Enhancing First Responders' Safety in Fire Incidents using an Interactive Hazardous-Material Detection Platform

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Abstract

During a freight fire emergency, proper detection and respondence to unknown chemicals can help control the spread of a fire and prevent potential explosions. Failing to identify the hazardous materials in a timely manner might obstruct or even mislead the use of the correct fire extinguishers for the first responders, resulting in heavy casualties and economic losses. Thus, in fire incidents, it is crucial to shorten the decision-making time required to identify the emergency with an interactive hazardous-material detection platform, and that the overall damage could be minimized.

In collaboration with the National Research Council of Canada (NRC), we are developing a multifunctional, robust interface as an aid in freight fire incidents. Functional requirements include showing the detected materials precisely and recommending the first responders with the corresponding emergency response guides and strategies. Non-functional requirements include that the platform should be user-friendly and easy-to-understand for first responders who are not familiar with combustion processes. Our metrics unit revolves around our objectives including user satisfaction, usability, and efficiency. It will be measured by the average time (in seconds) taken by the user to navigate through the end-to-end process.

With an understanding of our clients' needs, our procedure is to first confirm the most suitable software development tool, and then code the software and its features including part per million (PPM) visualization and integration of machine learning model ROCKET with time series data. In the near future, we will conduct testing with the NRC researchers to assess and improve the software upon their feedback. Taking account of these features, the software is believed to play an essential role for first responders at the fire scene once implemented.