

## INNOVATIVE APPROACHES TO ELUCIDATE OPTIMAL DEPLOYMENT OF CB SENSING ASSETS

### Novel Generative AI For Sensors: Augmenting Downstream Deployed Sensors For Improved Agent Detection And Identification

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The current suite of fielded chemical agent detectors, including mass, Raman, infrared, and ion mobility spectrometers, rely on preset discriminatory algorithms to identify the specific analytes. These libraries rely on comprehensive pre-collected data libraries and various mathematical data transformations to inform classification decisions. While comprehensive, these methods are not exhaustive as the collective detector systems are often confused by new molecules, complex mixtures, and environmental variables. To overcome these limitations, much larger data libraries would be required, and the collection of this massive quantity of data is logistically impossible. To address this challenge, we continue to work on novel machine learning-based solutions using generative artificial intelligence (GenAI) methods previously not developed for chemical sensors. Based on the previously reported ChemCeption machine learning method used to predict select chemical properties based on structures, we are developing a similarly structured network architecture that can accommodate sensor data of from disparate sensor modalities and connect them to the resulting chemical structure data for positive classification. We will highlight our on-going work focusing on mass spectrometry, where our generated mass spectra achieve near full accuracy using commonly used MS databases classification tools. Lastly, we will preview our planned application of this foundational work towards the other sensor modalities.

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