



USU AFRL MATES

Mobile Active Threat Emergency System

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COLLEGE of
ENGINEERING
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Problem Statement

First Responder Active Threat Support System

- Locate and identify individuals
- Magnify effectiveness of trained professionals
- Connect existing and future systems
- Locate “hide-in-place” individuals
- Adaptable to multiple emergency situations:
 - Natural Disaster
 - Active Threat
 - Search and Rescue

SME Introduction

- Captain Tyson Budge – Logan City Police
- Cole Smith – President of Tresit Group
- Captain Harris – USU Police
- Sergeant Dunn – USU Police, S.W.A.T.
- Corporal Harvey – US Marine Corp. Marksman
- Will Lusk – Emergency Manager
- Stephen Parker – Tuscon S.W.A.T. Instructor
- "John Doe" – Las Vegas Medical First Responder

System Requirements

SME requested system features:

- Assist and enhance current First Responders
- Lightweight and hands-free
- Enhance communication among First Responders
- Identify and report location of personnel
- Distribute information to Responders
- Integrate easily into existing First Responder equipment

SME Feedback Avoidances

SME requested system features:

- DO NOT replace trained professionals
- No special tools
 - Ineffective
 - Improper Search and Seizure
 - Training
 - High Costs



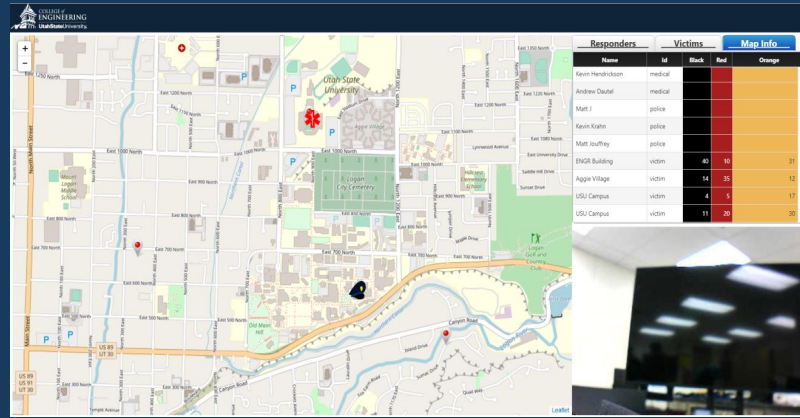
Linked
Emergency
Gear
Inter-
Operative
Network

System Overview

Location
Video Stream



Map
Video



Location
Victim Data

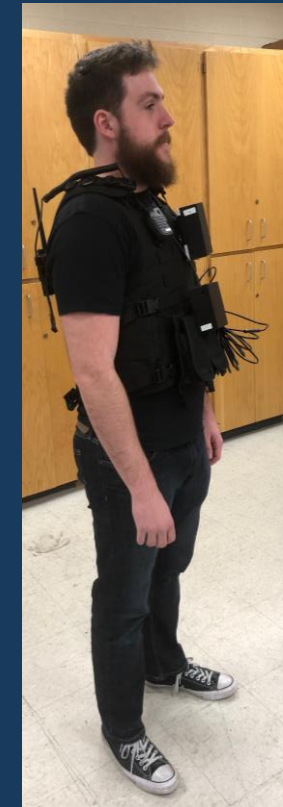
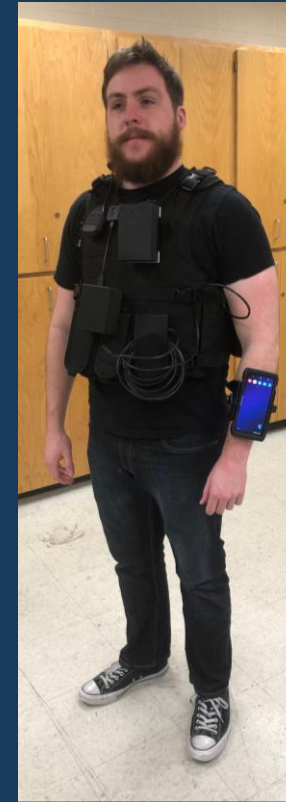


Map
Victim Data

Physical Devices

Physical Devices

- Forearm mounted cellphone
- Body camera
- Borescope
- Thermal camera
- MiFi router
- Battery



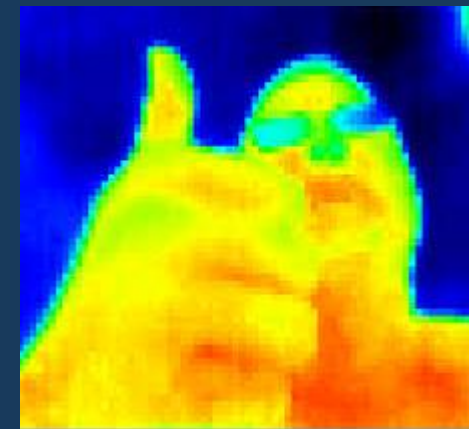
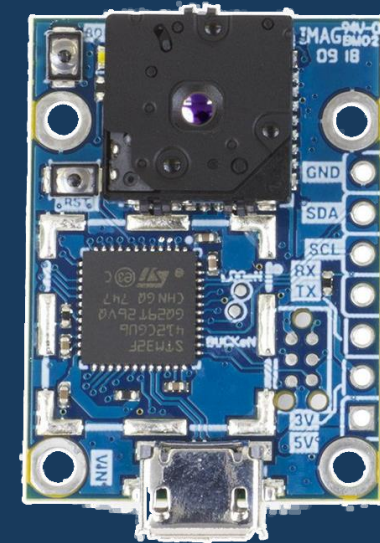
Smart Phone w/ Forearm Mount

- Durable Case
- Ambidextrous
- Rapid/Secure attachment
- Samsung S9
 - Flexible OS
 - OTS screen & battery
 - SME approved



FLIR Thermal Cam

- Requested:
 - Logan Police
 - USU Police
 - Cpl. Harvey
- Useful for low-visibility environments
- Locate hide-in-place individuals



Depstech Borescope

- Requested:
 - Cpl. Harvey
 - Capt. Budge
- Assist Contact Team
 - View through tight spaces
 - View around corners



Body Camera

- Commercial body camera (Future Goal)
- Raspberry pi 3b+ w/ pi camera



Power Supply

AA Battery pack with UBEC

- Requested:
 - Cpl. Harvey
 - Capt. Budge
- Batteries can be replaced in the field
- Provides 3+ hours of device life
- Used in existing responder devices



Device Connection

Verizon MiFi 8800L

- Currently in use by Logan City
- Small size/weight
- Personal WiFi signal
- Internal battery
- Basic network security



Cradlepoint ibr900

- Ruggedized
- Designed for First Responders
- Up to 128 connected devices
- Unified edge security including multi-zone firewalls, IDS/IPS & internet security
- Central Command internet connection



+ **24x7**
SUPPORT



ThingWorx

ThingWorx Security

- Role – based access controls
- Encrypted WebSocket channels
 - Adheres to protocol RFC 6455
- Secure data centers
- Multilevel authentication between the cloud and edge devices



App Info and GUI displays

Three Separate Interfaces:

- Command – View situation and disseminate information
- Unarmed Personnel – Identify victims and locations
- Armed Personnel – View map and share video streams

Central Command

- Map displays location of responders and victims
- Select a location to highlight map pin
- Triage victim count at location

- List team personnel information
- Select each camera feed
- Broadcast special camera feed to team

Responders		Victims		Map Info
Name	Id	Black	Red	Orange
Kevin Hendrickson	medical			
Andrew Dautel	medical			
Matt J	police			
Kevin Krahn	police			
Matt Jouffrey	police			
ENGR Building	victim	40	10	31
Aggie Village	victim	14	35	12
USU Campus	victim	4	5	17
USU Campus	victim	11	20	30



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Medical Responders	Armed Responders
Matt J	Kevin Krahn
Kevin Krahn	Matt Jouffrey

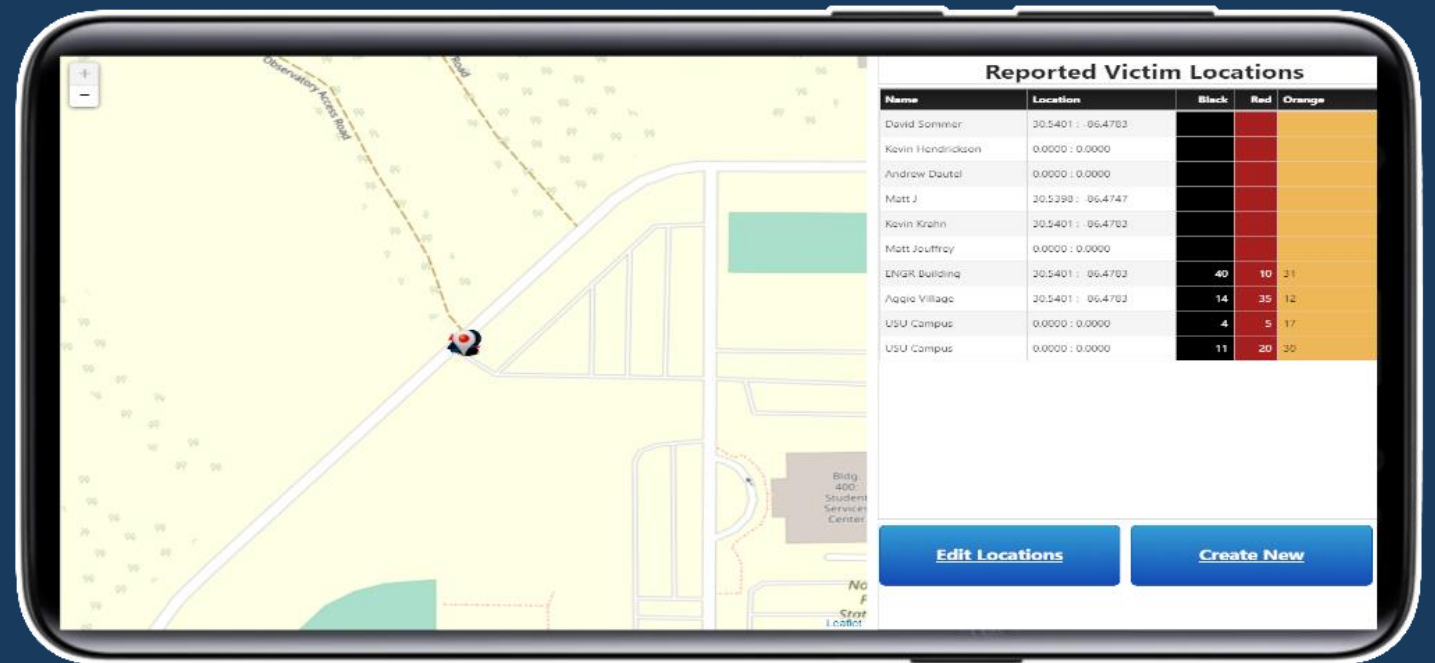
Cameras	Actions
Body Cam	Broadcast
BoreScope	
Thermal	

Refresh Map Refresh Image



Unarmed Responder-Home

- Map on left of screen displays victim locations
- Select locations of victims
- Add new victim location



Add/Edit Victim Locations

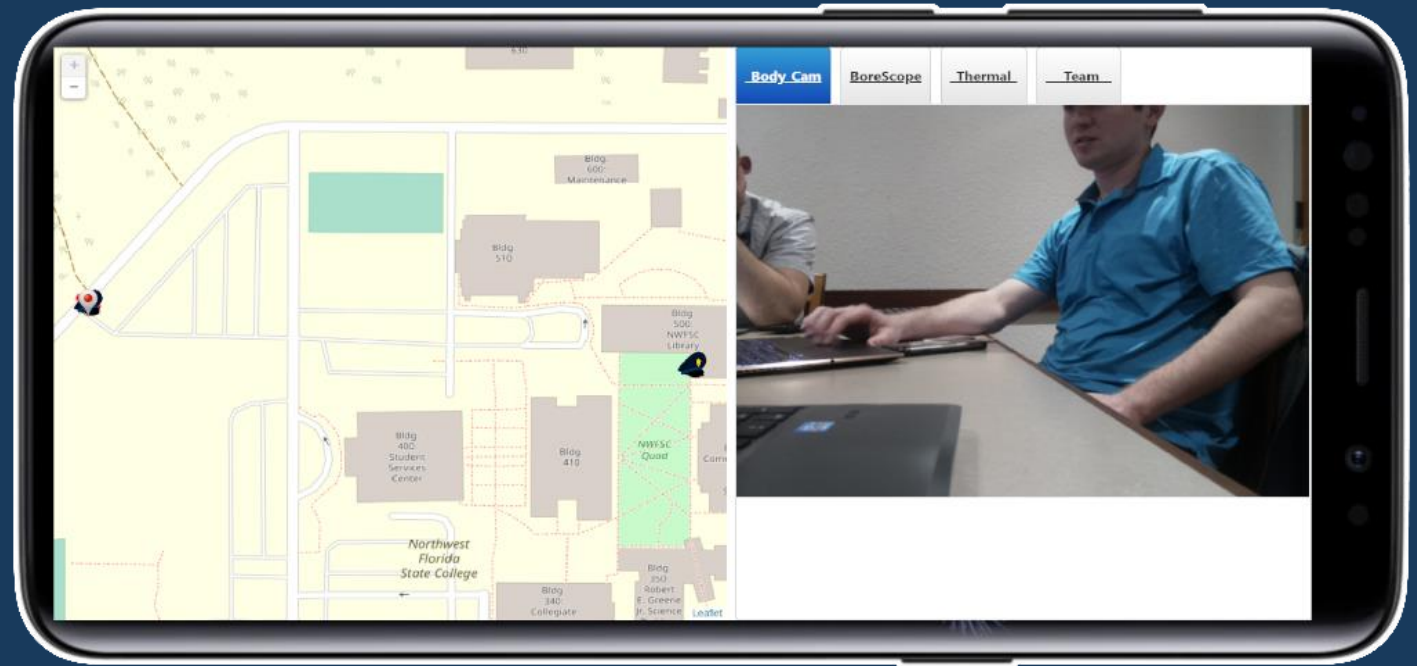
Command Central and Medical Responders

- Text box to name location
- Sliders to count victims by Triage status
- Add number of victims
- Text box to add comments

The screenshot shows a web interface titled "Reported Victim Locations". At the top, there is a "Select Locations" dropdown menu currently set to "ENGR Building" and an "Edit Location Name" text box containing "ENGR Building". Below these are three horizontal sliders, each with a blue bar and a black handle. The first slider is on a black background with markers at 0, 40, and 100. The second slider is on a red background with markers at 0, 10, and 100. The third slider is on a yellow background with markers at 0, 31, and 100. Below the sliders is a large white text area labeled "Test 2". At the bottom left, there is a blue "Submit" button.

Armed Responder-Home

- Map displaying personnel locations
- Right screen shows selected camera feed
- Minimalistic design elements



Future Developments

Dynamic Google Maps Overlays

- Dynamically update cleared rooms
- Provides headquarters with visual progression of event
- Useful for post-event medical efforts
- Geofence areas of interest



Real-time Social Media Data Import

- Search social media posts for keywords
- Increases first responders' data sources
- Increases situational awareness from victims' perspective
- Contact affected people



Increasing Sensor Options

- Professionally manufactured sensors
- Robot/Drone integration
- Additional data collection sensors
 - Air Quality Sensor
 - Radio Frequency Human Detection Sensor

