FAMU-FSU College of Engineering

CIA Wearables

Team 505

2/1/2024

Team Introductions

Kartika Ahern
Systems Engineer

Maxwell Orovitz
Design Engineer

Eliot Hamilton
Materials Engineer

Malachi Johnson-Taylor
Human Factors/ Ergonomics Engineer

Patrick Molnar
Mechatronics and Software Engineer

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Sponsor and Advisor

Teaching Faculty
Shayne McConomy
FAMU-FSU College of Engineering

Team Sponsor
Franklin Roberts
Central Intelligence Agency

Secondary Stake Holder
David Merrick
Director of FSU Emergency Management & Homeland Security Program

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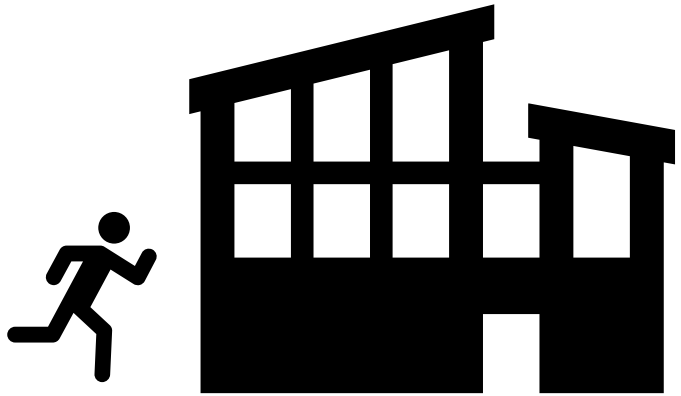
Objective

The objective of this project is to develop an innovative wearable for the CIA, featuring an integrated gas detector, as well as additional technology to aid in building collapse search and rescue missions.



Background

Key Goals

Successfully collaborate to implement a gas sensor into our wearable technology

Improve operative safety and communication

Develop a reliable and fully functional prototype

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Assumptions

User will be wearing the device over search and rescue gear

Operatives will wear the same device and be connected to each other at the start of mission

Team 506 will recognize relevant gasses and calibrate their detector accordingly

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Concept Selected

- Lightweight and Maneuverable physical design
- Easy to See Displayed information
- Central Location for Vital Collection

Back Brace + Helmet HUD

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Design Review Updates

Design Changes
- Important design updates as some items have been swapped

Procurement Review
- Review of what has been ordered and what has been received to date

Back Brace
- Update of back brace changes and improvements

Helmet
- Schematic and CAD mockup of proposed design with custom mounts

HUD
- Schematic and proposed process on how to get data to display on visor

Batteries
- Details of battery type needed and proposed design of enclosure

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Important Design Changes

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★ = Received
⊘ = Ordered, Not yet Received

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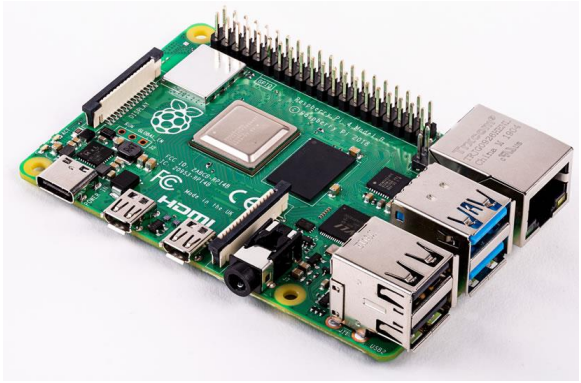
Procurement Review: Order 1



★ Vendor: DigiKey

Description: RASPBERRY PI 4 B 8GB

Date Ordered: 1/19/2024

⊘ Vendor: Med-Tac International Corp

Description: EB EMERAIR ALS Bag/Pack

Date Ordered: 1/19/2024

⊘ Vendor: JORESTECH

Description: Helmet Replacement 4-point Ratchet Suspension System

Date Ordered: 1/19/2024

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★ = Received
⊘ = Ordered, Not yet Received

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Procurement Review: Order 2

⊘ Vendor: Amazon

Description: Reflective Film for Visor

Date Ordered: 1/30/2024

⊘ Vendor: Honeywell

Description: Chinstrap for Helmet

Date Ordered: 1/30/2024

⊘ Vendor: Ruroc

Description: Tinted Visor

Date Ordered: 1/30/2024

⊘ Vendor: DigiKey

Description: 1.3” LCD Screen

Date Ordered: 1/30/2024

⊘ Vendor: Edmund Optics

Description: Collimating (PCX) Lens coated in MgF2

Date Ordered: 1/30/2024

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Back Brace Update

*Ordered bag only includes backpack and compartment bags

Reasons for Change:

- Immediate First Aid/toxic gas response
- Increased mobility
- Increased storage for technological components
- Component compatibility
- Increased customization options

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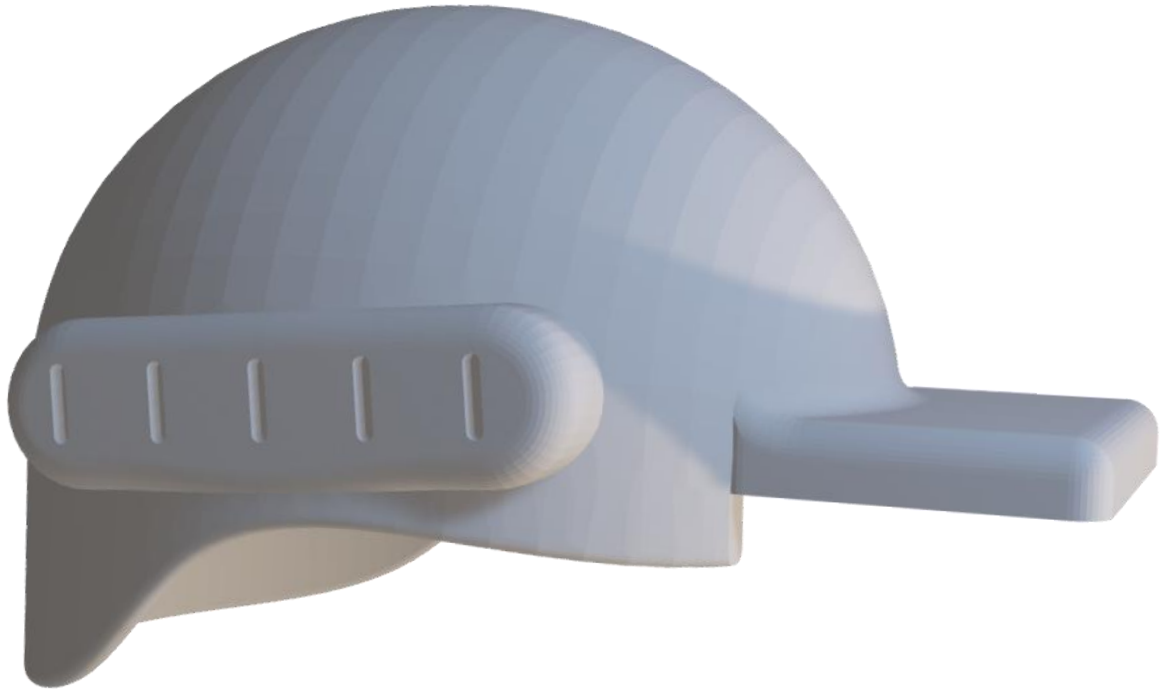
Helmet Design



Will Include:

- Mount for Flashlight
- Mount for Vitals Sensors
- Adjustable Helmet Harness
- Custom Mount for Visor/HUD
- Custom Wire guides for Cable Management

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Helmet Specifications

Hard Hats:

- **Type I** (6 Point Harness)
- **Type II** (6 Point Harness and EPS Liner)

Climbing Style Safety Helmet:

- **CS WEB** (6 Point Harness webbing and EPS Liner)
- **CS FOAM** (EPS Foam Liner covered by comfort pad)

Dedicated Rotation-Damping Technology:

- **MIPS** (MIPS low friction Layer w/ 6 Point Harness and EPS Liner)
- **CEL** (Comfort pad w/ WaveCel Liner that is suspended by a WaveCel spacer)

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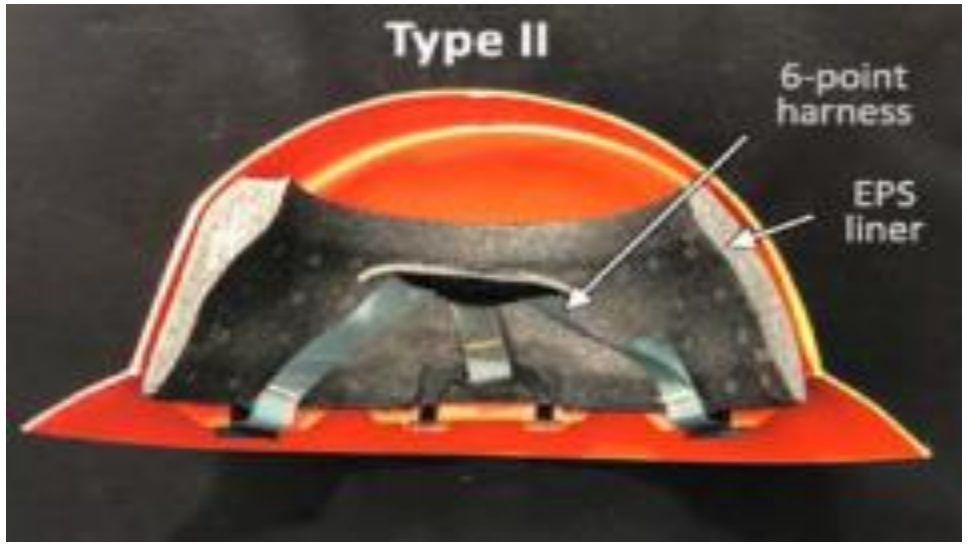
Helmet Specifications



Reasons for the Helmet Selection:

- Reduced Front, Side, and Rear impacts caused by head acceleration
- Less Impact from falling compared to other designs
- Includes Liner for user comfort
- Adjustable headgear to accommodate a bigger range of users

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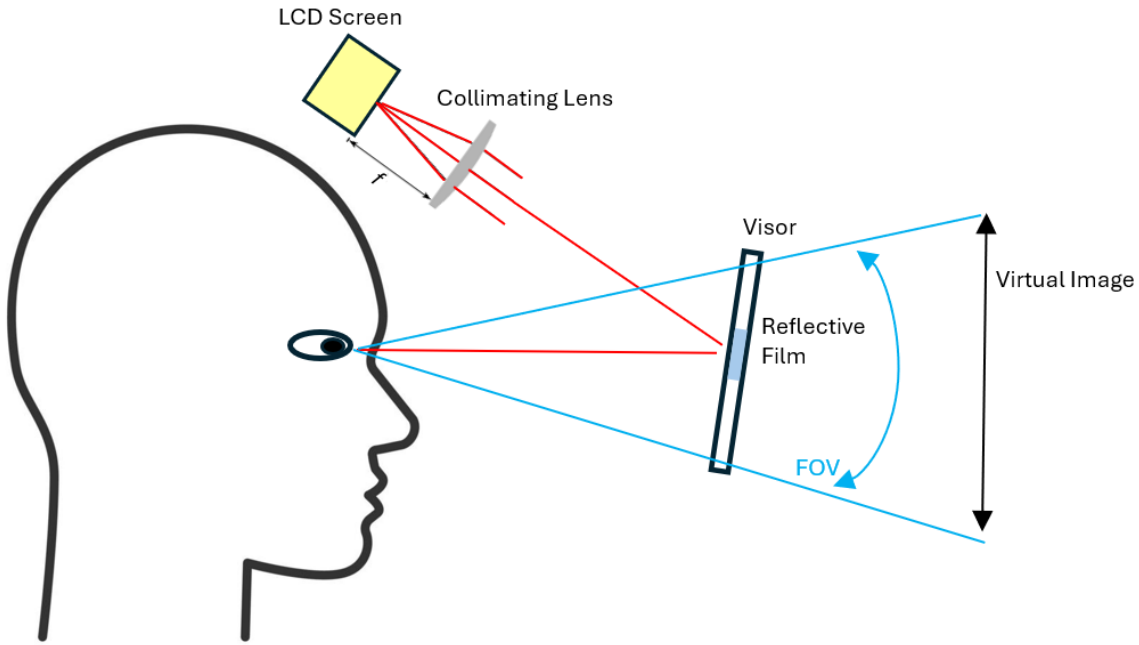
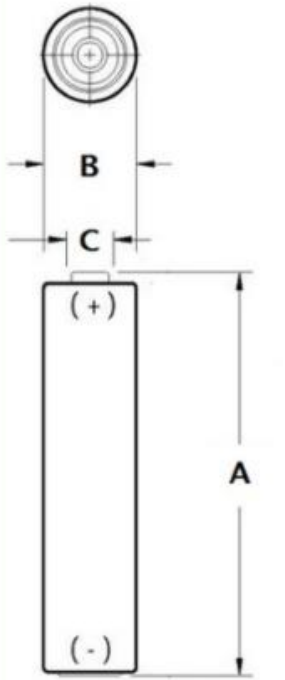
HUD Schematic



Will Include:

- Collimating Lense
- 1.3” LCD Screen
- Photochromic Transition Visor with Reflective Film Patch

Battery Information



18650 batteries are ideal for several reasons:

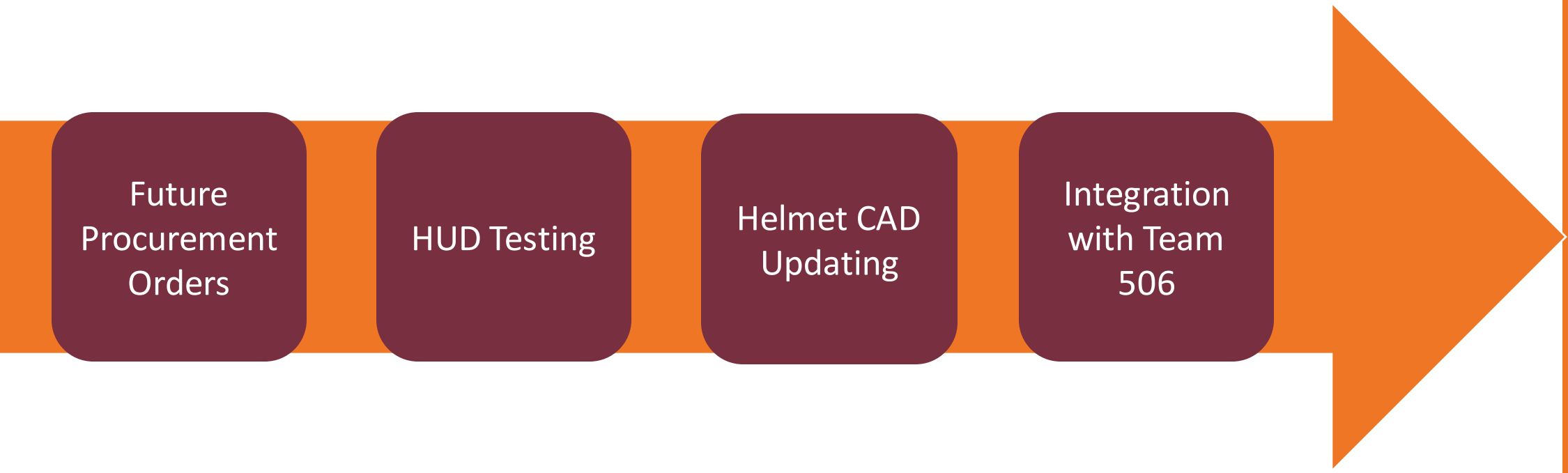
- Rechargeability
- Small form factor
- Stack-ability
- Lightweight
- High cell voltage
- High safety performance

Battery Enclosure Information

Includes:

- The battery enclosure will be made of a combination of PVC heat shrink and 3D printed PLA filament
- The combination of materials will assist in heat dissipation

Future Work



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Thank you from Team 505

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