

1.2 Customer Needs

1.2.1 Investigating Needs

The CIA has partnered with the FAMU-FSU College of Engineering to develop a wearable device with the ability to detect harmful gases in the environment. The CIA placed Franklin Roberts, designated team advisor and liaison, to be our main point of contact regarding topics related to the wearable gas sensor. To understand the needs and wants of the CIA for the wearable gas sensor project, Team 506 conducted a customer interview via Google Meets on October 6th at 2pm EST with the CIA team. The questions were open-ended and made to avoid scope creep. The responses to the set of questions, along with the interpreted needs are displayed in Table 1.

The feedback obtained from the questions has assisted the team in refining the focus of this project, highlighting the crucial areas for attention. Our inquiries primarily centered on the primary functions of the gas sensor, any environmental limitations, and the size and weight of the device. Based on the CIA's answers, the team made an interpretation of the sponsors response for each question. These interpretations were formulated to describe the underlying requirements needed to transition into the next phases of the project and understand device requirements and constraints.

Table 1: Customer Needs Breakdown

Question	Sponsor Response	Interpretation
1. Is the purpose for tracking or for warning the wearer?	"The main purpose is to warn the user. Tracking the sensor is not necessary."	User notification is main objective
2. What are the expected mission durations, and	"As long as possible without using a heavy battery."	Long battery life without an unwieldy battery weight

how does this impact battery life requirements?		
3. Are there any weight or shape constraints?	“Yes, keep it lightweight.”	Have a lightweight (< 40 lb.) device
4. Are there any specific reliability or durability standards to keep in mind?	“You do not need to follow any standards or regulations because that cost too much money and is too complex.”	There is no explicit standard of reliability/durability
5. What training and support resources are required for CIA operatives to effectively use and maintain the gas sensor?	“No training is needed.” Create just a basic manual for the components	Make the system intuitive and easy to use. Have basic manual just in case
6. Are there considerations for maintaining operational discretion and keeping the gas sensor covert or discreet when needed?	“The device can be hidden or on the outerwear of the user.”	Device can be visible or covered.
7. Does the device need to be heat/Temperature Humidity resistant?	“Withstand realistic heat/humidity temperatures.”	Realistic temperatures range from 20°F - 120°F
8. How do you want the data transmitted? (In a database etc.)	“Transmitting the data is not a hard requirement.”	Data from can be transmitted however the team pleases as long as hard requirements are completed first.

1.2.2 Explanation of Results

From the interpreted customer needs, the most important needs were for the device to be wearable, be able to detect gas, and to prioritize shelf life and power. The design primarily focusing on warning the user of harmful gases rather than back hauling the data to a central

location. The customer is concerned about the size and the weight of the device in order to keep the scenario realistic while considering the relative weight of the battery.

With respect to high safety standards and preventing hazardous incidents the team will not use toxic gases and be tested in a safe environment. The final concept is open for interpretation between Team 505 and Team 506. The assumption that the wearable gas sensor will be used in a building collapse search and rescue scenario was agreed upon with the CIA and the two Senior Design teams.

Ultimately, throughout Senior Design, the CIA wants to be updated with designs, and prototypes of the device. By the end of Senior Design, they most desire to have a functional prototype that can detect gas, be wearable, and have a good shelf life.