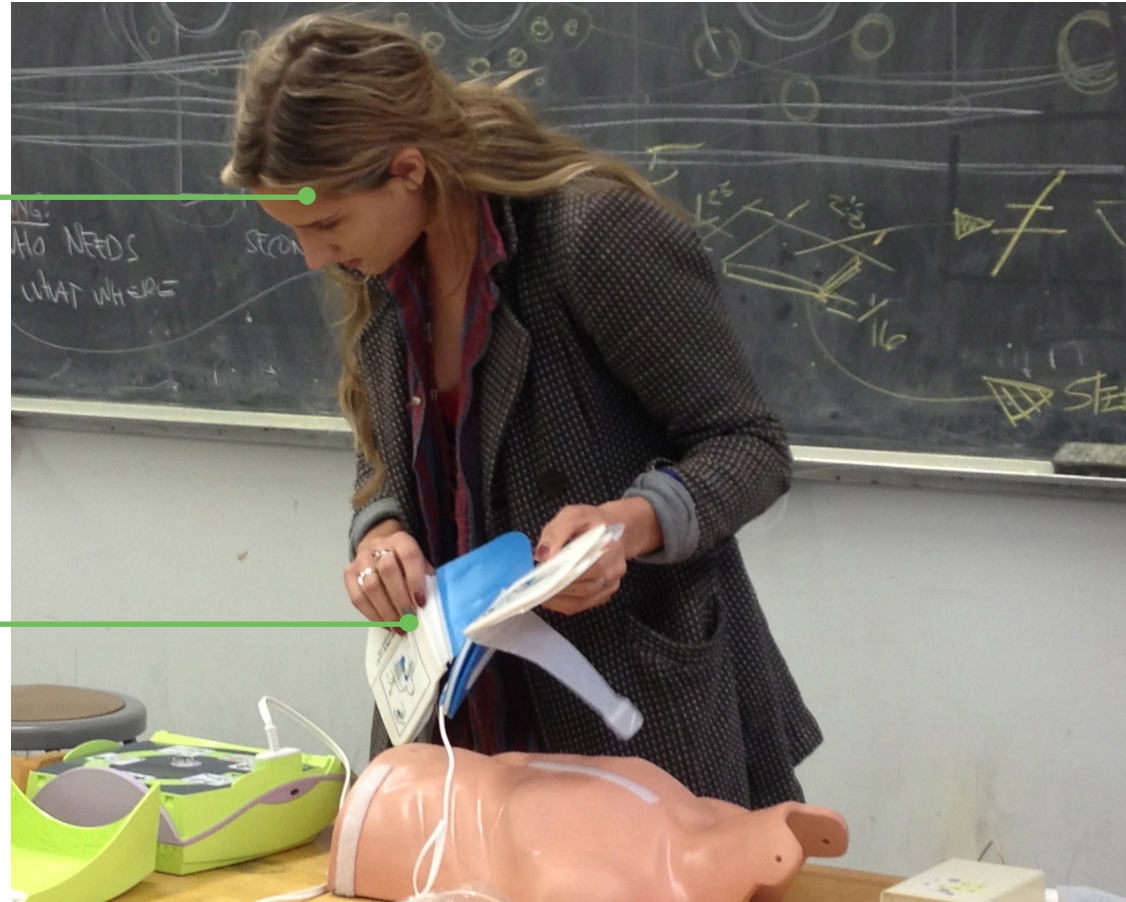
Shock Delivery :

1   2   3

Causes delay and frustration
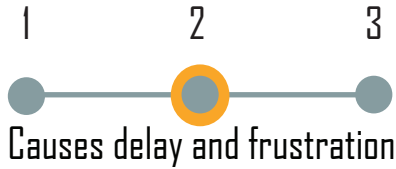
PROBLEM:

The shock button is HARD TO PRESS

Delay procedure and risk of patient's survival.

SOLUTION:

Will AUTOMATICALLY SHOCK patient when after analyzing patient

More efficient and allow the user to be more in control during the procedure.

Product Evaluation

CPR Delivery :

1   2   3

Causes delay and frustration

Prevents completion of a task
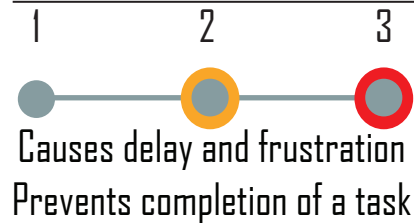
PROBLEM:

The product is unclear for TIME LENGTH of CPR

User cannot give effective CPR on patient. Product request heavy compressions from user.

SOLUTION:

Give vocal/visual instructions of APPROPRIATE CPR for new user

Help users recover from errors and follow accessibile guidelines step by step.
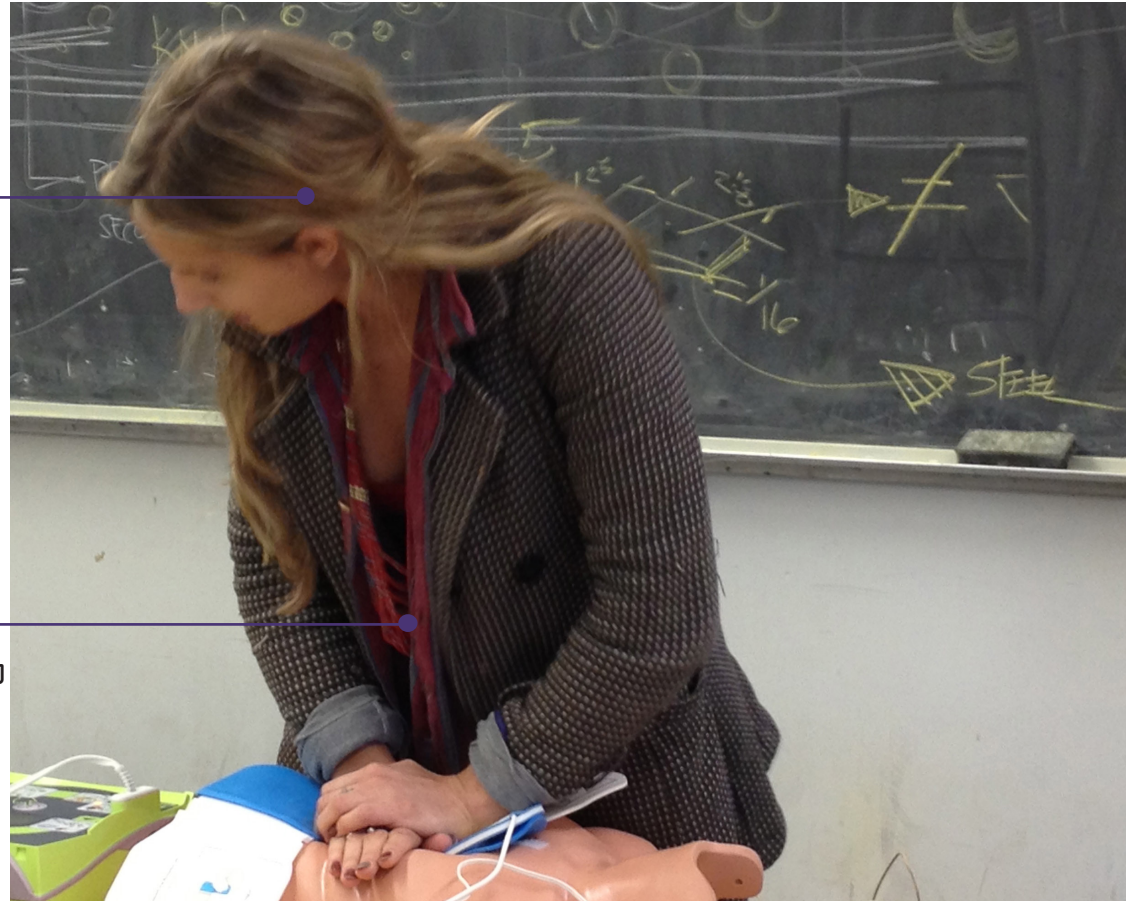
Group Development- Defibrillator Concepts:

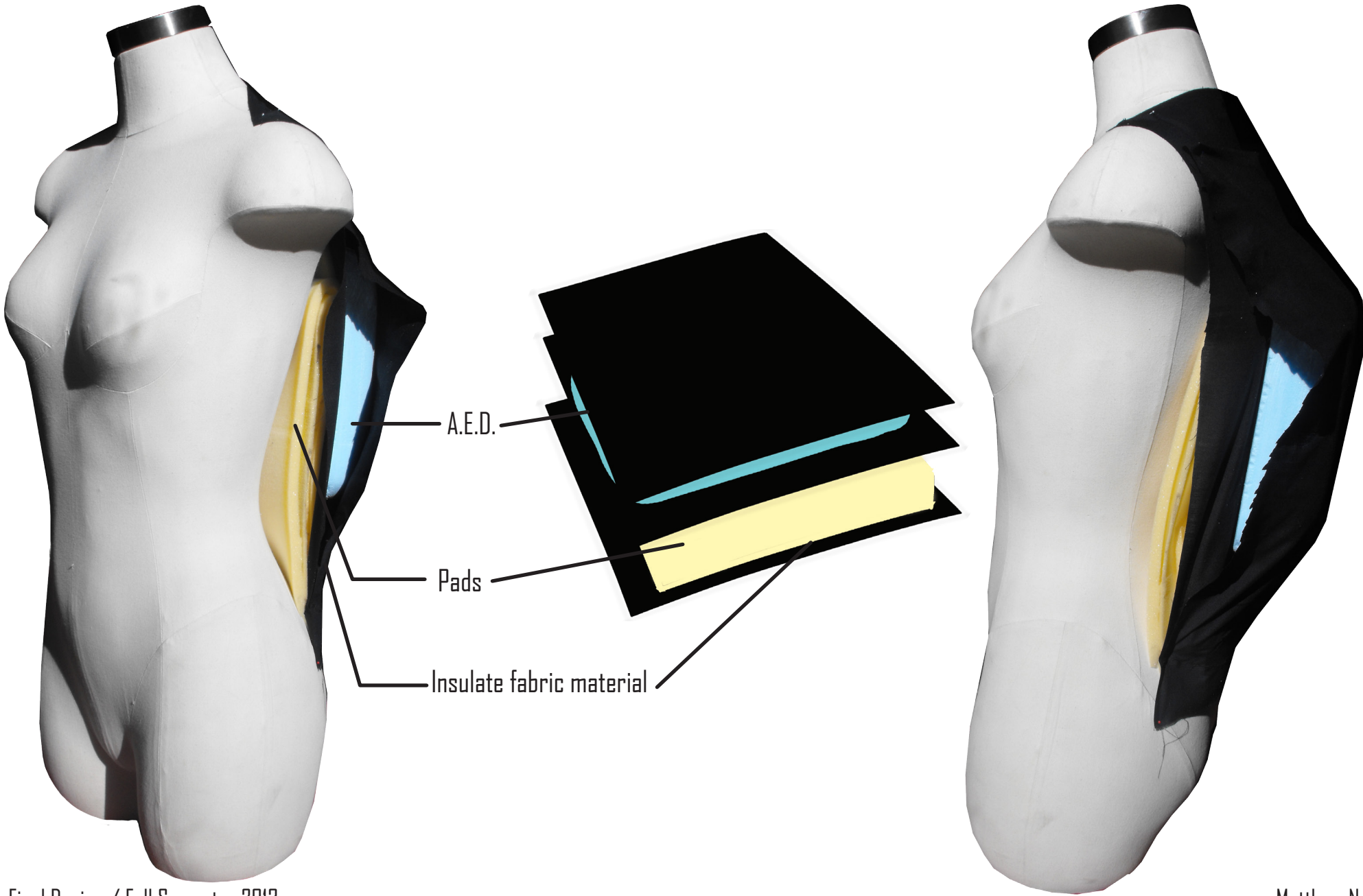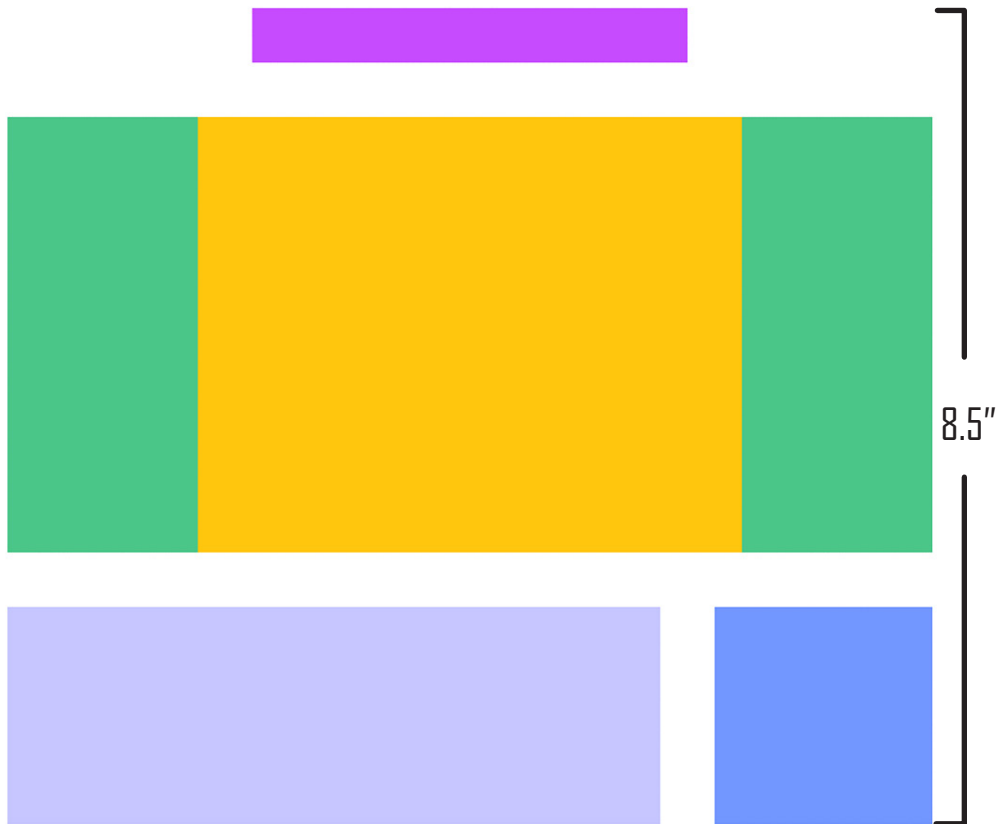| Location	Pads	Power Button	Main Feature
- On person (strapped vest or backpack)	- Pads are on corresponding sides on pull out of AED- connection for pads (wide-thin wires attached to AED) - Have release button by pad handle & reusable - Adult/child pad sizes	- ON button by vest (illuminate green for ON & red OFF) - SHOCK button included on vest	- PORTABLE BACKPACK (Optional: LED)
- Post on wall	- Pads are in single package; open by peel off, then stick onto patient - Two color indication for chest & abdominal	- Auto ON when peel off pads and stick onto patient	- SIMPLE OFFICE SPACE (Optional: LED)
- Ambulance, Fire truck, etc.	- Reusable pad handles; have corresponded sides for new pads - Two separated wires and handles - Two color indication for chest & abdominal	- Auto ON by removing AED from dock - Illuminate when use	- CHARGING DOCK (LED)
- Home environment	- Reusable pad handles - Have opposite sides for new pads - Two separated wires	- Auto on when extending it by hand slots	- TWO HANDLE AED SPLIT (shrink/expand volume)

Draft Concepts of Defibrillator Portable Backpack:

A.E.D.

A.E.D.

Chest Pads

Straps

Pads

Wide-Thin Wires

Shock button

Straps for fit
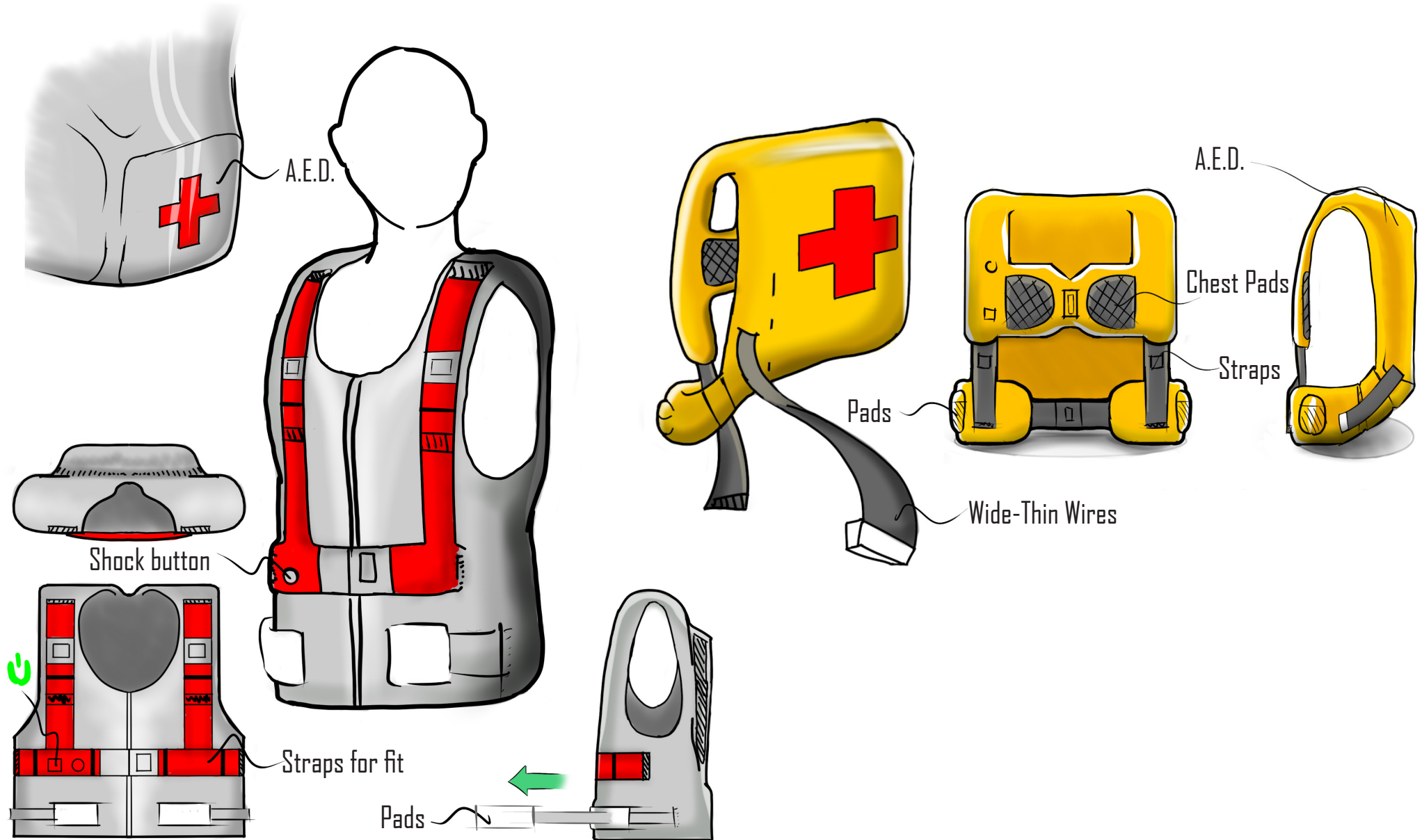
Pads

Human Factors: Materials

A.E.D.

Pads

Insulate fabric material

A.E.D. Internal Components and Proportion

TOP VIEW

8.5"

SIDE VIEW

2.5"

10"

Electronic Boards (4" x 4" x .5")

Interaction Board (4" x 5" x .25")

Connector Board (1" x 4" x .5")

Power Entry Module (2" x 2" 1.5")

Custom Battery Pack (2" x 6" x 1")
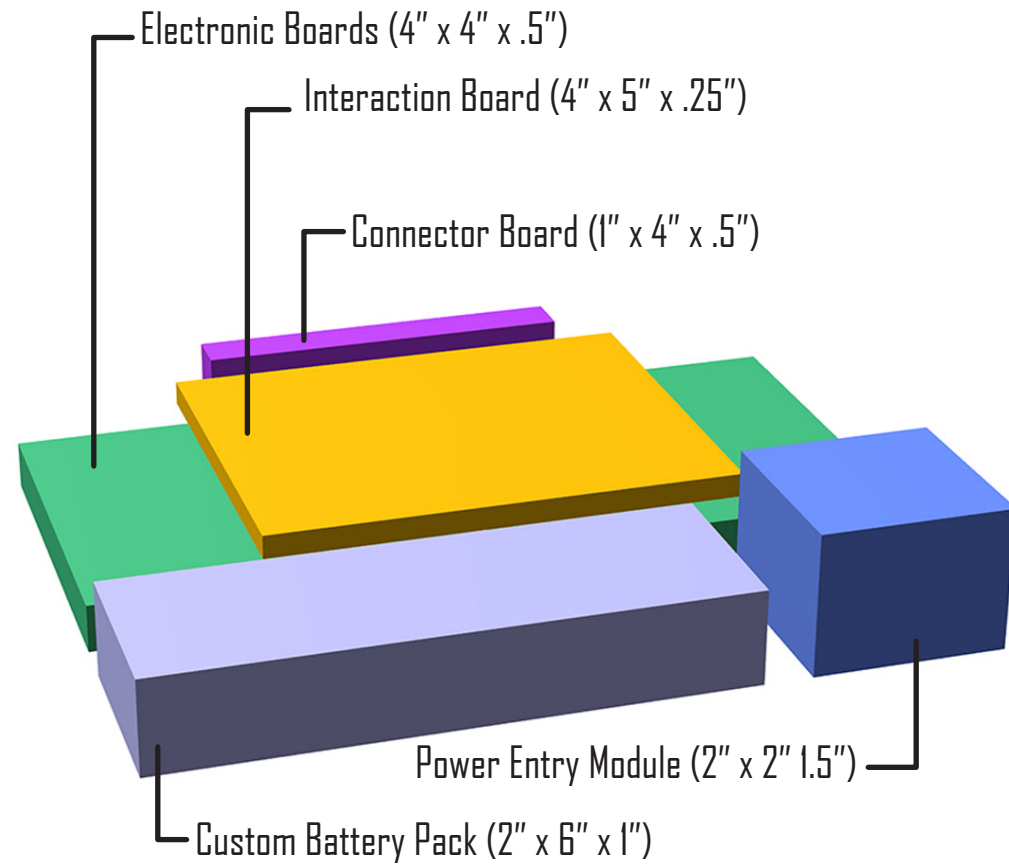
Human Factors: Torso Size for Male and (Female)
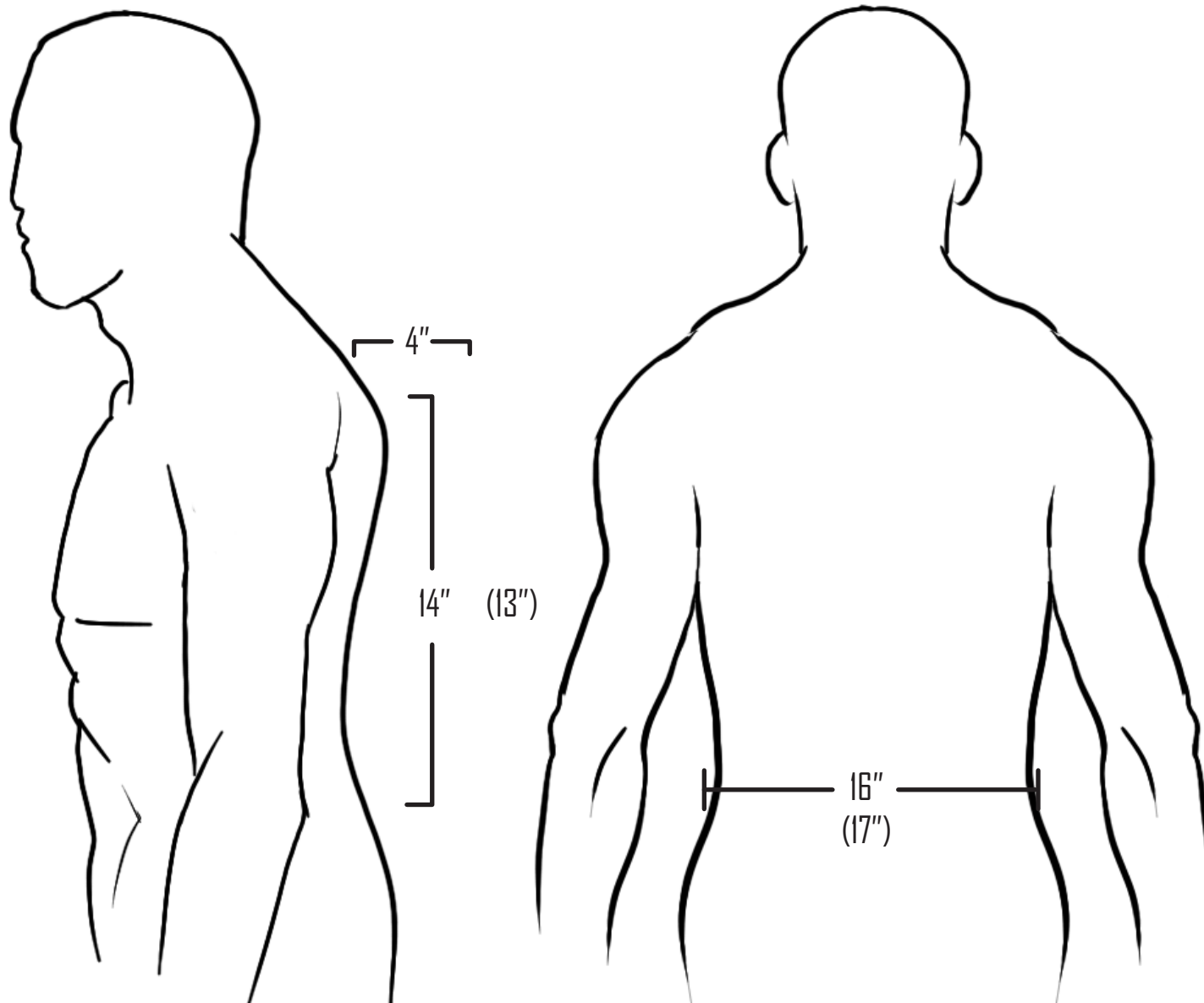
4"

14"   (13")

16"
(17")

Draft Model of Defibrillator Portable Backpack:

Draft Model of Defibrillator Portable Backpack:

Sequences:

Redevelopment Stage

Down Selection Stage

Concept Refinement Stage

Overall A.E.D. Concept Stage

Automated External Defibrillator Landscape:

Backpack Landscape:

Fannypack Landscape:

Glove Landscape:

Ideation Process

Developing Concepts from heuristics:
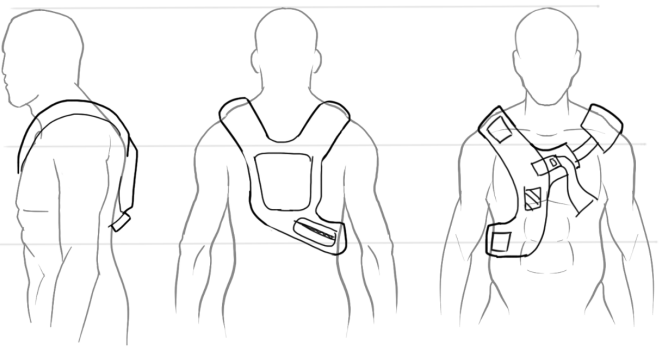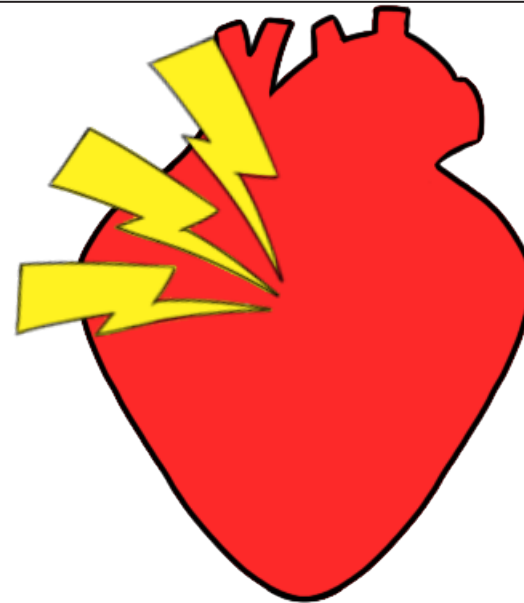
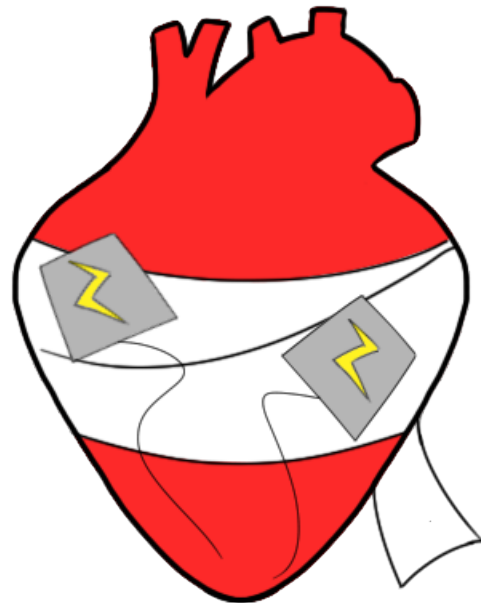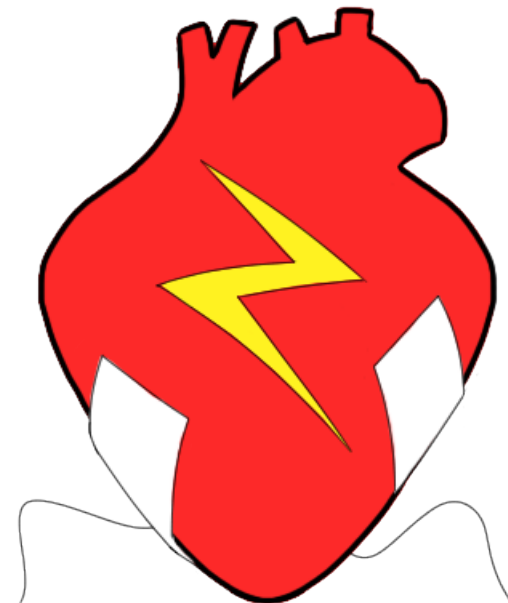| Backpack	A.E.D. Glove	Fannypack

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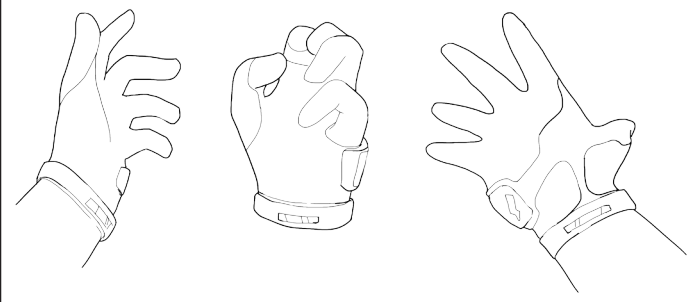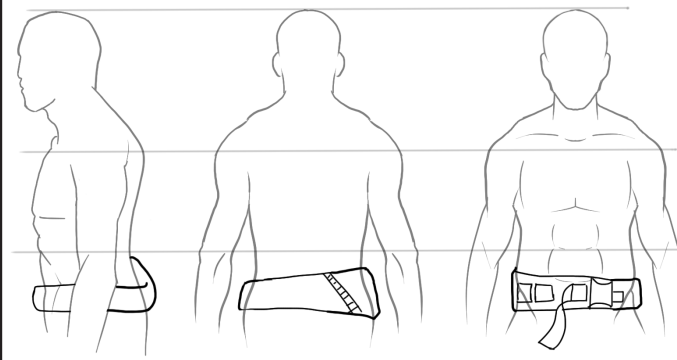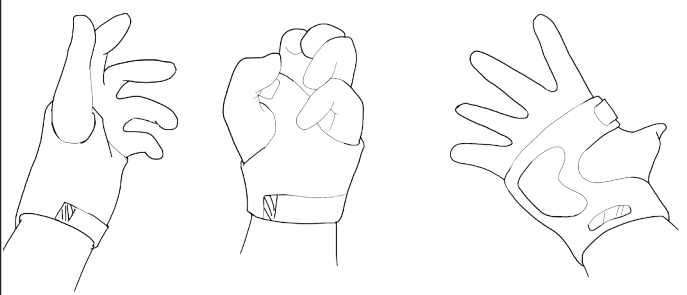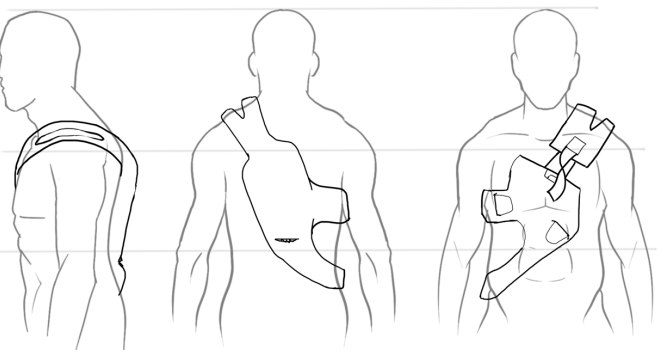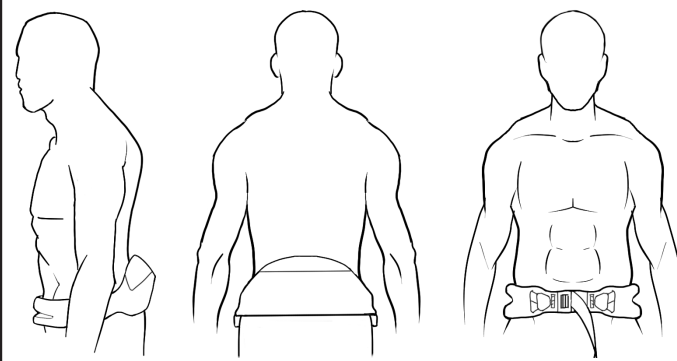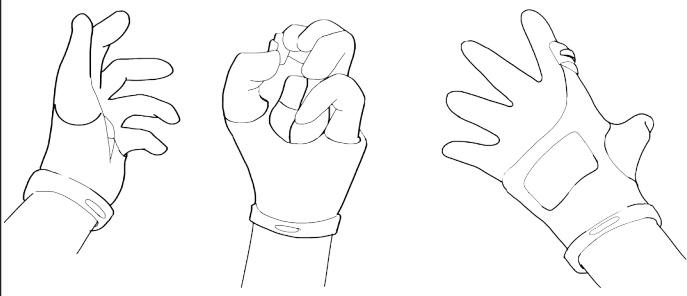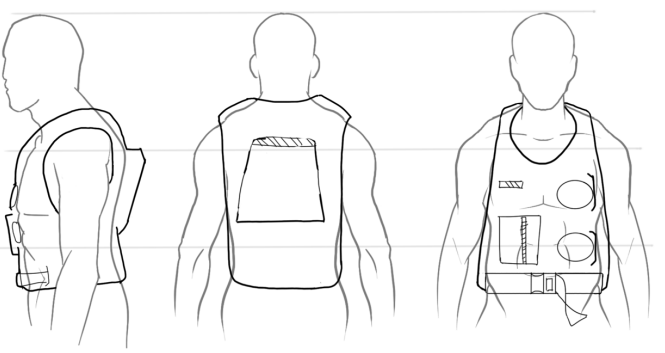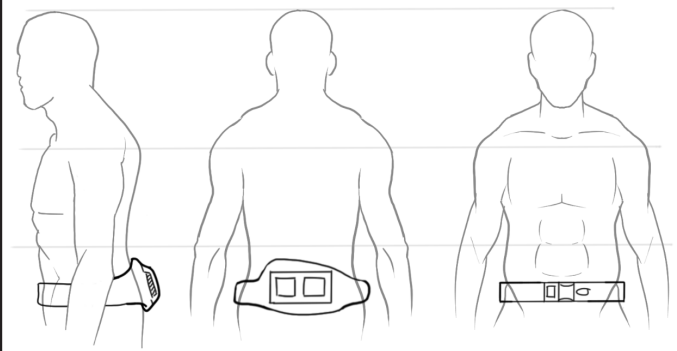
Logo Concepts:

CARDIAC ARREST FIRST RESPONDERS

CARDIAC ARREST FIRST RESPONDERS
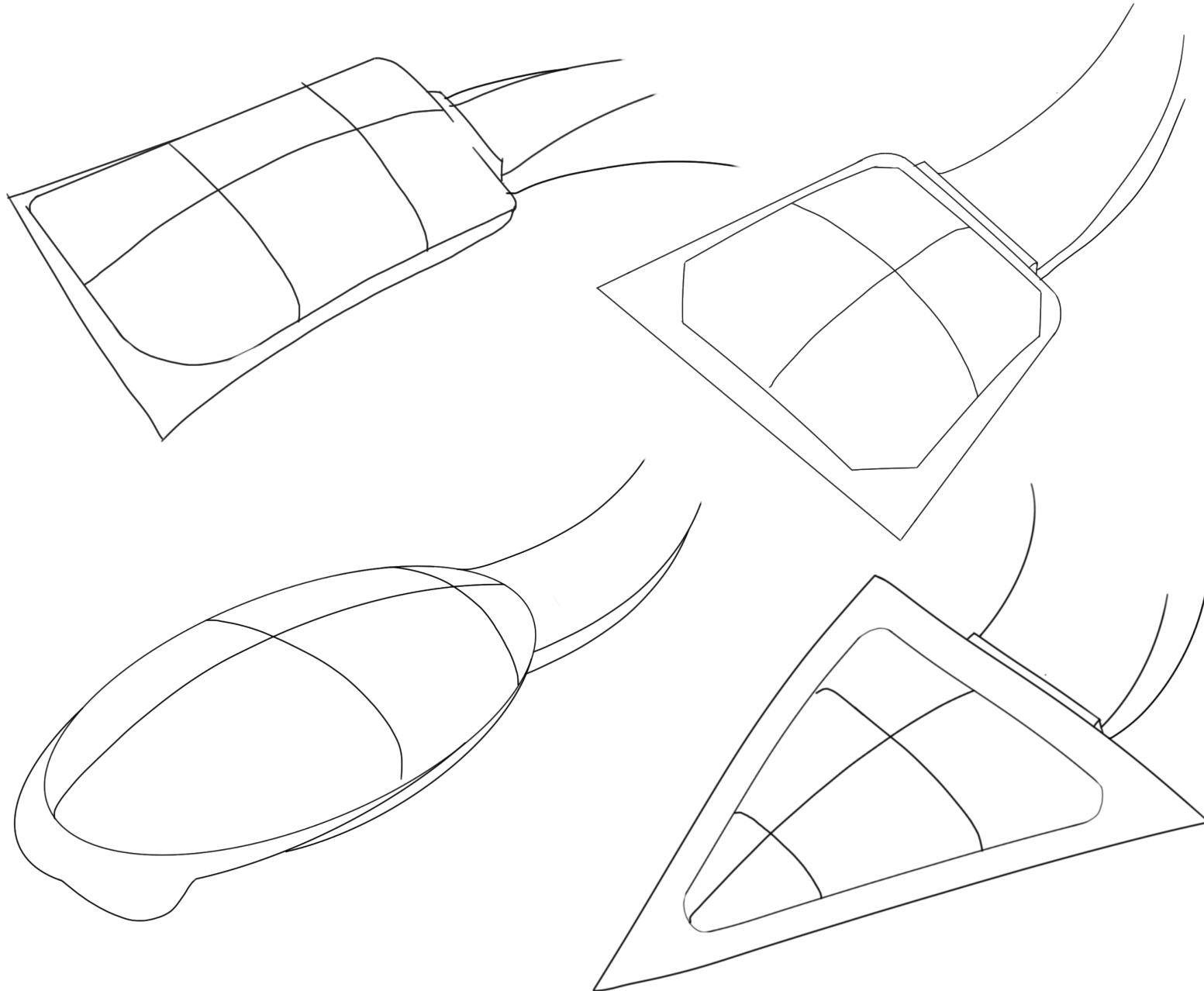
CARDIAC ARREST FIRST RESPONDERS

CARDIAC ARREST FIRST RESPONDERS

A.E.D. Pads Development:

Sequences:

Redevelopment Stage

Down Selection Stage

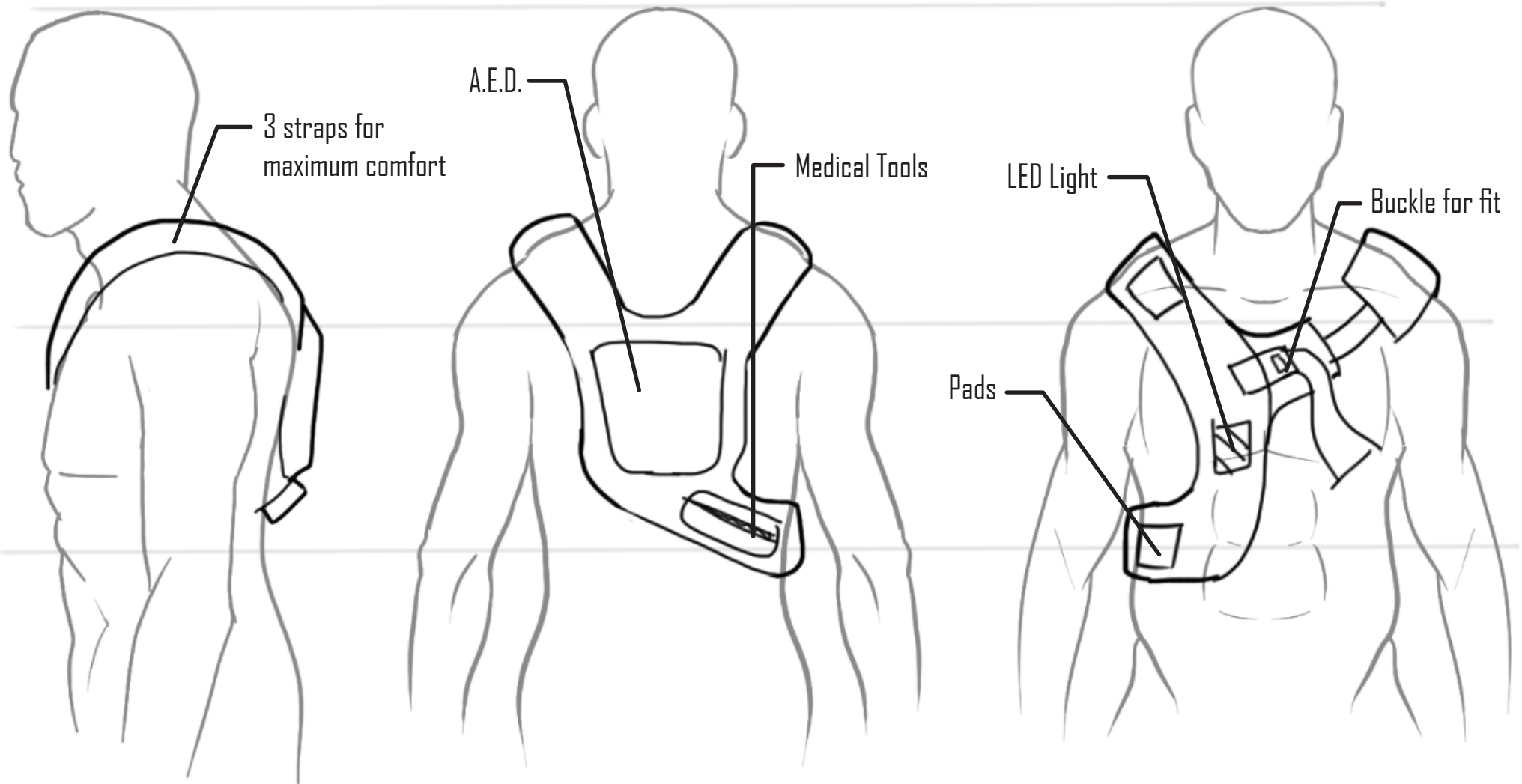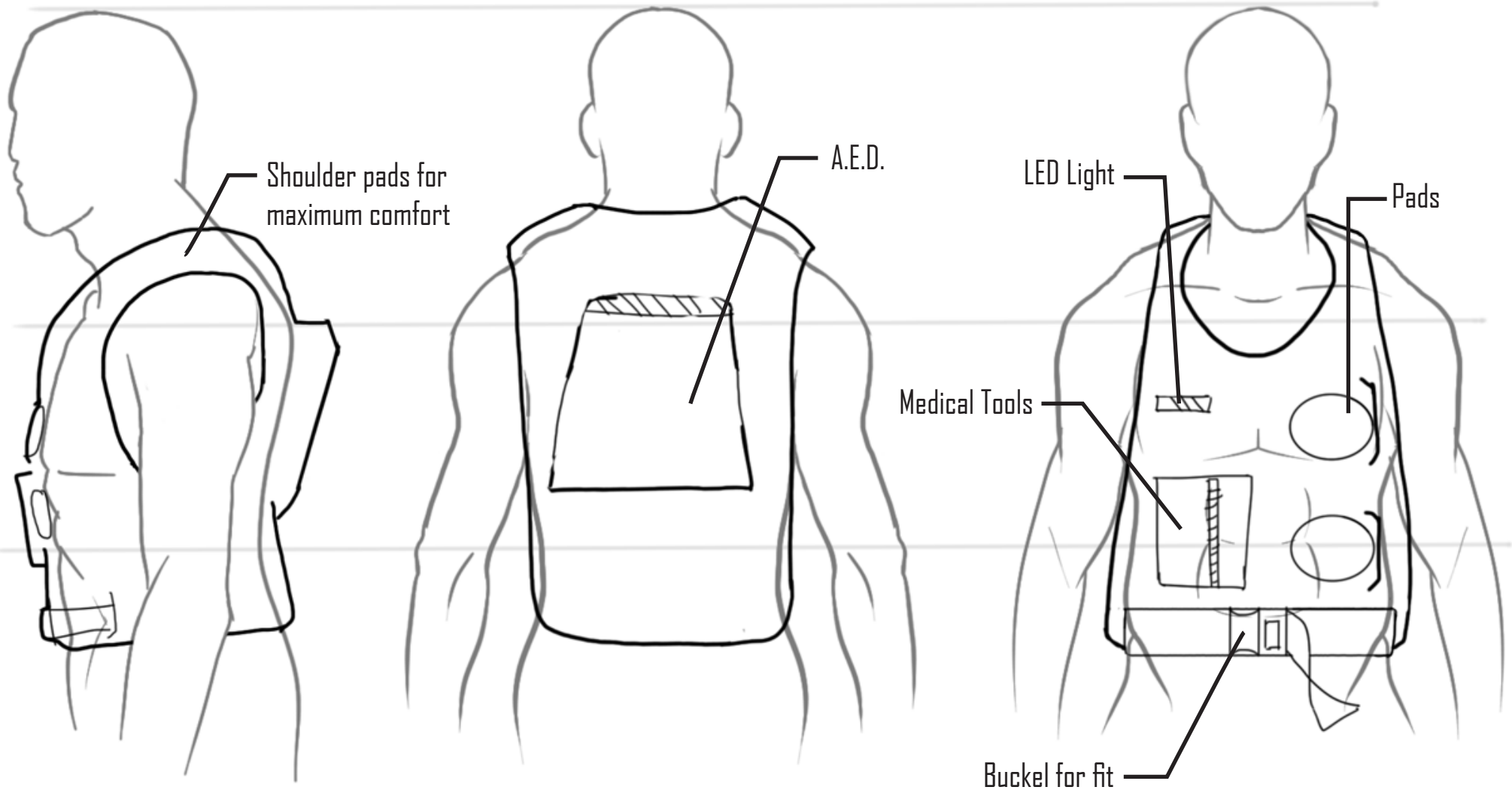Concept Refinement Stage

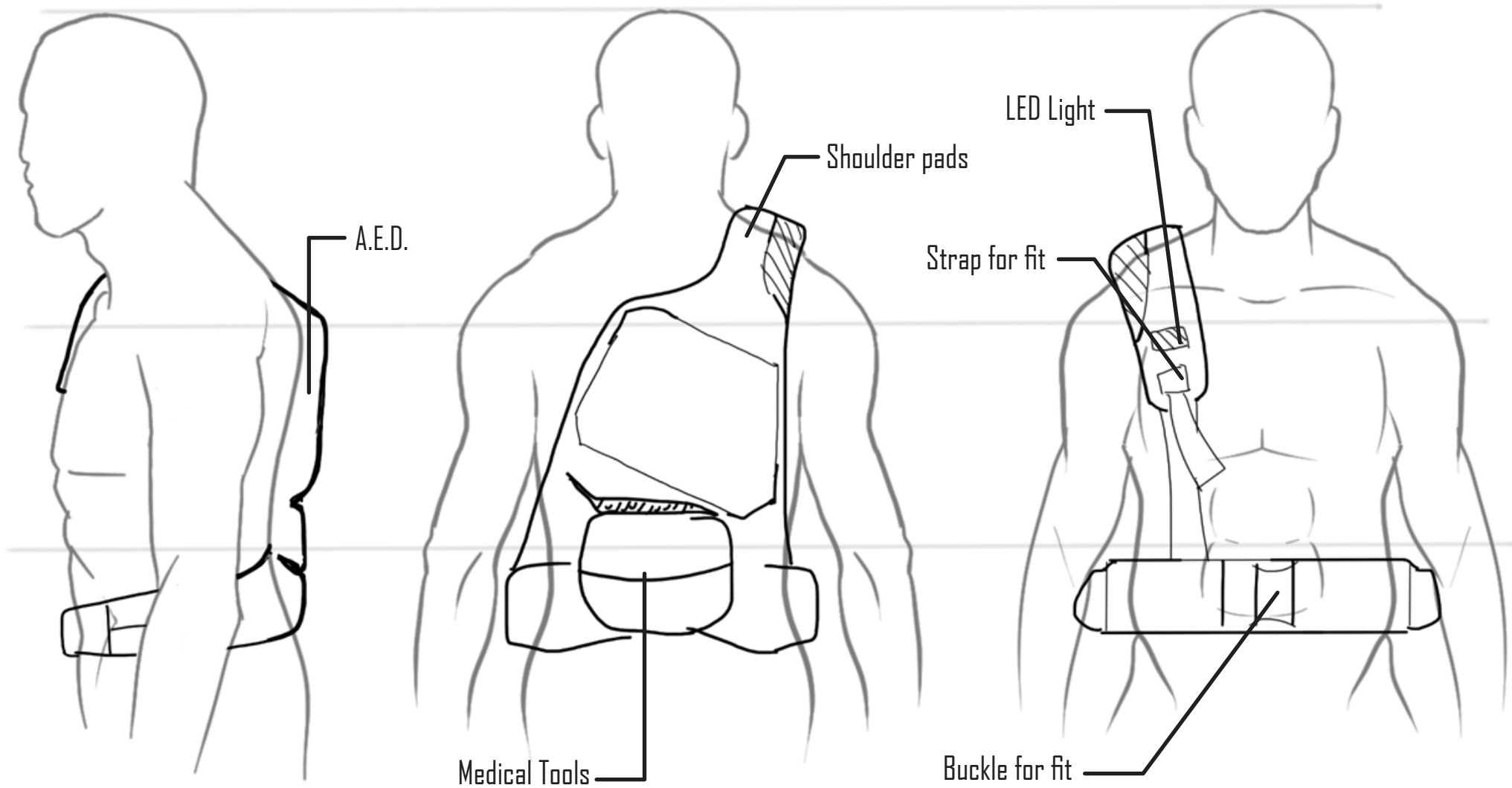Overall A.E.D. Concept Stage

Backpack/Vest Defibrillator Designs:

3 straps for
maximum comfort

A.E.D.

Medical Tools

LED Light

Buckle for fit

Pads

Backpack/Vest Defibrillator Designs:

Shoulder pads for maximum comfort

A.E.D.

LED Light

Pads

Medical Tools

Buckel for fit

Backpack/Vest Defibrillator Designs:

A.E.D.

Shoulder pads

LED Light

Strap for fit

Medical Tools

Buckle for fit

Backpack/Vest Defibrillator Designs:

A.E.D.

Medical Tools

Buckle for fit

Pads

Fannypack Defibrillator Designs:

A.E.D.

Medical Tools

Pads

Buckle for fit

Fannypack Defibrillator Designs:

Pads

Medical Tools

A.E.D.

Buckle for fit

Fannypack Defibrillator Designs:

Pads

Medical Tools

A.E.D.

Buckle for fit

Fannypack Defibrillator Designs:

A.E.D.

Medical Tools

Pads

Buckle for fit

Defibrillator Glove Designs:

A.E.D. battery status

Thick elastic material

Heart pulse sensor

Interaction components

LED screen heart monitor

Power button

Defibrillator Glove Designs:

Strap fit

Thick fabric

Shock button

Interaction components

Power button

Defibrillator Glove Designs:

Interaction components

A.E.D. battery status

Shock button

Power button

Defibrillator Glove Designs:

Shock button

Heart pulse sensor

Power button

Interaction components

LED screen
heart monitor

A.E.D. battery status

Sequences:

Redevelopment Stage

Down Selection Stage

Concept Refinement Stage

Overall A.E.D. Concept Stage

Ideation Process

Portable A.E.D. Vest Design:

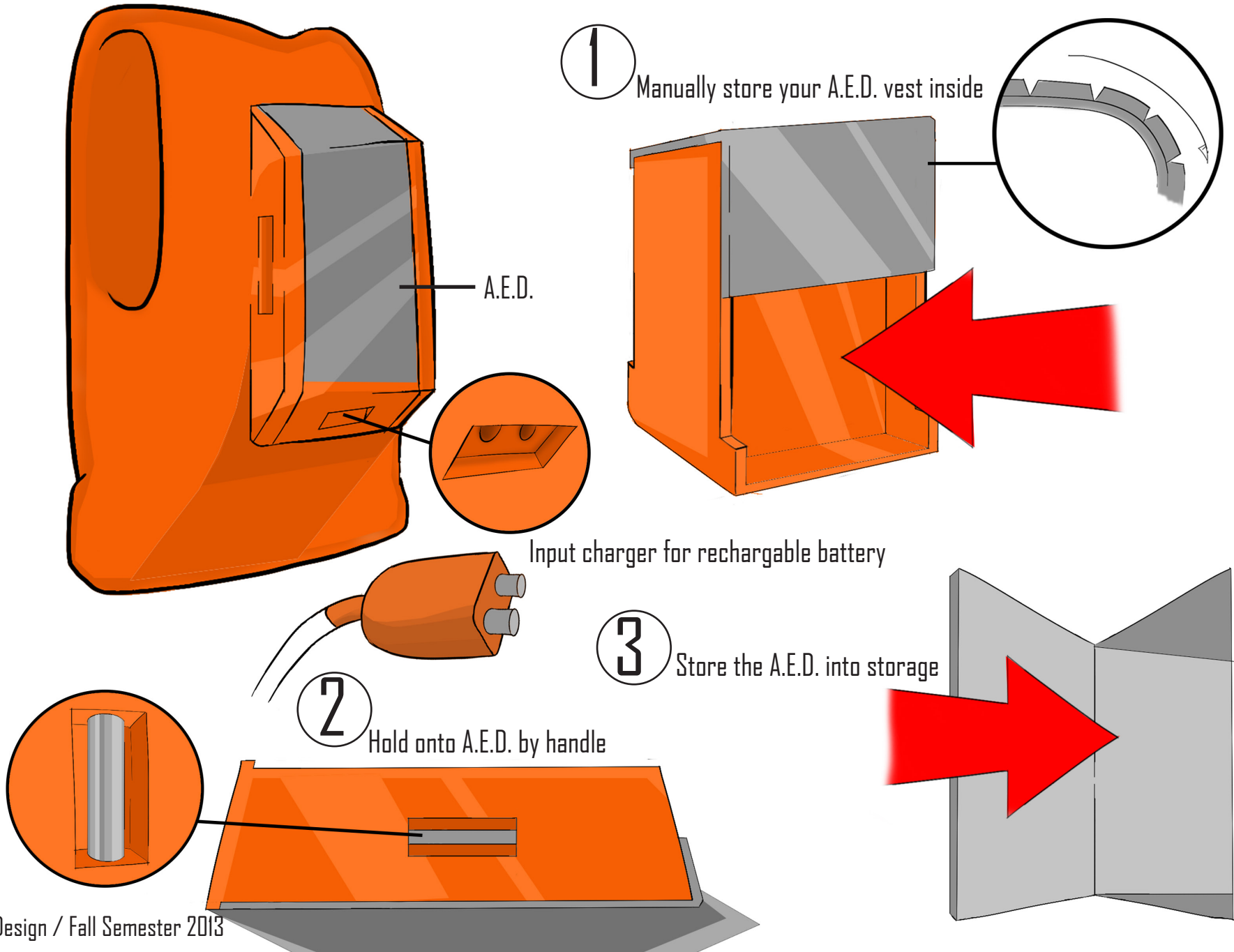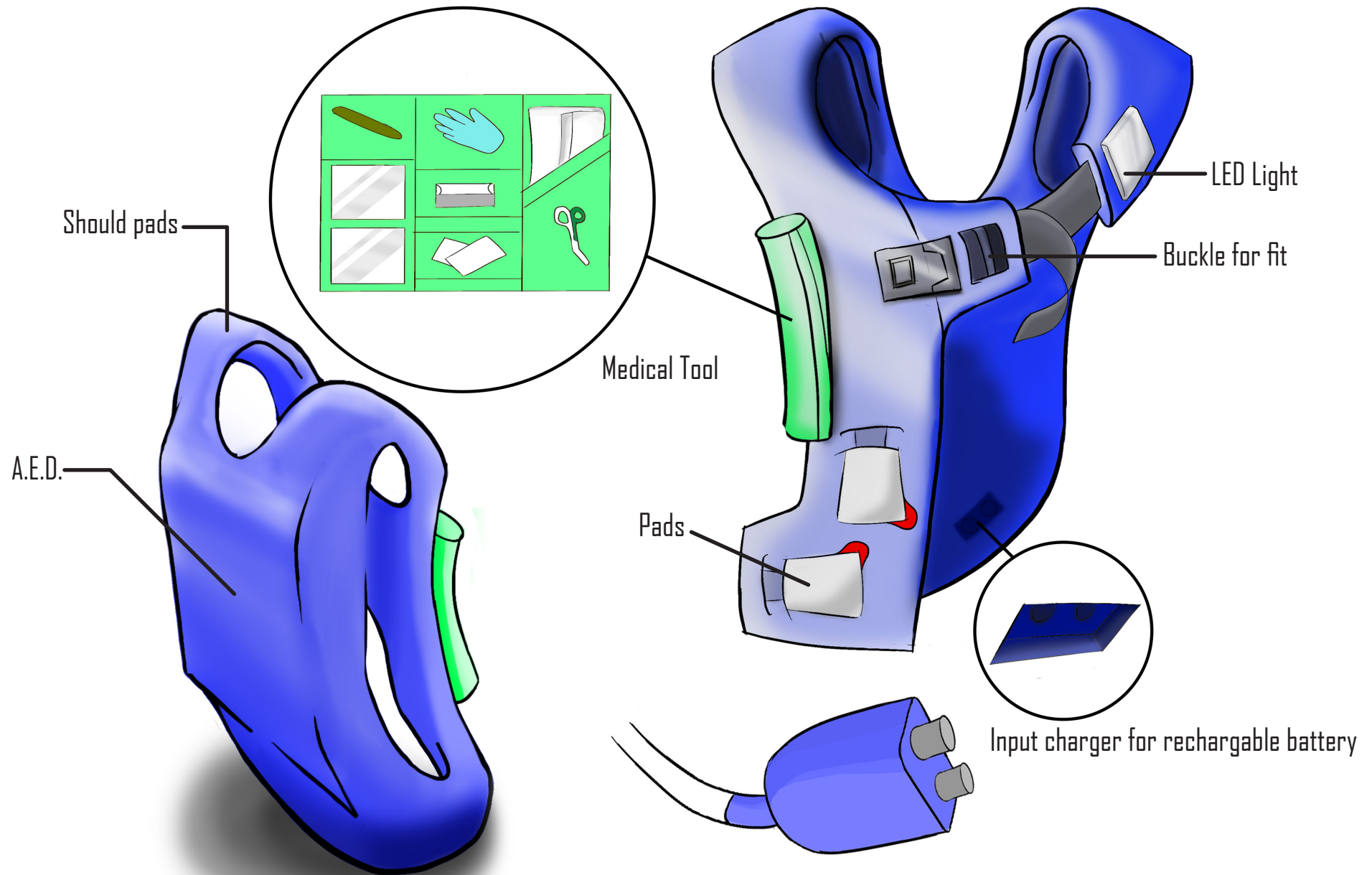① Manually store your A.E.D. vest inside

A.E.D.

Input charger for rechargable battery

② Hold onto A.E.D. by handle

③ Store the A.E.D. into storage

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Flexible A.E.D. Backpack Design:

Should pads

A.E.D.

Medical Tool

LED Light

Buckle for fit

Pads

Input charger for rechargable battery

Flexible A.E.D. Backpack Design:

Pads

Medical Tool

Buckle for fit

Input charger for rechargable battery
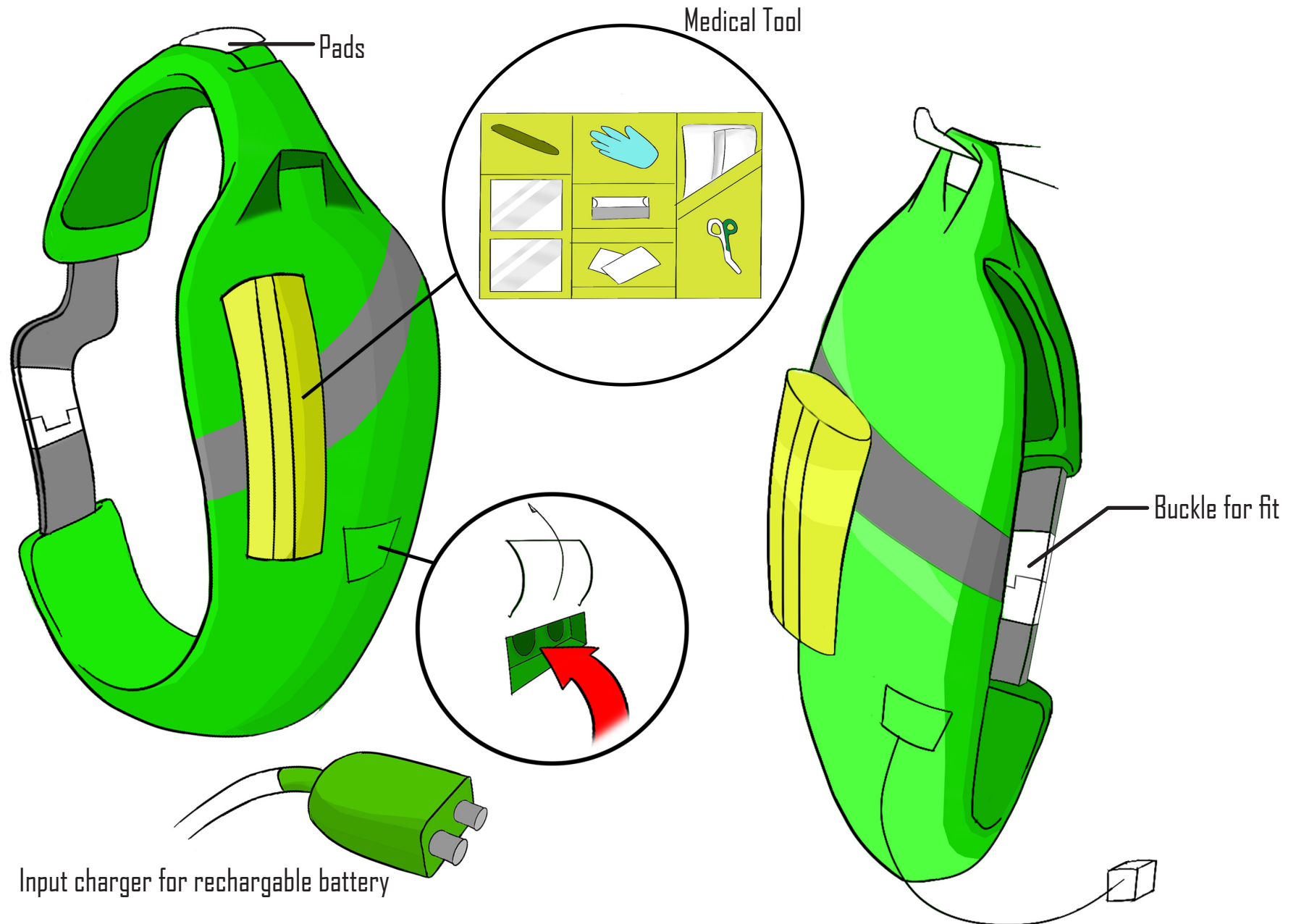
Defibrillator Glove Design:

1 PRESS POWER BUTTON; Check pulse of patient

Interaction components

Power button

2 Give CPR to patient

Heart pulse sensor

4 Repeat cycle

AED battery status

(Thin LED screen) Patient's heart pulse

3 CLEAR AWAY and APPLY SHOCK

Sequences:

Redevelopment Stage

Down Selection Stage

Concept Refinement Stage

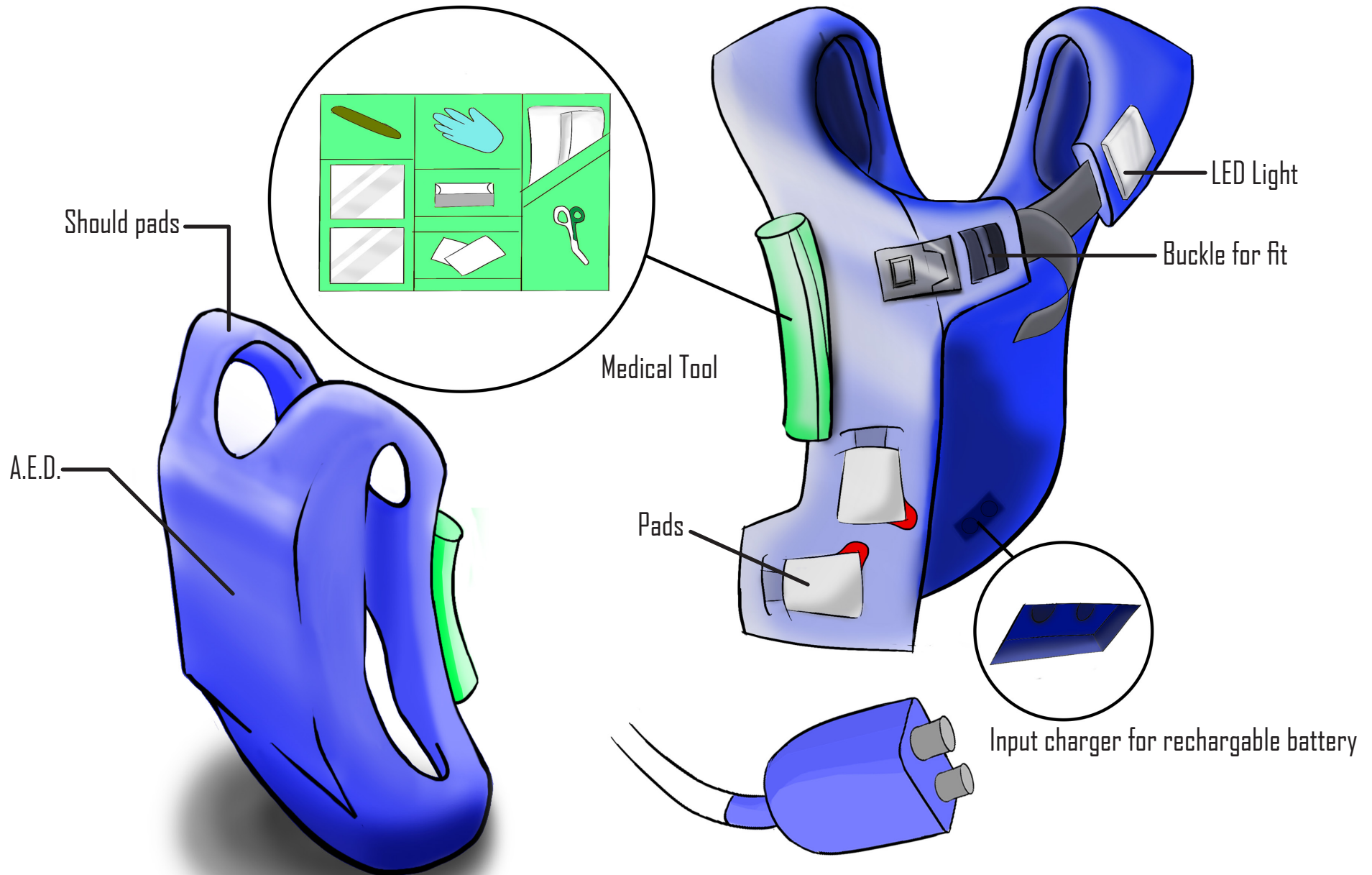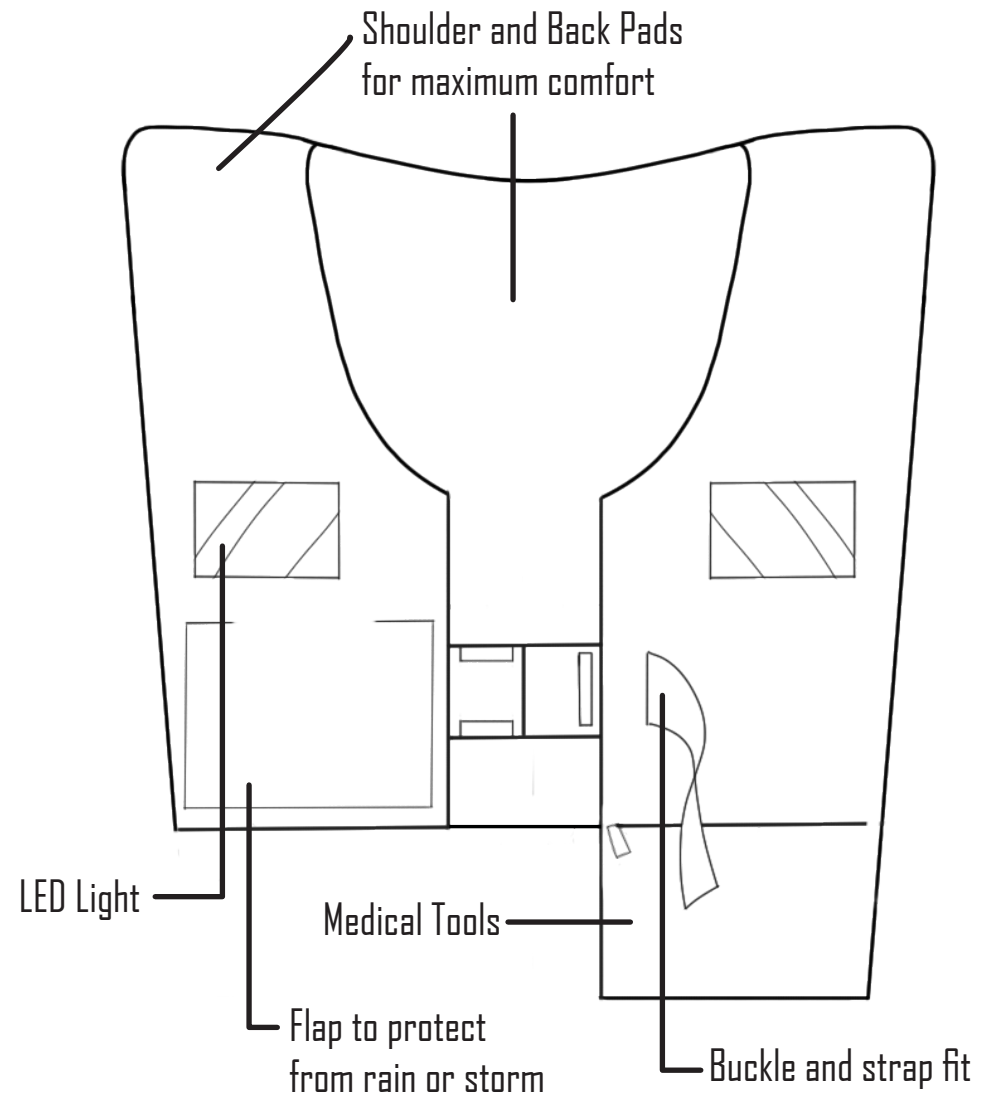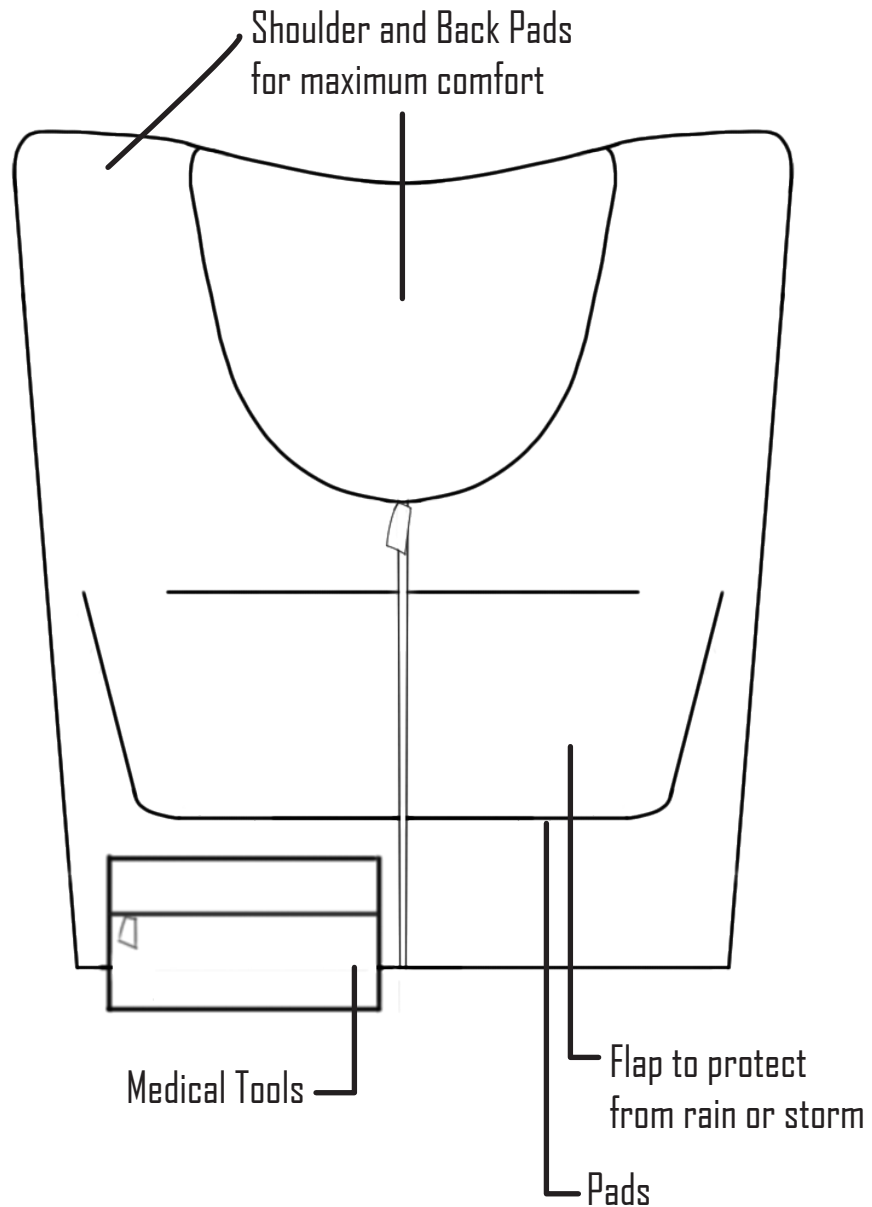**Overall A.E.D. Concept Stage**

Vest/Backpack A.E.D. Refinement Stage:

Should pads

A.E.D.
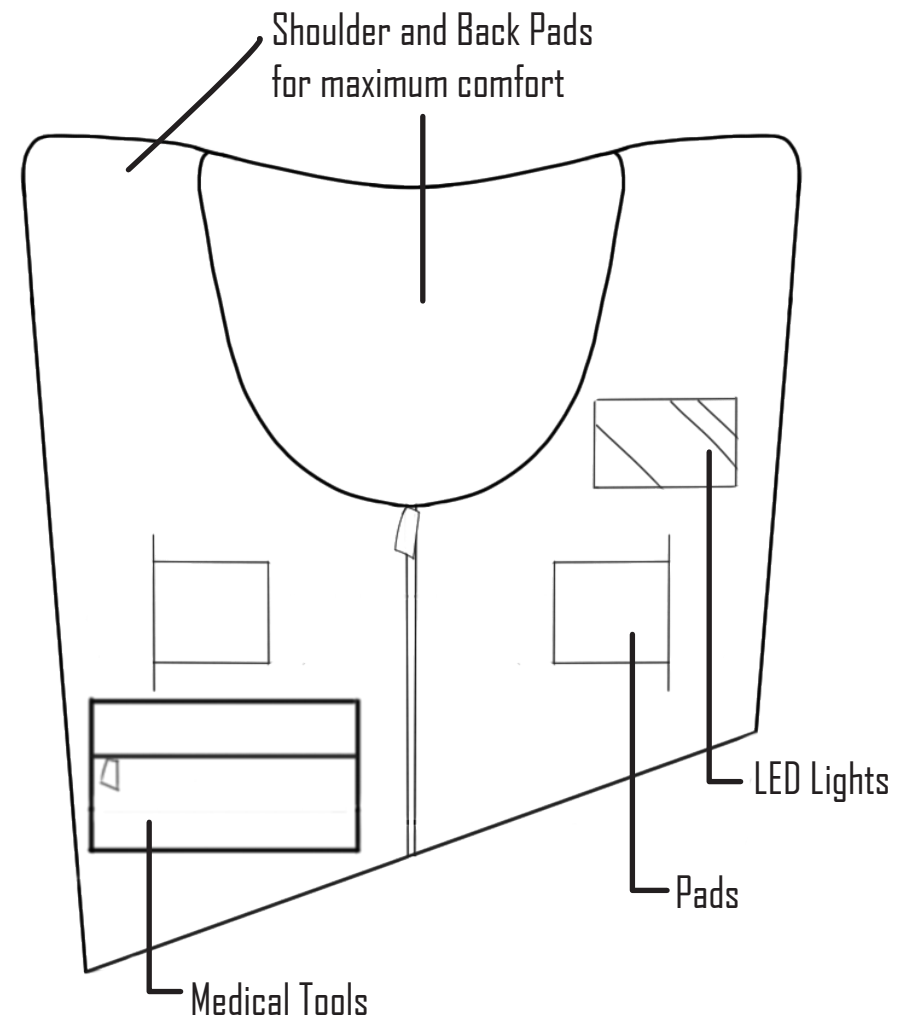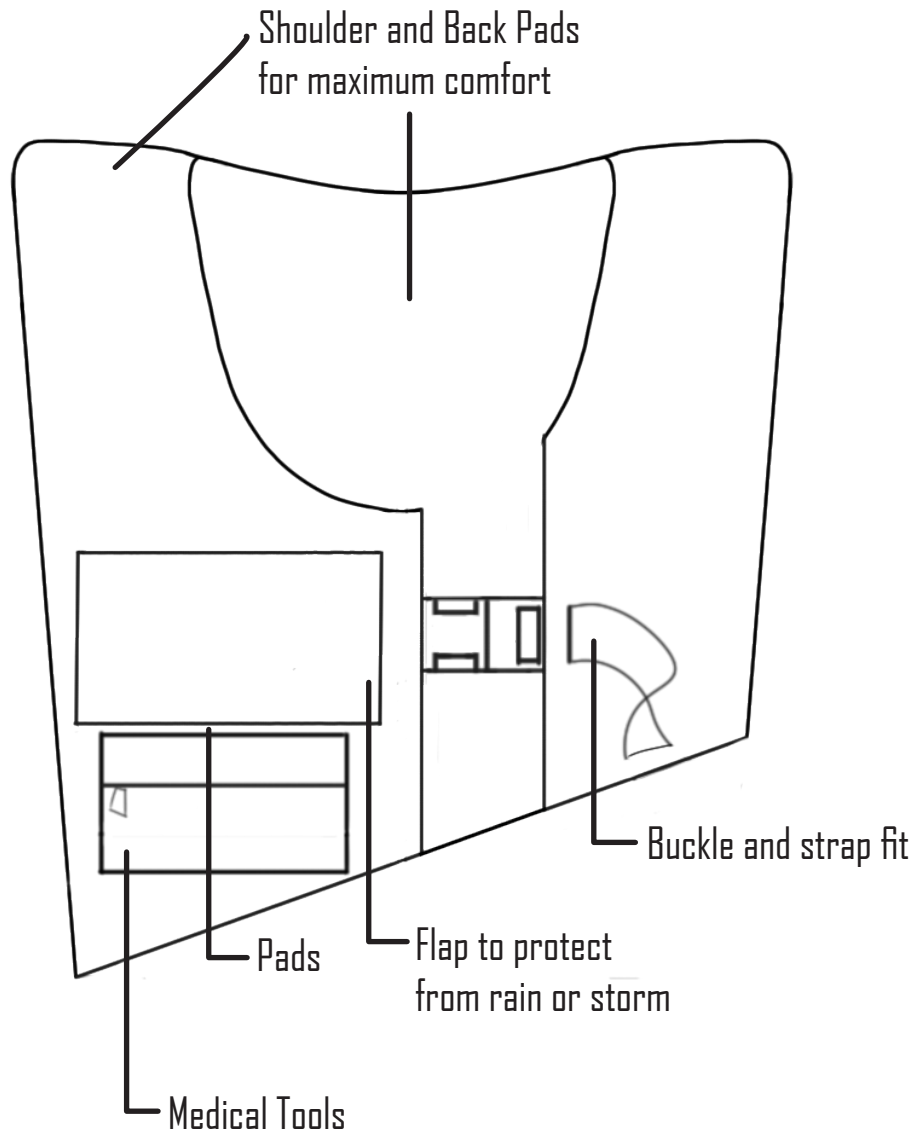
Medical Tool

LED Light

Buckle for fit

Pads

Input charger for rechargable battery

Vest/Backpack A.E.D. Refinement Stage:

Shoulder and Back Pads
for maximum comfort

Shoulder and Back Pads
for maximum comfort

Medical Tools

Flap to protect
from rain or storm

Pads

LED Light

Medical Tools

Flap to protect
from rain or storm

Buckle and strap fit

Ideation Process

Vest/Backpack A.E.D. Refinement Stage:

Shoulder and Back Pads
for maximum comfort

Shoulder and Back Pads
for maximum comfort

Buckle and strap fit

Flap to protect
from rain or storm

Pads

Medical Tools

LED Lights

Pads

Medical Tools

A.E.D. Final Design / Fall Semester 2013

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Vest Defibrillator Design (Professional Users)

LED Light (Push down 5 seconds for emergency power down)

GPS

A.E.D.

LED Battery status

Flap (protect from damage)

Pads

Buckle and strap fit

Medical Tools
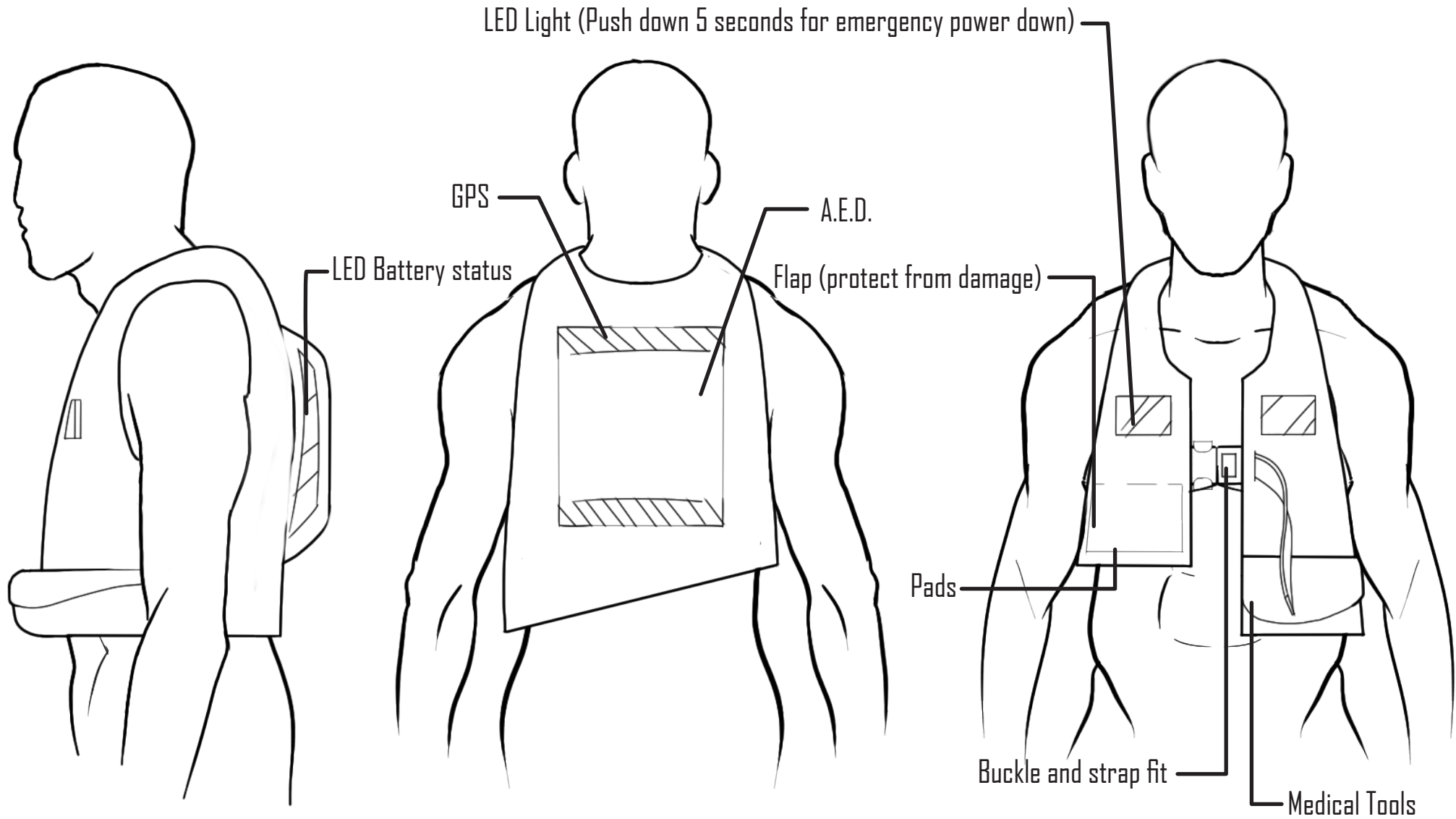
Vest Defibrillator Design (Professional Users)
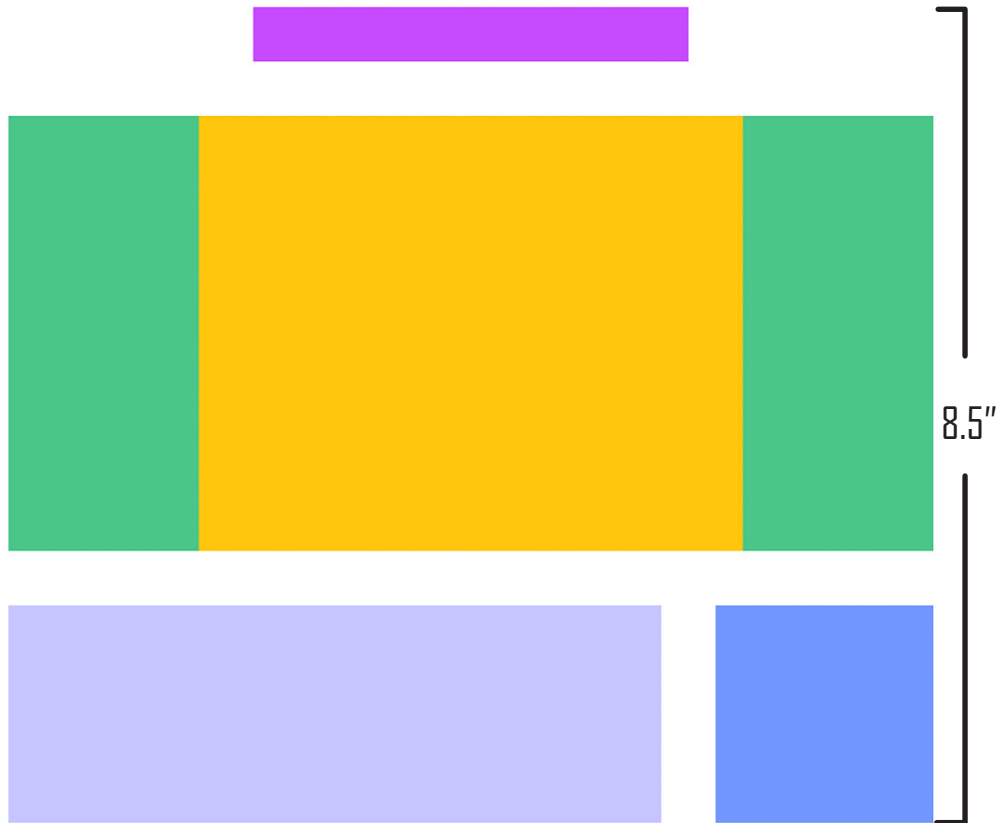
TOP VIEW

A.E.D. Overall size(lxwxd) : **11" x 9" x 4"**

8.5"

Electronic Boards (4" x 4" x .5")

Interaction Board (4" x 5" x .25")

Connector Board (1" x 4" x .5")

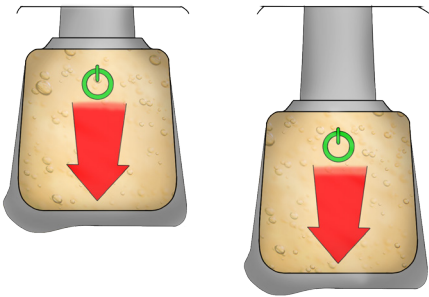Power Entry Module (2" x 2" 1.5")

Custom Battery Pack (2" x 6" x 1")

SIDE VIEW

2.5"

10"
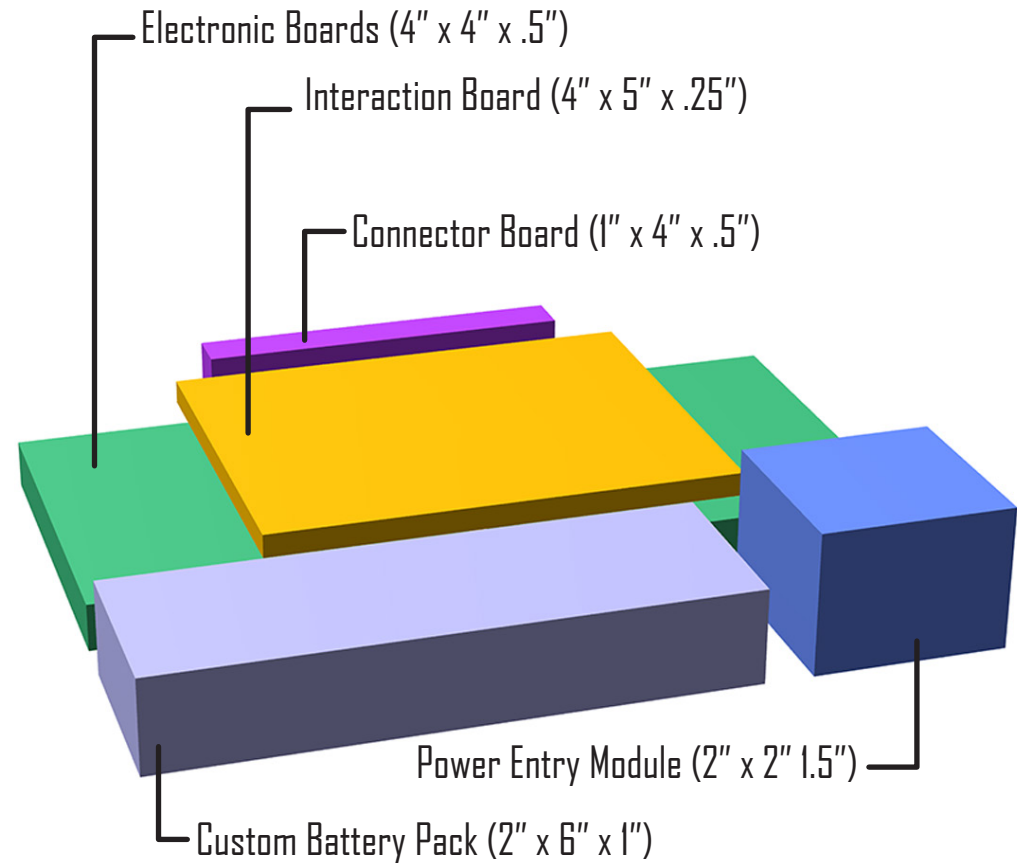
Vest Defibrillator Design (Professional Users)

1 PULL Pads (power on A.E.D.)
Activate GPS location for ambulance

Child and Adult Pads

2 SPLIT package by tab to get 2 pads
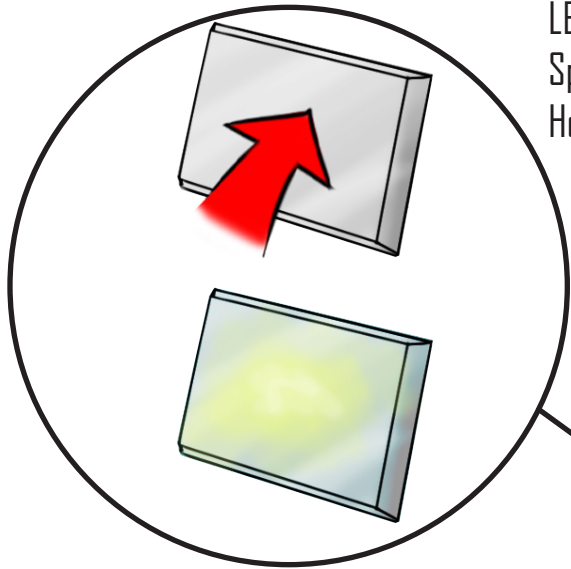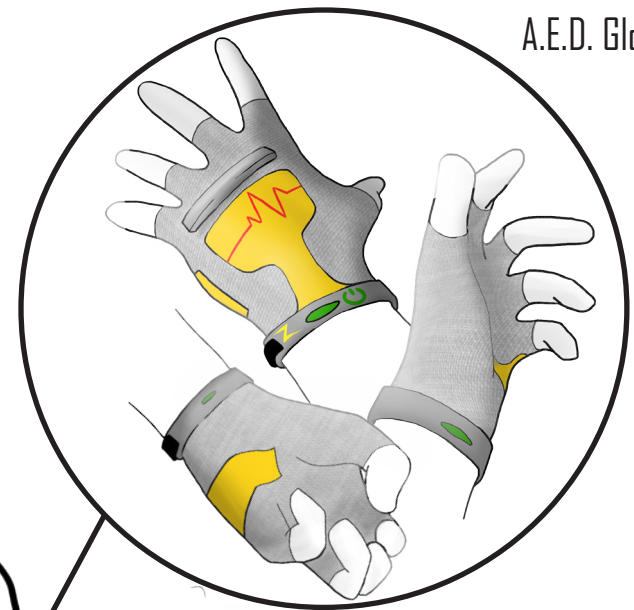
3 ATTACH PADS to patient
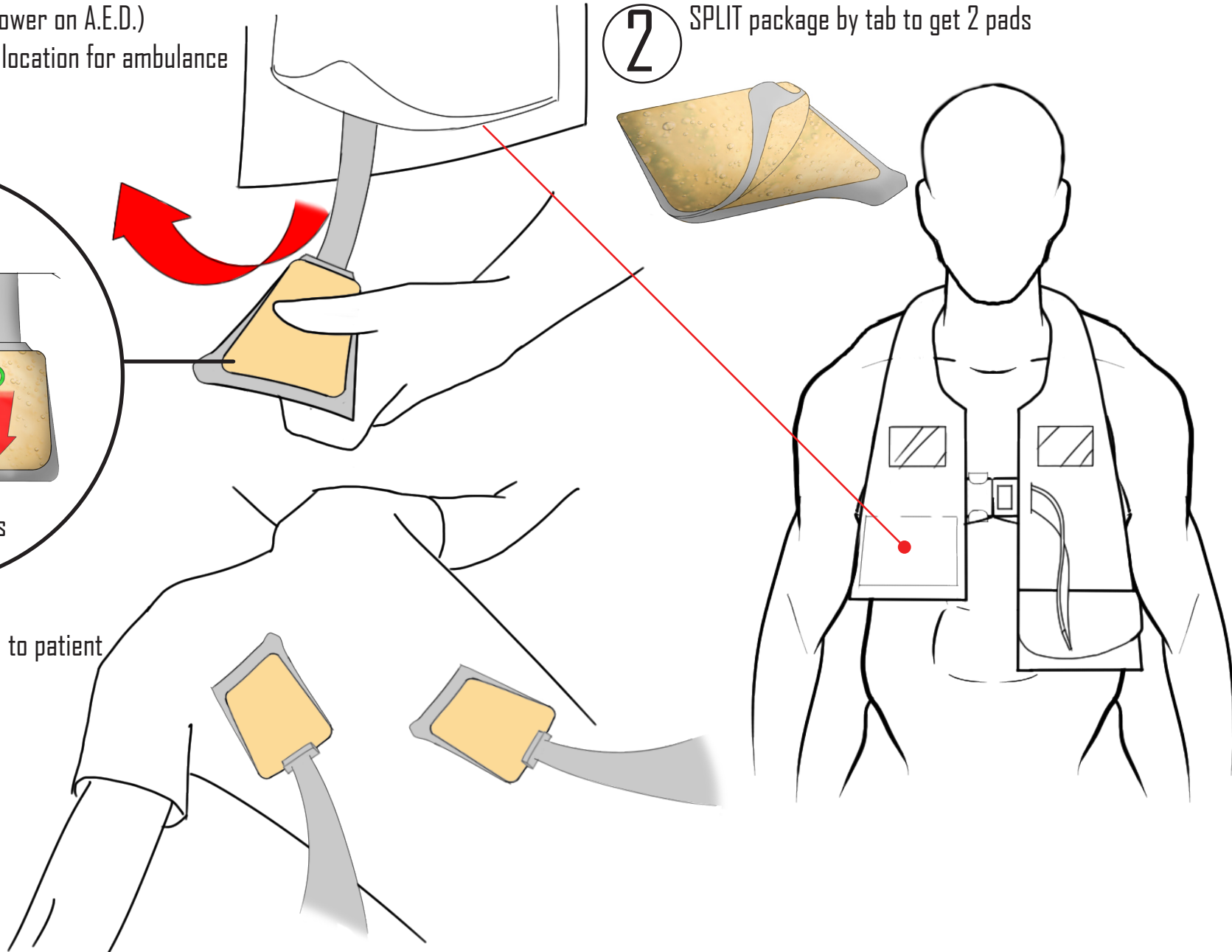
Vest Defibrillator Design (Professional Users)

LED Light PRESS ONCE (ON/OFF)
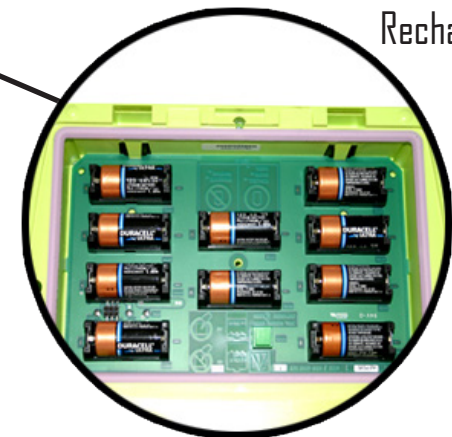Special feature:
Hold on 5 seconds for emergency power down

A.E.D. Glove

Expanded Features:
- Battery status
- Patient's heart rate status
- Signal low battery
- Glove power button
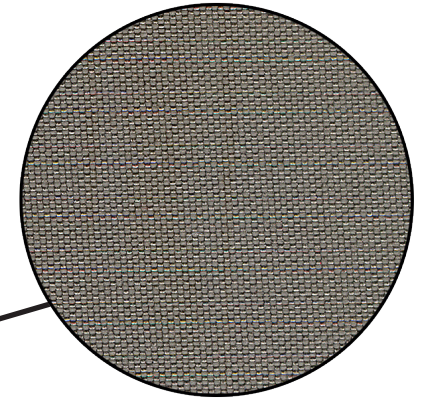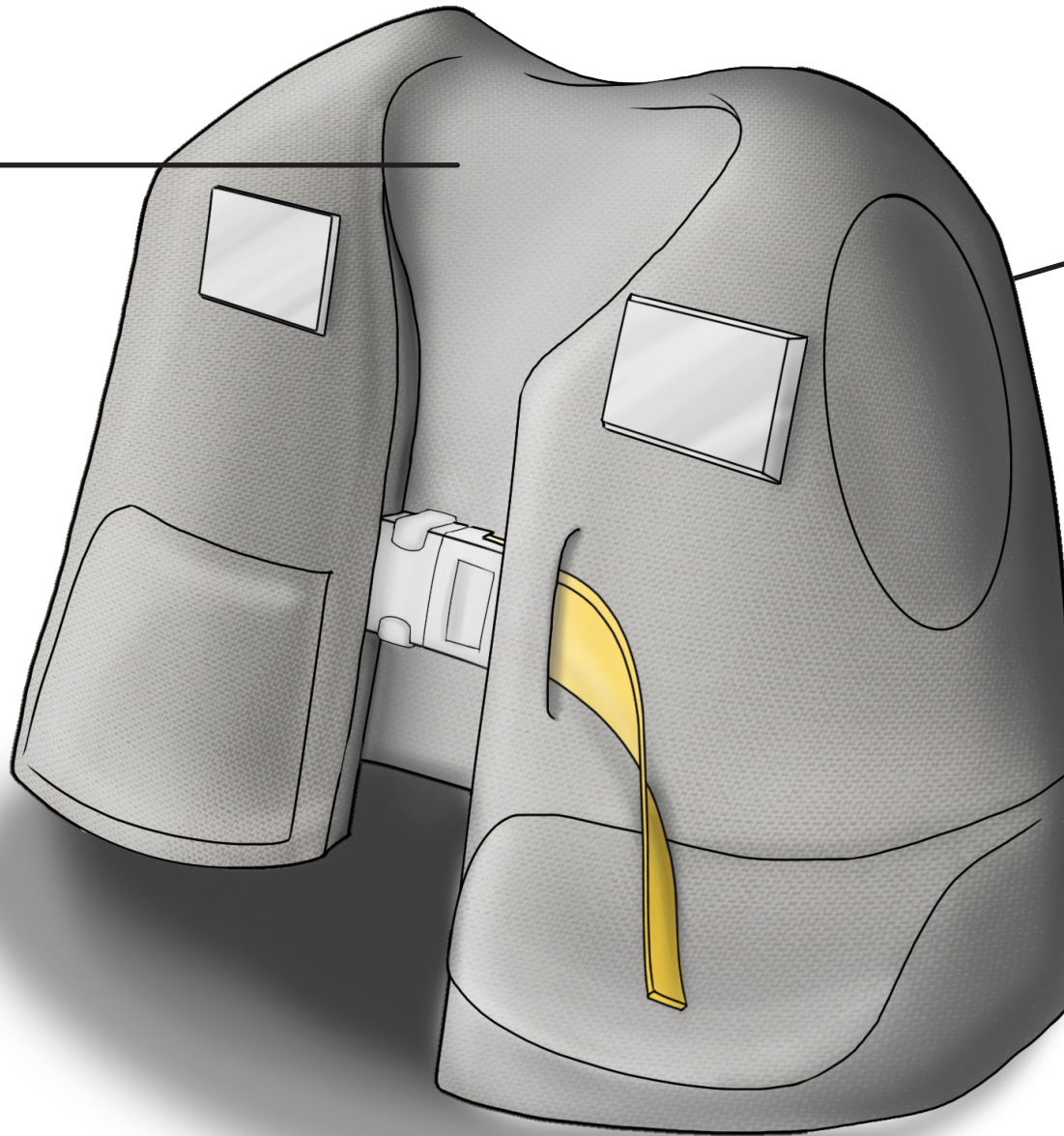- Accessible Shock button to signal A.E.D. vest

Rechargable batteries

Medical Tools

Vest Defibrillator Design (Professional Users)

Padding for comfort

Nylon Fabric for insulated electricty

A.E.D. Final Design / Fall Semester 2013   Matthew Nouv