



## Sample Project Abstracts

### **Houston Community College, TX**

#### ***Project Name: The NanoSense Mask***

First responders, such as firefighters, often face severe long-term health risks due to frequent exposure to toxic gases and volatile organic compounds (VOCs). The NanoSense mask is a cost-effective solution to this problem. Our mask is an advanced air-purifying respirator (APR) that uses NASA's nanosensor array technology to detect toxic gases and volatile organic compounds in real time at trace levels and analyze their chemical composition. This data is then sent to a command center via USB or Bluetooth, enabling informed decision-making for faster, more efficient responses. In addition, the mask monitors firefighters' physical condition by detecting biomarkers in exhaled breath that signal dehydration, fatigue, and metabolic disturbances while recording respiratory patterns. This real-time health monitoring allows for early detection of potential risks, preventing further complications. By integrating the NanoSense mask into fire stations nationwide, we aim to protect those who protect us. In doing so, we also reduce the long-term financial burden of disability pensions and retraining costs.

### **Middlesex Community College, MA**

#### ***Project Name: InSight***

InSight is an innovative wearable navigation system designed to assist individuals who are blind or visually impaired. The device combines LiDAR, AI-powered imaging, and GPS technology to create a real-time 3D map of the user's environment, offering detailed spatial awareness and obstacle detection. InSight announces upcoming hazards, and optimal pathways through spatial audio, helping users move confidently and independently. While white canes and guide dogs offer some mobility support, they fall short in terms of range, cost, and usability. InSight fills this critical gap, offering extended detection range, visual recognition, and a discreet design. A built-in safety feature allows users to instantly share their location with emergency contacts at the press of a button. InSight not only enhances day-to-day navigation but also opens new doors for education, employment, and social inclusion. With over 50 million visually impaired adults in the U.S. alone, this solution addresses a long-standing equity issue in assistive technology. Our goal is to empower users with greater independence, dignity, and confidence. Disability is the only minority community that you can join at any point in time due to age, accident, or illness. With InSight, we hope to make a difference.

**Des Moines Area Community College, IA****Project Name: Smart Tapering Vaporizer with AI Coaching**

Vaping-related nicotine addiction continues to rise, especially among youth and young adults, with many traditional cessation methods failing to address the psychological and behavioral aspects of dependency. AI-CQD (AI-Coached Quitting Device) presents an innovative approach to addressing this issue by combining a smart vaping device with an AI-powered mobile application that guides users through a personalized and sustainable quitting process. The device gradually reduces nicotine levels while tracking usage patterns and syncing with the app to deliver motivational coaching, behavioral prompts, and real-time coping strategies tailored to the user's progress. Unlike one-size-fits-all solutions, AI-CQD adapts dynamically to individual needs, helping users build healthier habits and overcome cravings with targeted, data-driven support. Designed to empower rather than shame, this solution emphasizes encouragement, education, and long-term engagement. With its sleek hardware, intuitive interface, and emphasis on behavioral reinforcement, AI-CQD seeks to improve public health by addressing addiction at both the chemical and psychological levels. By offering a compassionate and personalized path to quitting, our project contributes to reduced nicotine dependence, enhanced mental well-being, and a healthier future for individuals and communities alike.