

1.1 Project Scope

1.1.1 Project Description

The objective of this project is to design, develop, and deploy a wearable gas sensor system tailored for CIA search and rescue operations. The specific scenario we will focus on is a building collapse. This system will equip CIA teams with a reliable and portable tool for detecting and monitoring hazardous gases in disaster-stricken areas, ultimately enhancing the safety and effectiveness of missions. Our project offers seamless integration into Team 505's wearable safety system, providing the flexibility to either detach from the main system or function independently as a standalone unit.

1.1.2 Key Goals

The objective of this project is to create a wearable gas sensor for search and rescue operations, with a focus on the CIA principles: Confidentiality, Integrity, Intergration and Availability, to ensure the highest level of data security and reliability. Confidentiality goals include encrypting sensitive gas concentration data and controlling access to authorized personnel. For integrity, the sensor must validate data accuracy and maintain tamper-proof data logs. For our Intergration goals we want to be able to have the sensor read and display information on Team 505 search and rescue device. Availability goals require redundancy and remote monitoring to ensure uninterrupted functionality during critical missions. Comprehensive cybersecurity and physical security measures are essential to safeguard against threats. Usability goals encompass user training and an intuitive interface, while compliance ensures adherence to relevant regulations and ethical considerations, thus ensuring the effectiveness of the gas sensor in search and rescue efforts while upholding data integrity and privacy. The wearable will be modular to allow for first responders to adjust where on the body they wear the box/sensors.

1.1.3 Markets

Primary Market

The primary market for wearable gas sensors in search and rescue operations with a focus on the CIA (Confidentiality, Integrity, and Availability) principles is the public sector and government agencies involved in emergency response and national security. These organizations include fire departments, law enforcement agencies, and military units specializing in disaster response and chemical threat detection. These users prioritize the reliability, security, and confidentiality of sensor data to ensure effective decision-making during critical missions.

Secondary Markets

Secondary markets include private sector entities engaged in activities such as industrial safety, hazardous material handling, and environmental monitoring. Companies in sectors like oil and gas, chemical manufacturing, and construction can benefit from wearable gas sensors for employee safety and environmental compliance. For example, the MagLab would be interested in it for maintenance repairs on pipe leaks. Additionally, Universities like Florida State and FAMU may be interested in it for their science Laboratories. While they also require reliable and secure sensor solutions, their primary focus may not be on the stringent security measures demanded by government agencies, making them a secondary market segment.

1.1.4 Assumptions

Our assumptions have been derived from the conversations we have had with our sponsor about their goals and expectations for this project.

Our first assumption for this project is that the scenario(s) being designed for this project will be completely representative of the use case for this project. Team 506 (with team 505) is

working to design appropriate scenarios for which a wearable gas sensor could be used by the CIA. While the designed product may be helpful in other situations, our design will be tailored to the selected scenario(s).

We are also assuming that we will only be attempting to detect known gases. The detection method that will be used is yet to be determined, but we will not be responsible for quantifying characteristics of novel gases. If characteristics of unknown gases can be determined, this will be desirable, but it will not be a main goal of the project.

We assume there is no expectation of concealment for this project unless our sponsors state that it would be beneficial in a selected scenario. The CIA is known for spy-craft, but this project will primarily be focused on search and rescue operations, where concealment of safety equipment is not typically desirable.

We are as well assuming that Team 505 and Team 506 project/device should be integrable together and work together as one device.

1.1.5 Stakeholders

Central Intelligence Agency (CIA), Senior design professor Dr. Shayne McConomy, and the FAMU-FSU College of Engineering. Dr. Shayne McConomy is the advisor for this project, and the FAMU-FSU College of Engineering is represented, so they are interested in this product.