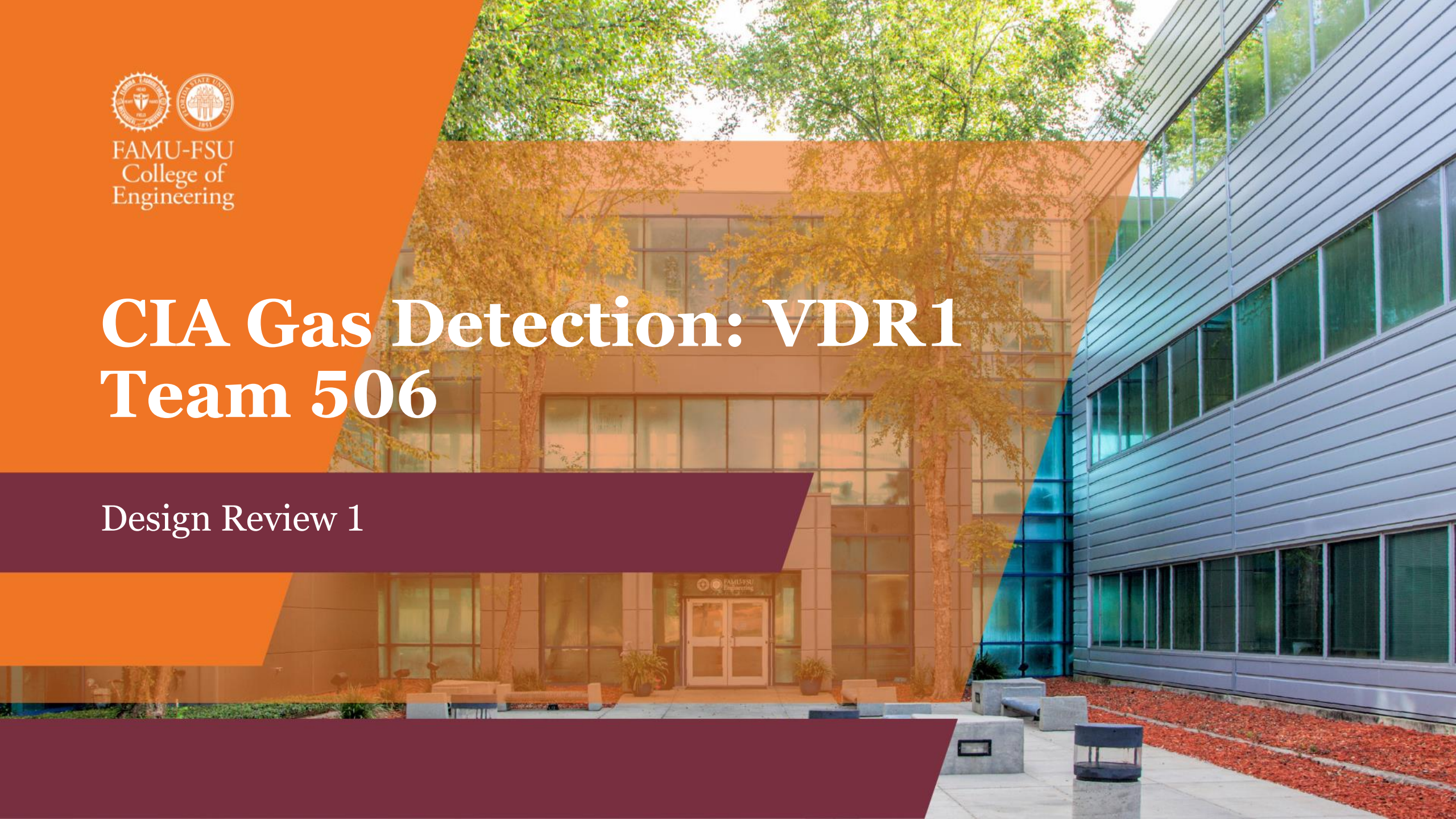




FAMU-FSU  
College of  
Engineering

# CIA Gas Detection: VDR1 Team 506

Design Review 1





# Team Introductions



**Shawn Butler**  
*Manufacturing  
Engineer*



**Ben Labiner**  
*Mechatronics  
Engineer*



**Alex McIvor**  
*Test  
Engineer*



**Jane Nordhagen**  
*Purchasing &  
Research Engineer*

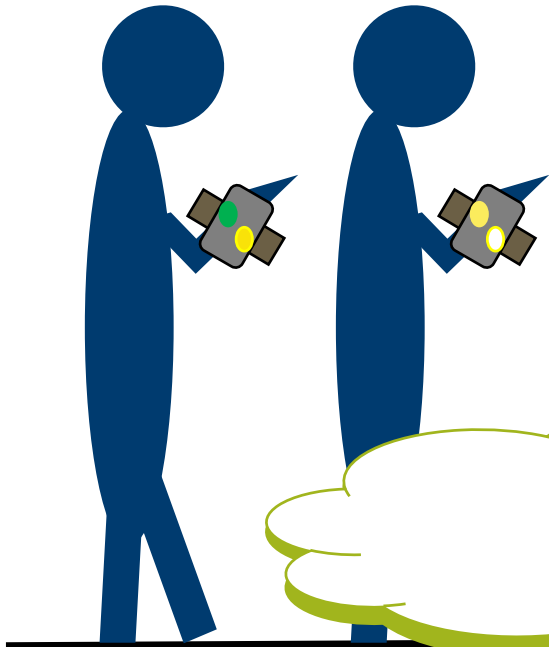


**Michaela Porcelli**  
*Design  
Engineer*



# Objective

**The objective of this project is to design a wearable gas sensor tailored for CIA search and rescue operations**



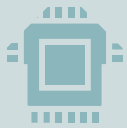
# Project Background



When buildings collapse, flammable or toxic gasses enter the air, making it dangerous for search and rescue responders to assist trapped survivors



Current gas detectors are hand-held and bulky, making them difficult to monitor and control when wearing response gear



A wearable gas detection and alert system would make it easier for first responders to focus on their job without needing to regularly check if the air surrounding them is potentially harmful

# Sponsor and Advisor



**Engineering Mentor**  
Franklin Roberts  
*Central Intelligence Agency (CIA)*



**Academic Advisor**  
Shayne McConomy, Ph.D.  
*Senior Design Professor*



# Assumptions



The agreed upon scenario (building collapse) will be completely representative of the use case for this product



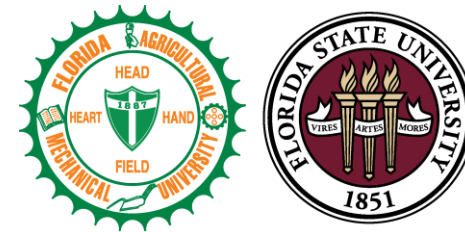
Only known and anticipated gasses will be detected, there is no expectation of identifying novel gasses



This device will not be concealed in any way



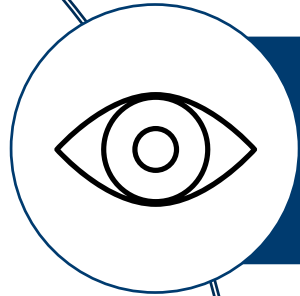
# Stakeholders



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Engineering



# Key Goals



Sense



Notify



Safety



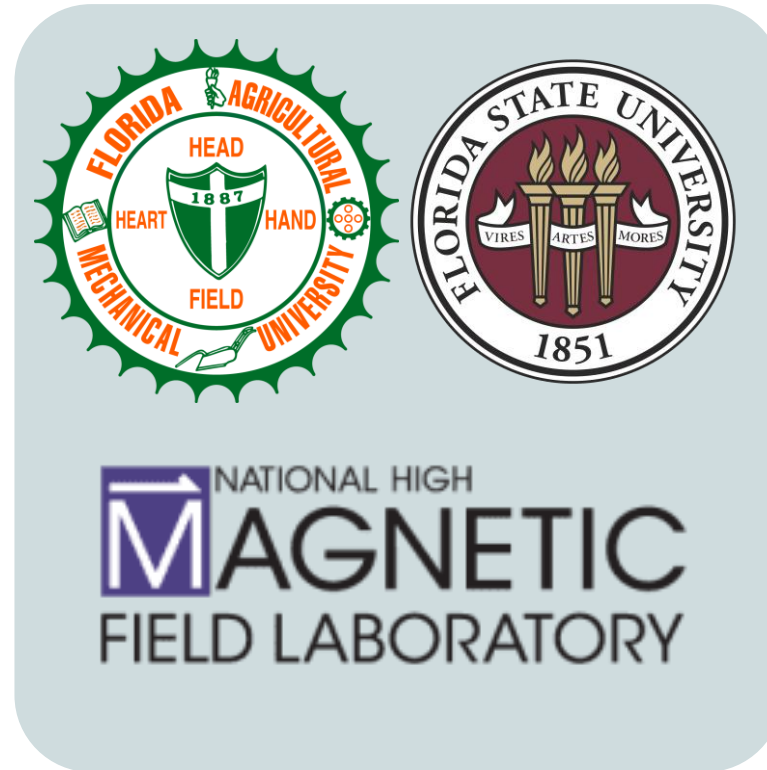


# Markets

## Primary Markets



## Secondary Markets



# Customer Needs



Are there any weight or shape constraints?



Is the purpose for tracking gasses or for warning the wearer?



What are the expected mission durations, and how does this impact battery life requirements?



Are there any specific reliability or durability standards to keep in mind?



Does the device need to be heat/temperature or humidity resistant?

# Customer Needs



Keep it under 40 lbs and do not  
user obstruct motion.

# Customer Needs



Keep it under 40 lbs.



Is the purpose for tracking gasses or for warning the wearer?



What are the expected mission durations, and how does this impact battery life requirements?



Are there any specific reliability or durability standards to keep in mind?



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# Customer Needs



Main purpose is to warn the user

# Customer Needs



Keep it under 40 lbs and do not user obstruct motion.



Main purpose is to warn the user



What are the expected mission durations, and how does this impact battery life requirements?



Are there any specific reliability or durability standards to keep in mind?



Does the device need to be heat/temperature or humidity resistant?

# Customer Needs



24-hour continuous usage from a single charge

# Customer Needs



Keep it under 40 lbs and do not user obstruct motion.



Main purpose is to warn the user



A 24-hour continuous usage from a single charge



Are there any specific reliability or durability standards to keep in mind?



Does the device need to be heat/temperature or humidity resistant?



# Customer Needs



No official standards or regulations are required to follow

# Customer Needs



Keep it under 40 lbs and do not user obstruct motion.



Main purpose is to warn the user



24-hour continuous usage from a single charge



No official standards or regulations are required to follow



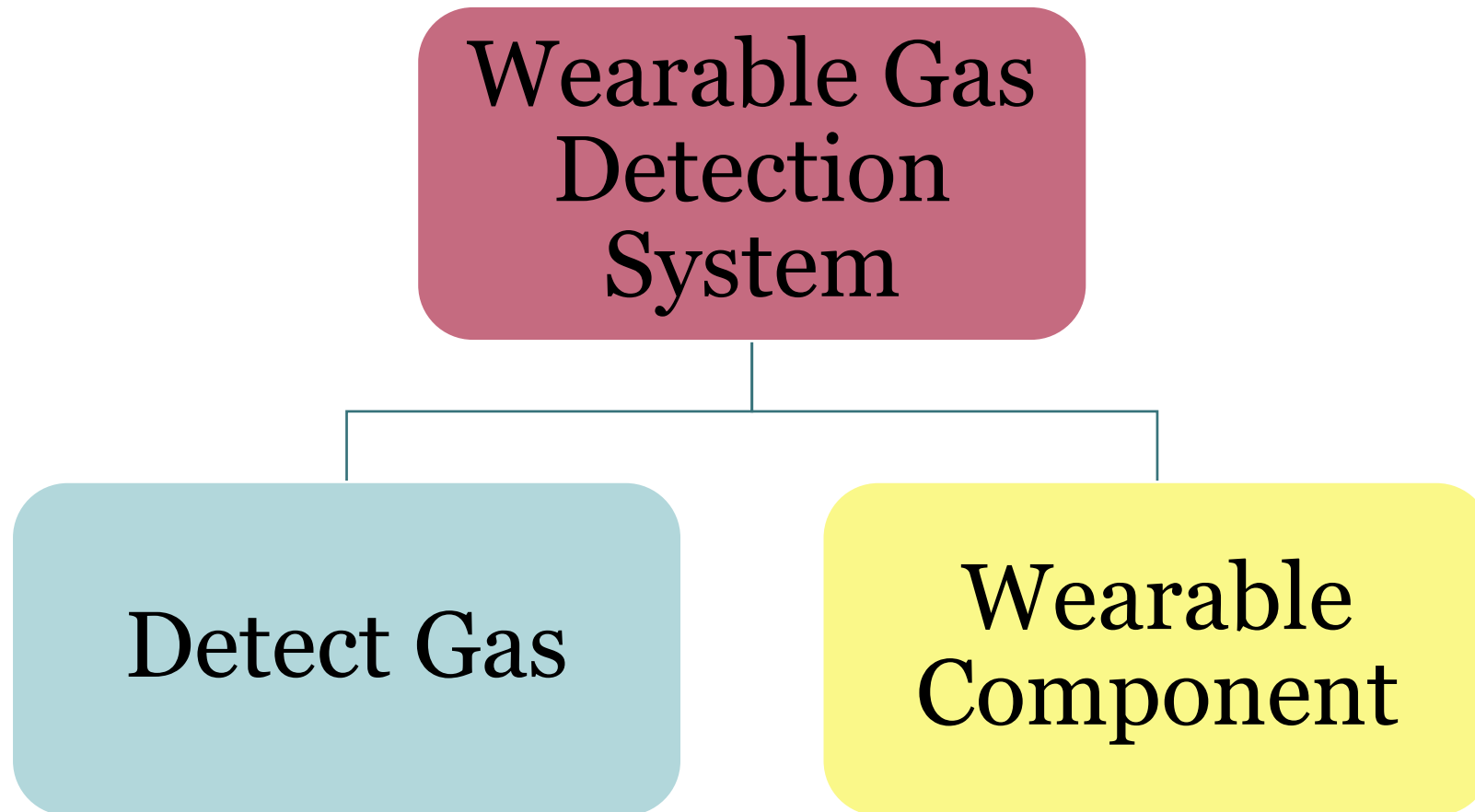
Does the device need to be heat/temperature or humidity resistant?

# Customer Needs



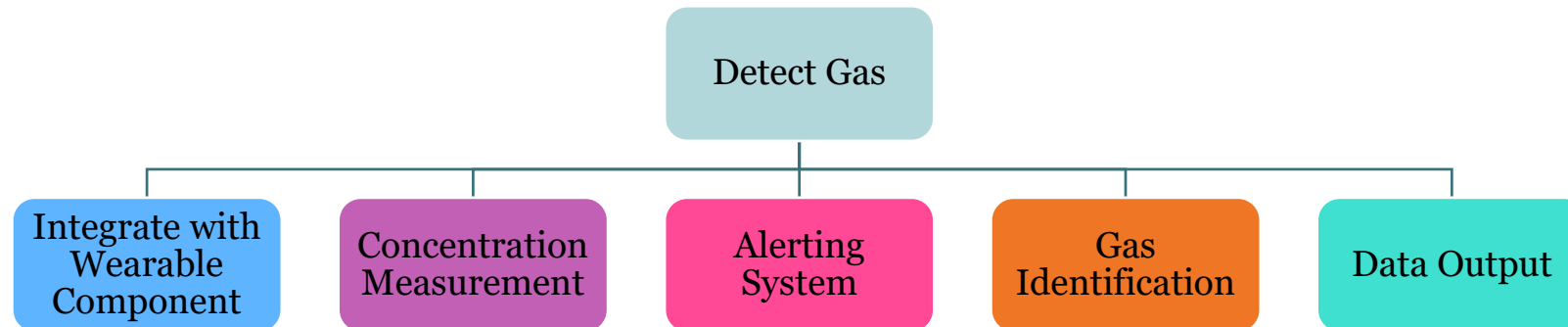
Needs to withstand realistic heat/humidity temperatures

# Functions Hierarchy Chart

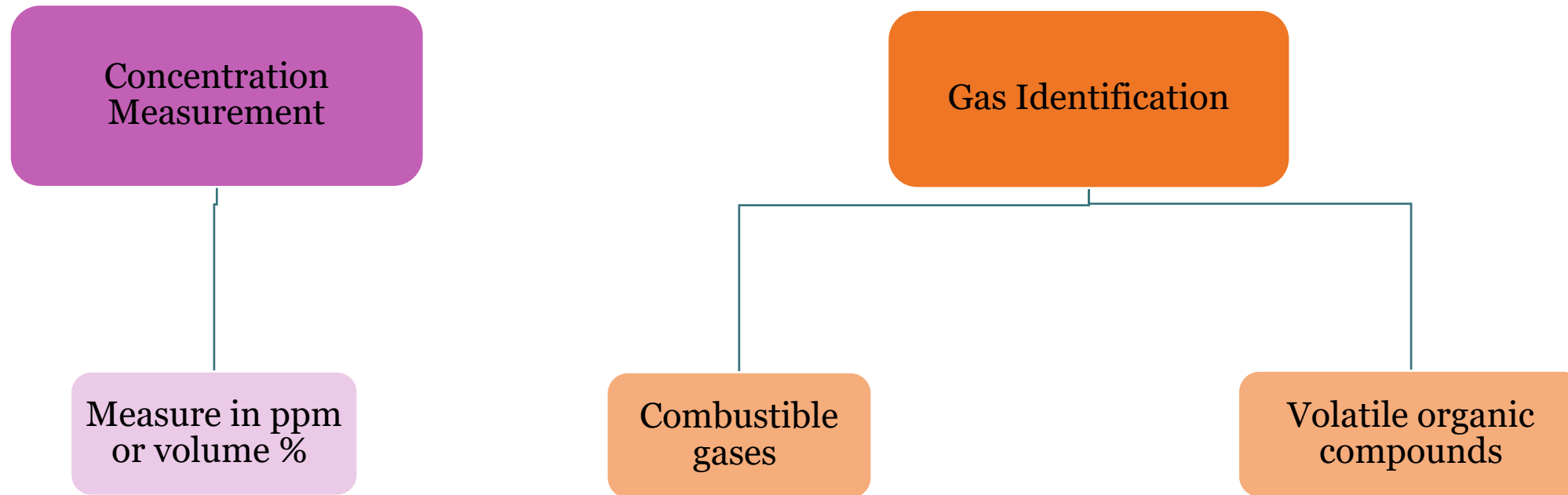




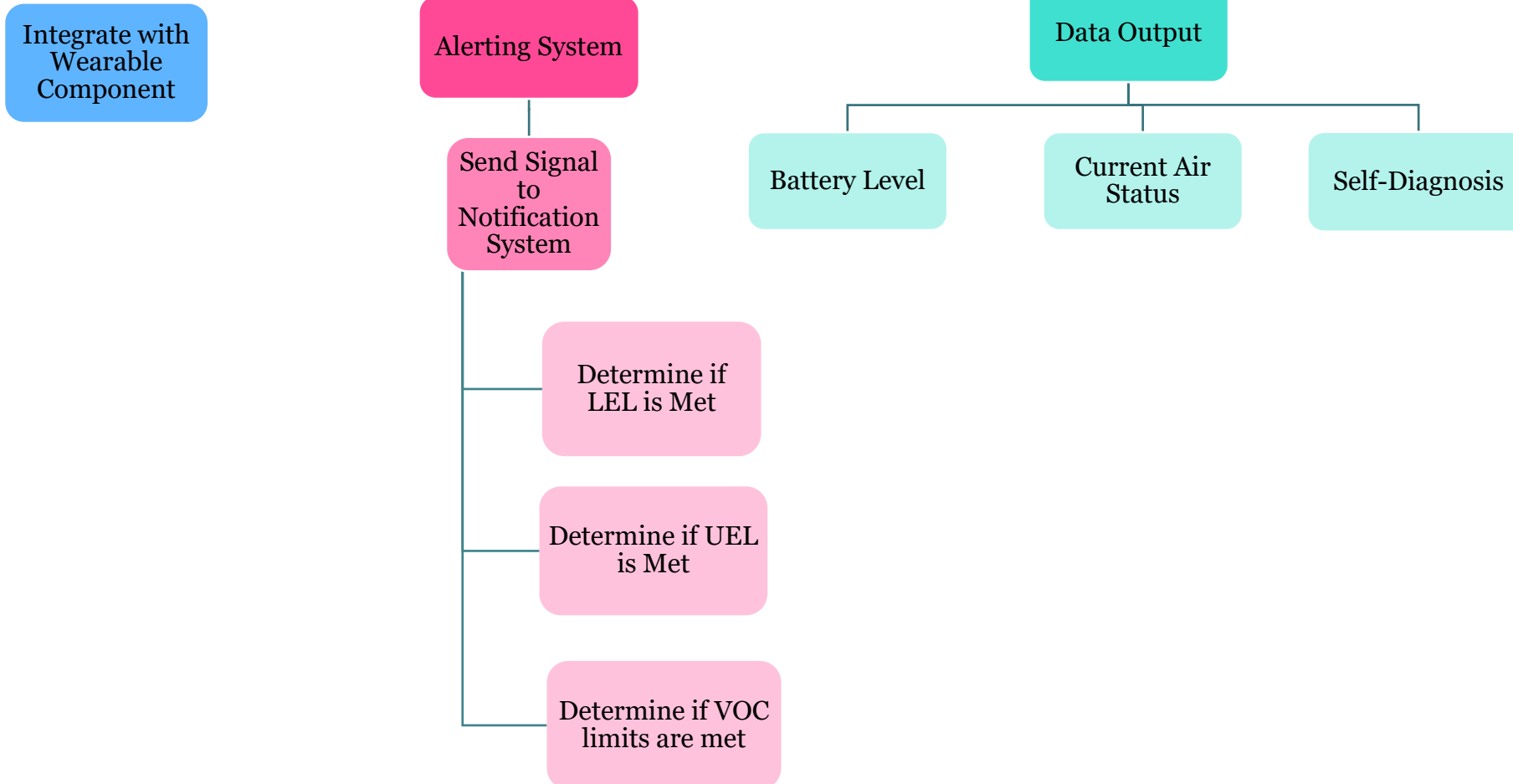
# Functions Hierarchy Chart



# Functions Hierarchy Chart



# Functions Hierarchy Chart



# Next Steps For Class



Targets and  
Metrics



Concept  
Generation

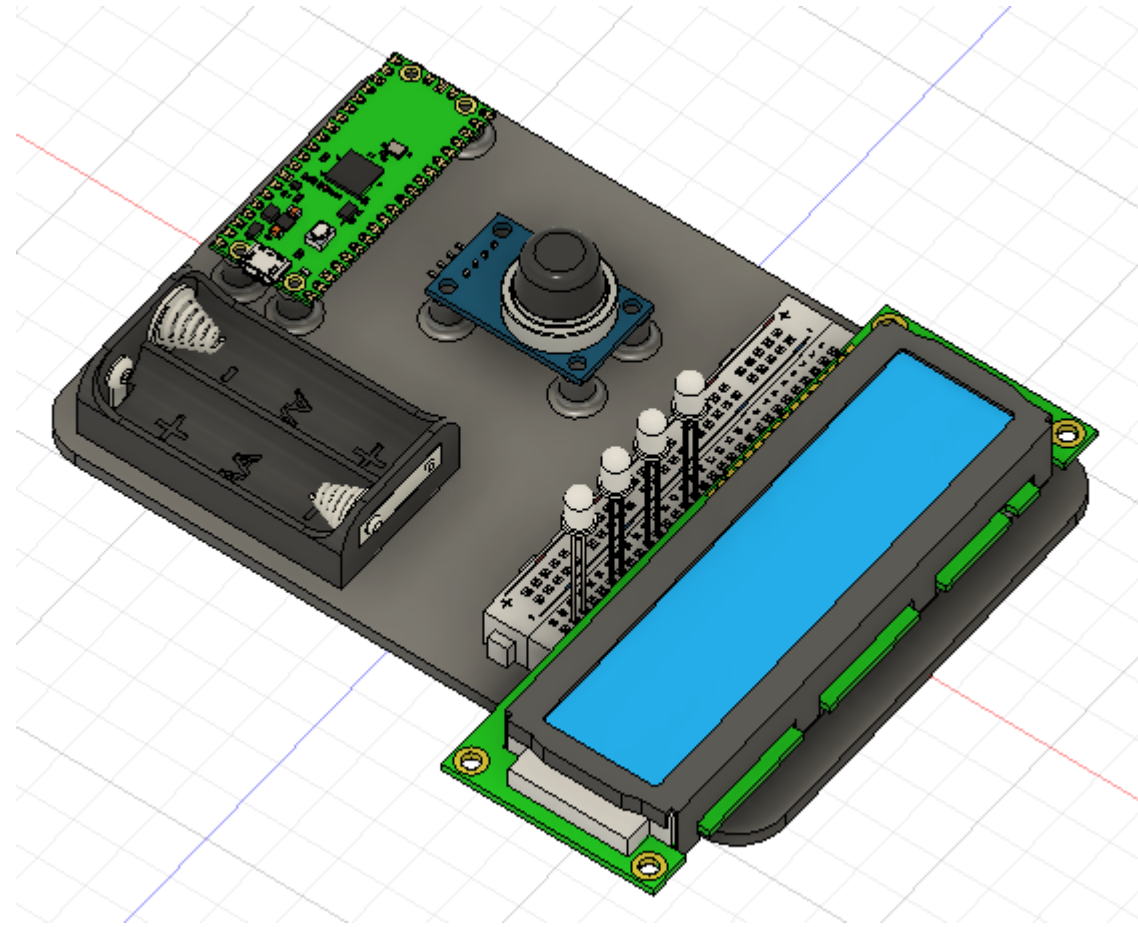


Concept  
Selection



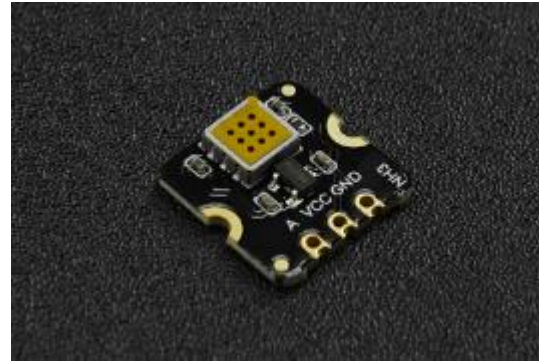
# Next Steps For Prototype

Test MQ-5  
Gas sensor  
for  
combustible  
gas detection



# Next Steps For Prototype

Spec appropriate sensors for the specifically desired gasses



Fermion: MEMS Ammonia NH3 Gas Detection Sensor (Breakout, 1-300ppm)

\$7.50

SKU:SEN0567

Add to Cart



In Stock



Gravity: Analog CO/Combustible Gas Sensor (MQ9)

\$7.50

SKU:SEN0134

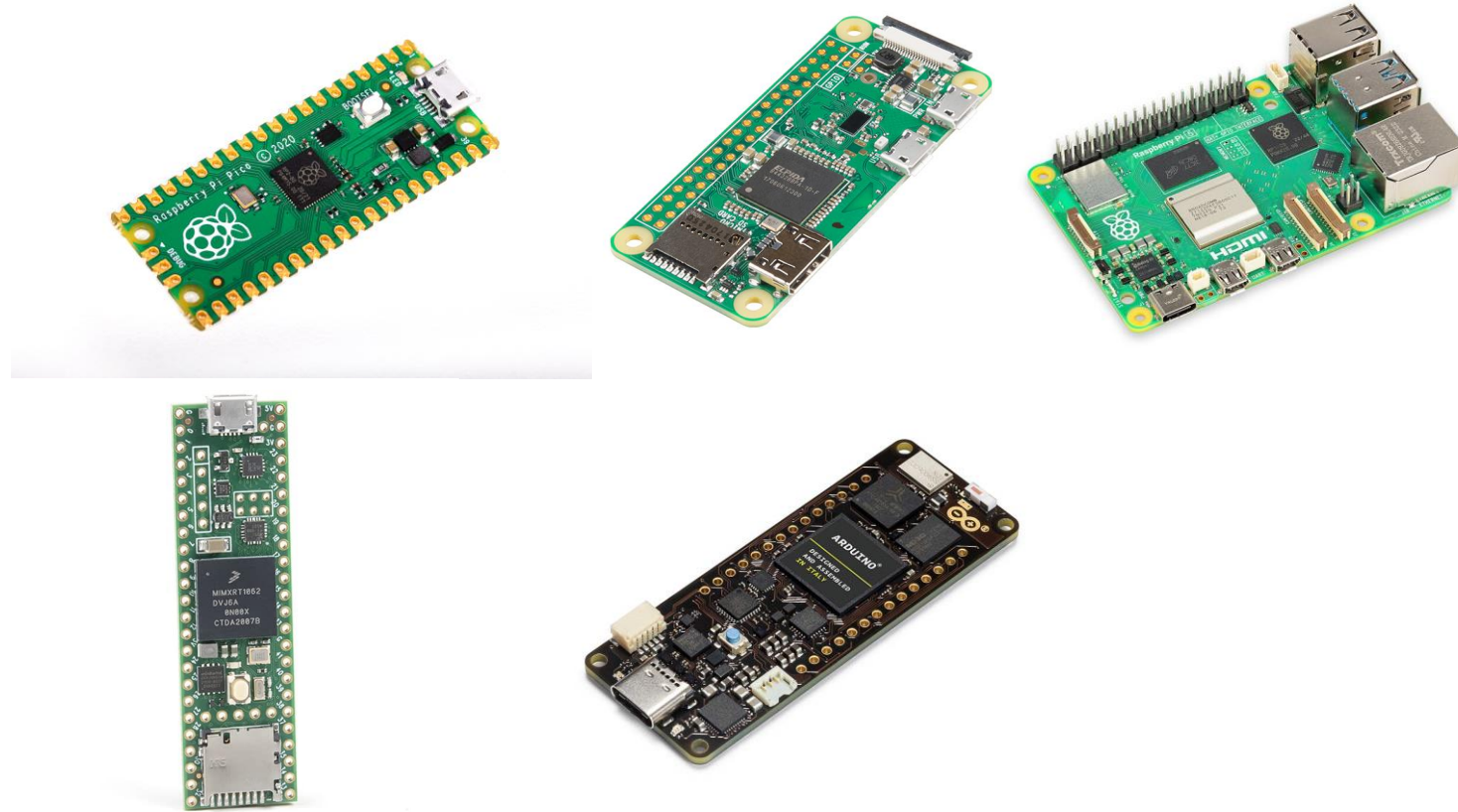
Add to Cart



In Stock

# Next Steps For Prototype

Select an appropriate micro-controller or SBC



# Questions?





# Questions?



SPONSOR



OBJECTIVE



PROJECT  
BACKGROUND



KEY GOALS



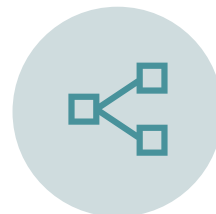
MARKETS



STAKEHOLDERS



CUSTOMER  
NEEDS



HIERARCHY  
CHART

# Functions Hierarchy Chart

