MERS Chap 2.1

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MUNICIPAL EMERGENCY RESPONSE SYSTEM IN TUY, BATANGAS

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CHAPTER II

RELATED LITERATURES

This chapter contains previous studies from different researchers that will be used for research basis that can help future researchers to build up and upgrade the previous studies. Different journals, articles, and frameworks will be sighted and read by the researchers to collect information to create new technology that will help the users and future researchers.

CONCEPTUAL LITERATURE

SMS is commonly used and readily accessible because it is supported by even the most basic phones. A wireless health recording and alert system for the elderly or athletes was created using the SMS feature of a mobile phone. It was made to hold a sensor, a base, and a server. In an emergency, a quick response can save lives. Mobile technologies can't physically transport drugs, doctors, or equipment between sites, but they can transport and analyze data in the form of coded data, text, photos, audio, and video. The multiple life-threatening hazards that arise from late arrival at emergency scenes must not be neglected. All of this is being done in order to set up a reliable notice and alert system in the event of an emergency. In the literature,

a number of publications addressing the design of SMS alerting systems for usage during emergencies were found. (Osebor et al.)

Text communication cannot currently be used to request assistance in an emergency. There has been no exploration into how text communications such as Instant Messaging (IM) and Short Message Service (SMS) can be linked into the Next Generation 9-1-1 system, an IP/SIP-based emergency communication system. They outline the technical hurdles in integrating IM and SMS networks with the NG9-1-1 system and suggest solutions for each. The researchers also provide a functioning prototype system that employs our method. (Song et al.)

Because location information is often valuable for coverage, deployment, routing, location service, target tracking, and rescue operations, it is critical to deliver location-based services (LBS) to the user. Positioning is one of the most visible technologies behind LBS, with the most well-known system being the Global Positioning System (GPS). There are no setup or subscription expenses when using GPS. Mobile phones have spread like wildfire in recent years. The mobile phone industry is the fastest expanding industry in the world, with over 2 billion phones in use worldwide and more mobile subscribers than fixed line customers. From unwieldy simple phones to compact all-rounders with high-resolution color displays, organizers, integrated cameras, and Global Positioning Service, advancement proceeded. (Qadeer et al. 4)

A College Bus Tracking android application allows the user to obtain bus location information in order to avoid being late. The major goal of the researchers is to gather data via GPS and send it to a server, where it will be acquired by an android application, and the bus's real-time location may be displayed on a Google map that is integrated into the android application. Users can access the program and learn about the college bus routes that are scheduled. Because it is a time-saving program, this application is user-friendly and versatile to use. (Kiran Kumar et al.)

The research entitled "Medical emergency and healthcare model: Enhancemet with SMS and MMS facilities". The goal of this study is to create a system that merges medical emergency, healthcare, and medical information systems to solve many of the concerns mentioned above. This project's major goal is to integrate real-time and mobile technologies into medical emergency services. SMS, MMS, live audio and video coverage of emergency circumstances, location-based access to emergency scenarios, large area coverage, and user flexibility are all features it can give. Open source software is used to create a model prototype. The following are examples of implementation results. (Hameed et al.)

Large-scale disasters, such as the earthquake and tsunami that struck Japan in 2011, wreak havoc on local infrastructure. Today's proprietary disaster response systems and protocols still lack the high spatial and temporal resolution data required to save lives and aid disaster recovery operations. Victims are rescued after

days, if not weeks; digital coordination interfaces between responders are non-existent, or are based on ancient technologies (pencil, paper, paint on walls); the time it takes to physically move cassettes or hard drives limits the amount of data that can be received from the field (Chenji et al. 2440-2460).

Android is a multi-platform mobile operating system that is both open and thorough. It's designed to be more open than existing mobile operating systems, allowing developers, wireless operators, and handset manufacturers to create new products faster and for less money. As a result, the user's mobile experience would be more tailored and flexible. As a result, this mobile development environment was used to create the disaster management system. (Fajardo and Oppus)

RESEARCH LITERATURE

The study on "A Mobile Disaster Management System using Android Technology", the Philippines is one of the world's most vulnerable countries to natural disasters. It also lacks a reliable disaster management system that can assist in times of crisis. During disasters, one prevalent scenario is that rescue and relief efforts are not well-coordinated. Therefore, the researcher developed a system that would aid in the efficient supply of rescue and relief to disaster-affected communities. According to research produced by the United Nations' International Strategy for Disaster Reduction (UNISDR), the Philippines is ranked 12th among 200 nations and territories most vulnerable to earthquakes, floods, tropical cyclones,

and landslides, based on a new Mortality Rate Index (MRI). Indeed, the Philippines has been affected by various natural disasters over the years due to its geographic location. Thousands of people have died, and hundreds of billions of properties has been destroyed. Despite the frequent tragedies, there is still a lack of an effective disaster management system to assist civilians in the event of a disaster. Since the use of smartphones is gaining interest in people, the researcher implemented a disaster management system as a smart phone application using Google's Android operating system. For optimization, a genetic algorithm was used, and several parameters were changed to find the best route (Fajardo and Oppus).

According to reports and studies communication during disaster time is very crucial for both the rescue team and the victim. Emergency never comes with prior intimation. Therefore, the researcher system is intended to function in case of emergencies in society. The emergencies include Fire, Medical Emergencies, Accident and External Emergencies (Earthquake, Floods, Strom). Traditional communication and cellular access points may be unavailable when tragedy strikes, preventing communication when it is most needed. Recent disasters, such as the Uttarakhand Flood, as well as many others in the past, such as the Indian Ocean and Gujarat Earthquake, have resulted in unparalleled devastation and massive loss of life, highlighting the need for rapid ad-hoc communication solutions for rescue forces and personnel. On each request, location coordinates are sent. The system is

functional based on client-server concepts, in which the server replies to the Clients' queries (Jadhav et al. 2803-2805).

In the study, the Philippines is one of the world's most vulnerable countries when it comes to natural disasters. Earthquakes, floods, mudslides, typhoons, and volcanic eruptions are among the natural disasters that could occur. The Philippines is regarded as one of the most storm-prone countries on the planet. Every year, 18 to 20 tropical storms make landfall in Philippine waters, with 8 to 9 of them making landfall. According to the World Risk Index 2012, the Philippines ranks third among 173 nations most vulnerable to catastrophe risk and natural hazards, with an average of 20 tropical cyclones each year, as well as other climatic and extreme weather anomalies like the El Nino phenomenon. With an average of P15 billion in annual direct damages, these disasters put a pressure on government expenditures. Worse, this stymies the government's efforts to reduce poverty. The Philippines, which is located on the Ring of Fire, have a number of active volcanoes that threaten their immediate surroundings on a regular basis. In the event of major volcanic activity, you should heed local authorities' advice and keep an eye on the Philippine Institute of Volcanology and Seismology warnings (PHIVOLCS). By this means, while the principles of preparedness are universal, regardless of place or scenario, proponents decided it would be helpful to have some material tailored to the needs of Metro Manila residents. The iHanda app was created to fill that void. Although researchers

may hear that Manila is unprepared to deal with a catastrophic tragedy, there are numerous things researchers can do to help the family (Fernando et al.).

According to reports and studies, Android applications come in a variety of shapes and sizes, and they're utilized for a variety of purposes. Android phones have become an integral part of everyone's life in the modern day. In the study about the Emergency Response System, the researcher's primary goal on this project is to provide assistance and emergency support to people who are in danger or in crucial situations. We all know how difficult it is for both the rescue team and the victim to communicate during an emergency. Emergency assistance is never provided without prior notice. In the event of a societal emergency, this software will be able to assist. Fire, Medical Emergencies, Accidents, and External Emergencies are examples of emergencies (Earthquake, Floods, Storm). Therefore, the software can be used by the user who is in a severe state to send their whereabouts to trusted contacts or the authorities. During an emergency, the phone's camera will be able to instantly take photos and videos. The application's most intriguing feature is that it can be launched by shaking the phone (Mulla and Ahmed).

Furthermore, the study on A GPS-based Mobile Dynamic Service Locator System was about the most extensively used means of communication offered by mobile network carriers. Providing highly individualized services is one of the greatest and most efficient methods to accomplish this. Location-based

personalization is one of the most powerful ways to personalize mobile services. Using mobile devices to locate the nearest emergency, public, private, and social services, as well as the nearest service provider, necessitates the development of mobile applications and the maintenance of connectivity through slow, inexpensive, and unstable networks. The researcher proposes and develops a GPS-based Mobile Service Locator System to assist people from all walks of life in locating addresses and services of interest using their mobile devices. Notably, the suggested system is capable of determining the local emergency service in relation to the user's current location. It's adaptable and expandable, making it simple to integrate new mobile service providers and services (Mathkour 95-106).

Location-based services (LBS) provide customized services to mobile clients depending on their current location. They also open up a new space for developers, cellular service network operators, and service providers to create and offer value-added services, such as advising customers on current traffic conditions, offering routing information, and assisting civilians in finding local retail centers. In the study entitled "Implementation of Location based Services in Android using GPS and Web Services " the researchers discussed that the location-based services provide mobile users with numerous benefits, including the ability to retrieve information about their current position and process that data in order to obtain more helpful information near their location. Smartphones such as (Android, Blackberry,

and iPhone) now provide a range of location-based applications and services that allow civilians to access a variety of services based on their current location. Another important feature found in smartphone applications is location-based services. Location-based services can be deployed on Android-based smart phones using A-GPS in phones and Web Services using GPRS to deliver these value-added services: alerting clients of current traffic conditions, providing routing information, and assisting them in finding nearby hotels. In this work, we suggest implementing Location-based services on Android phones using Google Web Services and Walk Score Transit APIs to provide users with a variety of services based on their location (Singhal and Shukla).

A considerable number of different mobile application location-based services instigates the emergence of mobile device usage. Services such as location-based systems entitled "Taxicab Tracking System with Cloud Data Logging using the Internet of Things", In the Philippines, robberies in taxicabs are widespread. Taxi driving is, in fact, one of the most dangerous occupations in the United States (Menendez et al., 2014). One of the main reasons is that taxicabs are vulnerable to criminals owing to a lack of security. The only security feature in the existing taxis is the usage of the emergency light indication located at the top of the taxicab. Taxicabs are a popular means of public transportation. It is highly vulnerable to robbery because of its accessibility. The placement of an emergency light indicator

at the top of the taxicab is the only security measure. This light indication has visibility and awareness issues. To overcome this issue, a tracking system is being created that may convey key information to the specialized receiver through SMS. The driver's location, automobile body and license numbers, and location coordinates using the Global Positioning System are all included in this data (GPS). Using the Internet of Things (IoT) platform, the user can track the coordinates and time details (Sercon et al. 1-14).

In the study of the application of location-based services in national emergency warning systems: SMS, cell broadcast services and beyond, Since the beginning of time, disasters and emergencies have been a part of our lives. However, the dangers of a wide range of known and newly unknown hazards continue to pose a threat to society today. Despite the technological breakthroughs that nations have made, they are still vulnerable to large-scale calamities. Emergencies are difficult to forecast, control, or manage in general. At every step of their occurrence, their complexity, surrounding uncertainty, timing, implications, and potential severity pose substantial problems to governments, humanitarian agencies, and the afflicted populace. According to the researcher, these extreme conditions are one-of-a-kind scenarios in which people are constantly in need of information. Position-based services can be roughly described as any service that gives information relevant to the present location of an active mobile device at a certain point in time, regardless

of the underlying delivery technology. Several countries have used the short message service and cell broadcast service during emergencies to date, but the future shows that these services, while cost-effective now, will almost probably be overtaken by newer, more powerful capabilities in the next five to ten years. Of particular importance is how location-based public alerting and warning systems are implemented using legislation or contractual service level agreement instruments or a hybrid approach. Of relevance here is also whether or not governments who deploy LBS for emergencies will carry the cost of the deployment during an emergency or disaster and whether or not carrier participation is mandated by the government. (Aloudat & Michael, 2011)

According to reports and studies, the researcher focuses on how to respond to emergency situations that are marked by disruptive events that create confusion about what to do next and when time is of the essence. In such settings, emergency response (ER) can be thought of as a complex dynamic process in which restrictions emerge in real time. When confronted with emergency situations, a number of dependent elements may have a significant impact on the predetermined reaction methods. The proposed strategy is based on the idea that an emergency response tool may help direct the response effort. The tool is built on a conceptual model that is based on existing situation awareness models and research with High Reliability Organizations. In order to alleviate the disruptive circumstance, the model

constructs the emergency management process in a series of dimensions that should be cooperatively correlated by the concerned players. From the standpoint of the researchers, they require an emergency-management model that can preserve the various interdependencies between events, activities, actors, contexts, plans, and any other aspects engaged in the process in real time. The researcher proposed that, in order to be effective, an emergency-management model should evolve beyond the traditional phases and toward a more dynamic and complex structure of all the parts that make up a disaster. (Sapateiro & Antunes, 2009)

Moreover, the researcher also came up with a Smart hospital emergency system (SHES) It is consequently critical that the emergency call service continues to operate as efficiently as possible, which implies that it can handle a large number of emergency requests with minimal delay (within a few seconds). Our system will seek to address the various issues with current emergency call systems by developing SHES, a mobile application for emergency services. The app is linked to the emergency and accident (E&A) units, so users will be able to make inquiries and request an ambulance, while doctors will be able to respond to a patient's inquiry and dispatch an ambulance in the event of an emergency. Using SMS to Request Emergency Services: Since late 2009, it has been possible to request emergency assistance using SMS text messaging. The goal of this service was to provide a way for deaf, hard of hearing, and speech-impaired people to request assistance. The

major goal of SHES is to automate the transmission of patient information rather than relying on callers to convey their information verbally over the phone. The overall goal of SHES will be to shorten the time it takes to respond to emergency calls by reducing the number of tasks involved in the existing procedure (Al-khafajiy et al.)

According to reports and studies Urban fire is one of the most alarming problems that plagues both developing and developed countries, and fire has tragically destroyed a great amount of property and lives in Ghana annually. The Ghana National Fire Service (GNFS) was founded to manage fire outbreaks against this backdrop, and it has since embarked on programs and activities to educate the public on fire safety and preventive measures, as well as establishing fire stations in major cities. The researchers came up with a fire emergency response service for GNFS based on a Geographic Information System (GIS) where time is critical. Emergency preparedness planning is an important subject to consider while creating a fire emergency response database since it can have a significant impact on people's lives (Forkuo and Quaye-Ballard 32-40)

Furthermore, natural catastrophes that are catastrophic have a significant negative influence on the economy and humanity all over the world. We build an emergency response system for disaster management with an emphasis on land transport vessels and mobile rescue team members because transportation and

communication are critical in such situations. We describe a prototype of an emergency response system based on the Global Positioning System (GPS) and Vehicular Ad hoc Networks (VANETs). The system contains a server (control room) that collects information about the disaster area and also provides the requested services (Khaliq et al.).

According to studies it is required to assess the earthquake intensity in multiple magnitude scenarios using Geographic Information System (GIS) analysis. The earthquake was triggered by a fault near the research area. In comparison to liquefaction, landslides, and seismic carrying capacity, earthquake intensity or ground shaking is the principal factor that causes building damage. The researcher's system GIS-based earthquake damage prediction is a technique for estimating damage to infrastructure and people in various earthquake scenarios (Rusydy et al.).

According to the study the project team created an open, cloud-based information system to improve the implementation and accountability of disaster preparedness, response, and relief activities in Albay province. This system provides disaster data to the general audience. It prepares families for earthquakes, floods, and typhoons by teaching citizens disaster-related knowledge in the simplest possible way. During emergencies, it also serves as a real-time platform for trustworthy communication between local government entities, non-governmental organizations, and the impacted communities (HIVOS ORG. et al.).

TECHNICAL BACKGROUND

Different technologies are employed in the development of an android-based application that attempts to reduce accidents. One of the most important technologies to employ is an Android smartphone. That operates on the Android operating system because it is the platform on which the system is implemented (OS).

Application Programming Interface. is a tool that is built for sharing, and its default setting is to connect. If you give developers access to it and let them utilize it, they'll add their own data and functionality to the table, bolstering your own program. Essentially, the API becomes the most important tool for your mobile app.

Smartphones. A smartphone, unlike any other mobile phone, can execute many of the duties of a computer, typically with a touch screen interface, internet connection, and an operating system capable of running downloaded software. Global Positioning System (GPS), Geographic Information System (GIS), and APIs are just some of the technologies that can be stored and accessible on a smartphone.

Global Positioning System. GPS is now the only gadget that can reveal a person's exact location on the world at any time, in all weather, and regardless of where they are. The majority of cell phones have their own GPS tracking system.

While the normal GPS in an iPhone or Android phone may not be sensitive enough to provide an exact address, it can reduce the location to within a small area.

Geographic Information System. Is a system for capturing, storing, manipulating, analyzing, managing, and presenting geographical data. This technology's core word is geography, which suggests that some of the data is spatial in nature. ... The spatial data represents the precise location of the schools.

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Short Message Service. Most telephone, Internet, and mobile device networks have a text messaging service. It makes use of conventional communication protocols to allow mobile devices to send and receive short text messages. SMS Notifications are text messages sent outside of the network in reaction to events or transactions that occur elsewhere. While SMS notifications are frequently used as a marketing technique to boost the percentage of repeat visitors, they are also incredibly effective for organization and public safety.

THEORETICAL FRAMEWORK

The Protection Motive Theory (PMT) by Rogers is a commonly used framework for understanding how civilians react to triggers that alert them to a possible threat. Fear messages, for example, can prompt people to take preventive precautions or refrain from engaging in behaviors that could hurt them or others. This idea is part of the expectancy-value theory family, which proposes that one's attitudes or beliefs

will lead to certain behaviors. The danger appraisal and coping appraisal processes, according to PMT, are used to evaluate potential responses (Shillair, 2020). The Protection Motive Theory can benefit in the study's determination of each resident's behavior in the Municipality of Tuy in order to avoid panicking in the event of a disaster.

Moreover, the person-relative-to-event (PrE) theory model of fear-arousing or negative threat appeals predicts that growing levels of threat would increase problem-focused coping when resources are deemed adequate in relation to the scale of the threat. This study uses the person-relative-to-event (PrE) model, which emphasizes the link between perceived threat and personal resources. Negative threat appeals that use a combination of levels of factors to cause a person to appraise their resources as sufficient in quantity and quality to obviate or minimize the negative consequences of a threatening earthquake were predicted to increase earthquake preparedness to a greater extent than communications that did not. (Mulilis & Duval, 2006). Therefore, researchers can use Person-relative-to-event theory. It conceptualizes the relationship between perceived risks and perceived opportunities to prevent harm from these risks.

Lastly, this study is anchored in the The Protective Action Decision Model (PADM) by MK Lindell. The Protective Action Decision Model (PADM) is a multistage model based on findings from research on people's responses to natural

catastrophes and environmental risks. The PADM combines the processing of data collected from social and environmental signals with messages sent to persons at risk by social sources through communication channels. The PADM outlines three important pre decision processes that come before any further processing (receipt, attention, and comprehension of warnings or exposure, attention, and interpretation of environmental/social signals) (Perry, 2012). The PADM can be used in this study to assist the Municipality of Tuy in processing data and sending messages to people.

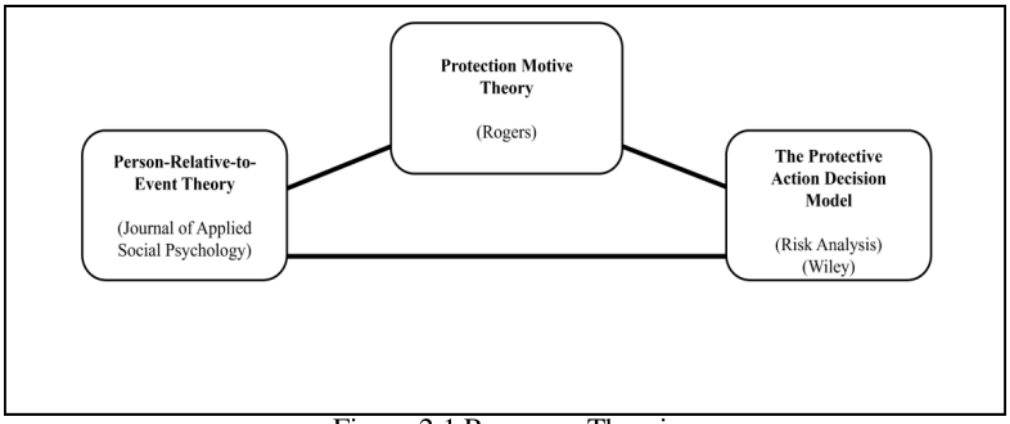

Figure 2.1 Response Theories

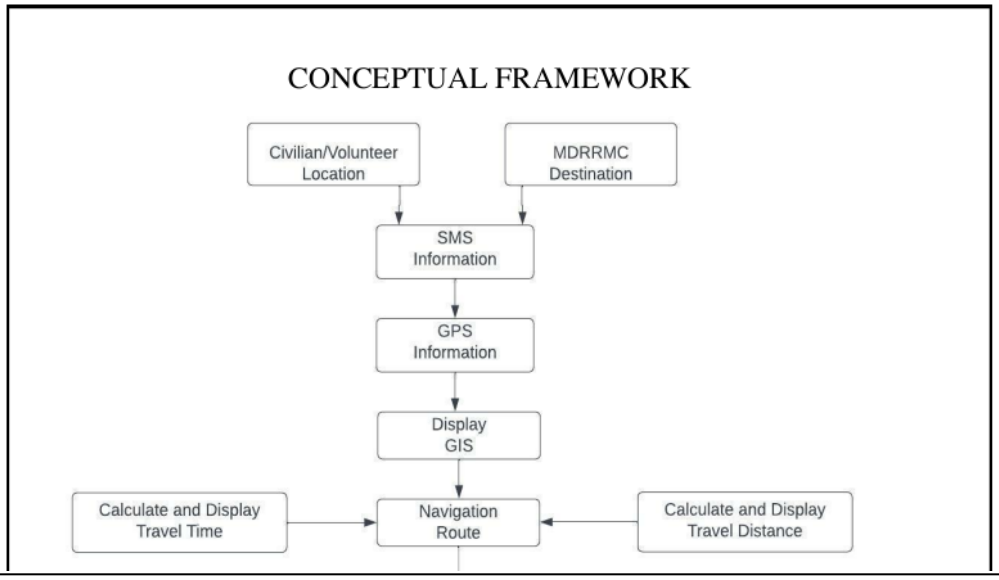

Figure 2.2 Conceptual Framework

Figure. 2.2 Conceptual Framework of the proposed application

It illustrates the Conceptual Framework of the proposed system. The main objective of the system is to reduce the rate of accidents that are not immediately rescued at times in Tuy, Batangas and notifying the Volunteers and the MDRRMC. Researchers will use the Mapbox Direction API; civilians can get directions, turn instructions, and trip durations using the Mapbox Directions API. Requesting directions, adding a single bike route between a fixed point and a clicked destination, and viewing the route's turn-by-turn instructions are all covered in this course. The researchers will also use GPS to determine the victim's location and the rescuer's direction, as well as to display the navigation routes, as well as the time and distance traveled. SMS will be also utilized, with its 'intelligent notification' solutions that may send or text information to one person or hundreds of thousands of individuals at once, aids victims in requesting emergency help. In emergency response and training settings, the researchers provide an efficient and interactive

mobile visual analytic system for increased situational awareness and decision making. Within a simple interface adapted to mobile device capabilities, the system provides visual analytics with locational scene data. The researchers are particularly interested in processing and displaying sensor network data for first responders (Kim et al.). Researchers will use several analytics tools to further investigate this, as well as plot the accident on a map.

SYNTHESIS

Over the last few years, a lot of research has been conducted and a lot of software has been built with the aim of decreasing the rate of late response and unattended accidents. Those research findings will be useful in the development of our capstone project's new system. Despite current suppression techniques, urban incidents continue to cause property damage. As a result, effective handling of major incidents needs a regional planned response system (Forkuo and Quaye-Ballard 32).

Therefore, it was found that the casualties were caused by natural disasters and road accidents, and that the casualties received no rapid medical attention. The researchers propose the Smart Hospital Emergency System as a novel system (SHES). SHE'S' major goal is to save lives by enhancing communication between patients and emergency responders through GPS and Wi-fi (Al-khafajiy et al.). The number of countries throughout the world that are prone to natural disasters due to their geographic position. It also lacks a reliable disaster management system that

can assist in times of crisis. Researchers developed a system to aid in the efficient delivery of rescue and relief to disaster-affected communities. Because people are becoming more interested in smartphones, the disaster management system was developed as a smart phone application based on Google's Android operating system (Fajardo and Oppus). The capstone project will also use Smartphones. Smartphones provide civilians with valuable information. In times of disaster, however, the more individuals who have knowledge with them at all times, the more self-reliant they will be, allowing rescuers or responders to focus on those who are most in need of assistance.

To handle urban fire in the Kumasi Metropolis, a GIS-based application for urban fire emergency response services has been developed. Its goal is to create a rapid approach to locate fire sites using residential addresses. A cost analysis model has also been shown to aid the GNFS in determining the best path from their position to any fire occurrence inside the Kumasi Metropolis (Forkuo and Quaye-Ballard). However, researchers will use GIS network analysis in managing urban emergency services.

MyDisasterDroid, an Android-based disaster management system that facilitates the logistics for rescue and relief operations during a disaster, was deployed in a mobile phone. People in need's locations were sent through SMS or immediately

entered into MyDisasterDroid (Fajardo and Oppus). SMS will be part of the capstone project needed tools.

The capstone project was built with bias using previous applications and conducted investigations. However, not all features are utilized, and system needs will be implemented as the system develops.

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