Leveraging Technology in Disasters

Disasters are a ‘Fact of Life’

Natural disasters - such as earthquakes, hurricanes, tornados, avalanches, floods, wildfires, and severe winter storms – can cause large-scale damage and threaten human health and safety, property, and infrastructure. It’s difficult to predict exactly when a natural disaster will occur and the impact it will have. Damage from these events can be catastrophic and they can lead to the loss of property, being stranded, suffering from injuries, and even death.

Chart, bar chart

Description automatically generated

How are Communities Impacted by Disasters?

Natural disasters can be based upon natural geographic location (mountains, coast, plains, etc.), regional location, as well as based upon directional location in the U.S based upon North, South, East and West which impacts climate and natural weather patterns, drought, rain etc.  An enhanced SMART based triage application could ensure that patients/victims could be properly triaged and in effect reduce loss of life where possible.

Rapid and effective response to emergencies has long been an issue for communities. Whatever the issue, public health experts can develop creative emergency management plans that combine cutting-edge technologies to boost the likelihood of a successful, efficient response. With the technology, responders may find it easier to evaluate hazards, disseminate information, and organize emergency responses. Some of the most recent developments in emergency response are prepared to fundamentally change how responders assess situations and plan their operations, while others are changing/altering how regular people respond to emergencies.

With rising wildfires across the globe, active shooters in schools and the spreading of the deadly corona virus, we looked to technology for seeking advice on how to deal with these deadly situations. Whenever there is a disaster, be it a flood, a hurricane, or a school shooting, we look to the emergency responders to pull us out of this ungodly situation. But we can also take the situation in our own hands and not remain fully dependent on them. During these disastrous situations we only have our phones, but these small devices can be significantly importance and guide us in such situations.

Graphical user interface, application

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Rivero-García, A., Santos-González, I., Hernández-Goya, C. *et al.* A secure approach to monitoring emergency health resources. *J Wireless Com Network* **2021**, 202 (2021). <https://doi.org/10.1186/s13638-021-02077-0>

Additionally, statistics from previous U.S. wars to the most recent OIF (Operation Enduring Freedom) and OEF (Operation Iraqi Freedom) show a remarkable survivability rate of wounded personnel. These changes are due in part to advances in training, triage practices on site, quick identification and assessment and application of improved methods of intervention and the skill of clinicians saving lives at forward deployed surgical locations on the battlefield. According to the authors, Howard et al., case fatality rates in OEF and OIF represent the lowest mortality in US military history.  A lot of this can be attributed to the use of tourniquets, increased use of blood transfusion, and rapid prehospital transport times which were associated with a 44% reduction in mortality. These prehospital steps to triage stabilize and transport a patient to the next level of care in order to ensure survivability.

## STaRT to the Rescue…

STaRT is a Mobile application that uses the principles of Simple Triage and Rapid Treatment to be used by citizen volunteers and certified professionals to perform triage in local community, regional and even national-based emergency situations or natural/man-made disasters. This application will be supported by a comprehensive set of algorithms that provide a more effective and efficient triage of patients in the field.  In reality this application can be downloaded and used by all those who fall under the command center, and it is intended to be able to function as a stand-alone or connected (cellular or satellite) application that performs the task necessary to serve as a crucial resource for first responders, triage sites, and makeshift hospitals in the disaster area by performing many of the emergency functions needed in the immediate post-disaster period.

Table

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In addition, this will be a multi-lingual application that the emergency responders can use to communicate with the people inside the post-disaster area, be it a mountain range, a river town, or a school. As we are living in an age of globalization, this means that each region of the world would have people of multiple origins & linguistics. The application would provide services in multiple languages to help as many people as we can. Potentially, the application sensors and features can guide stranded people through location monitoring and hazard alerts.

References and Prior Development

We were able to find an application on GitHub called MedicalTriageApp developed by Branden Soropia in 2015, This is an Android application to collect patient information and perform triage for patients who arrive at hospital emergency room (ER) :[BrandenSoropia/MedicalTriageApp: Result of CSC207: Software Design final project Android App. (github.com)](https://github.com/BrandenSoropia/MedicalTriageApp" \t "_blank)

We also located a mobile app called pSTaRT developed by Kurt Hoblinger in 2021, it is an iOS app that is limited in scope and does not have the features we are planning to introduce. The link to that app is: (<https://github.com/nitricware/pSTaRT.gitthe>).

We also located another TriageAppdeveloped by Sameh Mohamed in 2021, It is a mobile application that rates the user's urgency to seek medical attention using Machine Learning; and directs them to the nearest hospital and more.  : [SamehM98/TriageApp: A mobile application that rates the user's urgency to seek medical attention using Machine Learning; and directs them to the nearest hospital and more. (github.com)](https://github.com/SamehM98/TriageApp)

Constraints and Limitations

We realize that an application of this magnitude cannot be developed in a limited period (4-6 weeks). It is our intention to develop the shell of the application with base functionality in the beginning phase to be used as a stand alone application. Further developments will be required to make this application mobile-ready and cloud-based.