



## Critical Data Relay (CDR)

**Aggregation of Data from First Responders to Smartphone API Display**  
**ELECOMP Capstone Design Project 2023-2024**

### **Sponsoring Company:**

#### **Research and Development Solutions Inc.**

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### **Company Overview:**

Research and Development Solutions (RDSI) is a Service-Disabled Veteran Owned Small Business (SDVOSB) that performs a wide range of engineering, technical, and programmatic functions in support various Government and commercial clients and specializes in delivering affordable, scaled, state-of-the-art solutions to government and industry clientele. The RDSI Department of Defense (DoD) portfolio includes expertise in the areas of Submarine Imaging, Electronic Warfare, Weapons, Acoustics, Communication, Antennas, Special Projects, and software development. In support of Public Safety projects and clientele, RDSI works with RIDEM, RIEMA, RIDMAT, FAA, FEMA, and NRC. Our diverse commercial and academic support includes Walt Disney Imagineering, Pfizer, Alexion, Sea Research Foundation, Tyco, LAX Airport, Providence College, and the University of Pennsylvania, allowing RDSI to provide the products and types of services required by an increased demand for more efficient and effective utilization of resources.



## Technical Directors:

### Bruce Torman

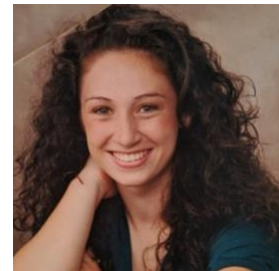
Engineering Manager

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### Hannah Morrissey (ELECOMP '22)

Electrical Engineer

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## Project Motivation:

RDSI has strong connections with local Public Safety efforts, such as the Rhode Island Office of the State Fire Marshal. Our President, Mr. John Evans, is a volunteer Fire Chief for the Town of Lyme, CT, and has close relationships with first responders for fire and emergency medical service situations. The incident management sector has a constant need for new technology, and organizations within that sector have received little innovation to their tools in the recent years. Designing and developing an application for firefighters will be beneficial in bringing their toolset up to modern day needs. This overall effort will have a lasting impact on the incident management sector and will benefit the lives of those who provide an invaluable service to our communities.

## Anticipated Best Outcome:

- A. Design and develop a prototype phone application to assist firefighters in their response to a hazardous materials incident.
- B. Using the prototype phone application, demonstrate a working version of the prototype and determine if additional functionality is required.
- C. Identify and highlight additional areas of the incident management sector like Emergency Medical Services and Police which may require a similar application, using the original prototype as a framework for specialization.

## Project Details:

The objective of this project is to further develop a mobile phone application for a ruggedized phone or tablet, that will be beneficial to the Fire Department. Previous research and development has yielded a useful phone application that has started to convert the written version of the Emergency Response Guide (ERG) into an interactive phone application by either being able to take a picture of the placard or inputting the placards' chemical number via the keypad. The application works exactly like the printed version of the ERG, with screen prompts to guide the user. Although previous work has yielded a workable prototype, the next phase of the project is going to concentrate on developing the final version of the product that RDSI wishes to launch. The successful outcome of this project will fulfill a critical need for those emergency services responding to a hazardous material event. To meet the threshold of product success, the following tasks must be met by the end of the school year 2024:

### Hardware Task:

1. Determine and purchase, borrow or rent a ruggedized hardware/system will offer the functionality required by the application. This system will probably involve more than one piece of hardware; logistics and requirements regarding space, installation, ergonomics... etc. will need to be considered for a successful product launch. *Completion of this task is the responsibility of the project sponsor.*

### Firmware Tasks:

1. Complete the chemical database (including the green pages) to the latest version of the ERG.
2. Improve the zoom function of the legacy version to be able to identify a placard at 300 feet.

3. Improve the Graphics User Interface so that it looks like an RDSI product with fonts and graphics consistent with RDSI templates and website.
4. Start development of an add-on sensor to sample the atmosphere, send the information to the phone/tablet to identify the chemical and provide the user with prompts to address the situation appropriately. Since this part of the project is R&D, a working prototype that shows that it can identify a handful of chemicals is all that is required. The final version will be required to give the user an output of all possible chemicals and their concentrations in the sample. *Sponsor to provide input as to what type of sensor will be used.*

## Composition of Team:

2 Computers Engineers (Electrical Engineers can also be considered, with mobile application experience and development; detailed justification will be needed)

Representative/consultant from a Fire Department with 10 or more years of experience

## Skills Required:

### Electrical Engineering Skills Required:

- Organization and documentation
- User interface design / GUI design
- User experience design
- Integrated Development Environments (Android IDE and XCode)
- Testing, debugging, and validating code

### Computer Engineering Skills Required:

- Organization and documentation
- Knowledge of common programming languages
- User interface design / GUI design
- User experience design
- Integrated Development Environments (Android IDE and XCode)
- Testing, debugging, and validating code



## **Anticipated Best Outcome's Impact on Company's Business:**

If successful, this project will provide a previously unmet need for Rhode Island's Fire Departments and State Fire Marshal, while opening the possibility for future relationships with local police, emergency medical services, local security entities, as well as Homeland Security.

## **Broader Implications of the Best Outcome on the Company's Industry:**

This project fulfills an unmet need for members of the community that focus on the safety and wellbeing of those around them. By tailoring the features of this project directly to a specific organization, this application will offer solutions to direct problems. With the resolution of these issues, the organization's members will be able to conduct their business with increased efficiency and in a timelier fashion, allowing for increased safety and the continued wellbeing of the community which is paramount.