

Implementation of an Institution Based Emergency Alert Management System.

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ABSTRACT

Around the world, many methods of emergency notice and response are used. Governments, corporations, and individuals all take emergencies very seriously, and they continue to come up with inventive ways to respond to them quickly. As time passes, the number of tragic events continues to rise. As a result, there has been a growth in the number of techniques to ensure real-time communication to the appropriate parties. Communication is critical both for rescue squad and the victims during a crisis. Because one of the core purposes of all higher institutions is to provide safe and comfortable learning environments; in this regards, this study addresses the need for improved emergency alert systems. The system is designed to function in the Federal College of Animal Health and Production Technology, Ibadan Nigeria in the event of emergencies such as fire outbreak, medical problems, accidents, cultism, and kidnapping are amongst others. In this study, the Emergency Alert Management System (EAMS) broadcasts emergencies to several devices at the same time, and only registered response teams within the College are contacted when an emergency occurs. This is a web-based system designed from the scratch and developed with HTML (Hypertext markup language) for the UI framework, PHP (Hypertext Preprocessor) for the backend, XAMPP for the web server, phpMyadmin for the database, and Sublime Text for scripting the environment.

Keywords: *emergency, system, management, personnel, database, alert, communication.*

I. INTRODUCTION

A condition that poses an urgent threat to public health, lives, property, or the environment is referred to as an emergency. Most emergencies require immediate action to avoid a worsening of the condition, while mitigating may not be able to provide palliative care in the aftermath in some cases yet it is an important aspect. The provision of stable and sound learning environments is one of the core missions of all higher education institutions, hence the need to keep looking for ways to ensure that this mission is achieved as easily as possible. Several catastrophic occurrences, such as school massacres, cultism strikes, theft, rape, conflicts, and natural catastrophes, show that academic communities are susceptible, and that technology may help protect them better. Similarly, the proposed web-based Emergency Management Alert System intends to strengthen, maintain, and enhance the capabilities to minimize against, begin preparing for, react appropriately to, as well as restore from destructive natural disasters, acts of cultism, or other man-made disasters, as well as to widely notify response teams (appropriate quarters) device simultaneously when an emergency occurs within the Federal College of Animal Health and Production Technology, Ibadan, Oyo State occurs. Many tertiary institutions employ voice calls, SMS, online posts, and statements put on the schools' official websites as warning channels (Horton, 2012; Romano, 2013).

To qualify as an emergency, an incident must meet some or all of the following criteria:

- i. If it causes an imminent danger to people's lives, property, or the environment.
- ii. If it has already resulted in the death of people, harm to their wellbeing, damage to property, or environmental degradation.

iii. If there is a substantial risk of it escalating and posing an imminent threat to life, health, property, or the environment.

In recent times we are now dealing with so many dangerous obstacles such as banditry, terrorist attacks (as we have seen in many regions of the country and other side the country), and infectious diseases like covid-19; it is critical that every tertiary institution have a functioning emergency alert system that can be used to alert the relevant agencies about looming threats which can escalate if not adequately and promptly curbed.

This web application sends out mail to the appropriate and registered emergency officer; such as the Chief Medical Officer, Chief Security officer, Fire Service Unit and School Management. The mails for action are sent to the appropriate quarters depending on the nature of eminent crises. In an academic setting, where there is a high concentration of people at any given time, diseases can spread quickly, terrorist attacks can be fatal, and cultism activities can affect a huge number of people at the same time; thus, it is critical to ensure that when a mail or text is received, the appropriate authority is notified, and immediate action is taken to start investigating and alleviate the impending danger.

A medium that sends out this information to the appropriate personal real time is precisely what this research achieves: A Federal College of Animal Health and Production Technology Emergency Alert Management System.

II. PROBLEM STATEMENT

The need to forestall an emergency situation in the Institution of Higher Learning is quite germane to avoid destruction of valuable properties like infrastructure or learning resources and loss of lives. Incessant violence and tragic events in the College are partially responsible for severe destruction of academic resources in the College. To solve these tragic events in the College, Implementation of an emergency management alert system is imperative. The system aims at handling both security and emergency issues within its case study. It is safe to note that this can be applied to any Institution by tweaking some features to the Instruction its been adapted in.

III. AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to design and implement an emergency alert management system for Federal College of Animal Health and Production Technology, Moor plantation, Ibadan. The objectives of the study are to:

- i. Notify and broadcast warning notifications to multiple devices simultaneously;
- ii. Aid reduce the effect of emergency & prevent exposure from turning into larger emergency incident;
- iii. Assist by sending real-time medical emergency alert to the appropriate quarters.

IV. RELATED WORK

Community Emergency Security Alert System

One of the most critical elements of emergency management, according to J. Li, Q. Li, C. Liu, S. (Khan and Ghani 2014), is emergency response. Information and communication technology (ICT) has been used to manage emergencies in a variety of different ways. The integration of ICT solutions into real-life emergency scenarios in the health sector has led to development of mHealth, which is defined as "healthcare to all, anytime, and anywhere by removing temporal and locational constraints while improving both coverage and quality care" (U. Varshney.2009, January, 2018). mHealth is a concept that has been realized through mobile applications that offer medical emergency support and dramatically shorten medical emergency response time based on user behavior, geographic location, and online community features (M. Khalemsky and D. G. Schwartz 2017).

The short message service (SMS), also known as text-message – "a service constituent that uses signals to send smart phones to convey short text messages" (Drj. 2001, January) – has become one of the most widely used among the wide variety of Smart technologies designed to combat security imbalances in the world today. This is due to the fact that it is readily available for nearly all types of mobile devices, and 95 percent of the world's population now resides in locations where cellular network coverage exists. (S. J. Iribarren, W. Brown Iii, R. Giguere, P. Stone, R. Schnall, N. Stagers 2017). Palmieri et al. (2016) proposed a hybrid virtualized framework for managing computing and storage resources needed to govern operations during emergency scenarios (F. Palmieri, M. Ficco, S. Pardi, and A. Castiglione 2016). The device also employs a novel positioning method that combines data from motion sensors with signal data from physically landmarks put by first responder in an emergency assault location. Their method took advantage of cloud infrastructures' virtually limitless computation and storage capabilities. J. Li, Q. Li, C. Liu, S. Ullah Khan, and N. Ghani suggested a society integrated information system for emergency management in Li et al. (J. Li, Q. Li, C. Liu, S. Ullah Khan, and N. Ghani 2014). The system was designed with excellent emergency management in mind. The system built a distributed society virtual database using a P2P (Peer-to-Peer) framework that connects local resource databases of suppliers that offer information to stimulate multi-criteria decision making, allowing for effective and rapid emergency response. The P2P architecture utilized to manage the target community's

dispersed datasets will allow a dataset to join and leave the network with ease, and also allow for autonomous dataset maintenance by each individual organization. The system was established as a social media site, giving end users access to data, good situational awareness, and the ability to share that information with all levels of emergency partners.

Emergency Alert Communications on College

One of the primary responsibilities of all higher education institutions, according to (Kopel, Sims, & Chin, 2014), is to create secure and safe learning environments. Several tragic occurrences, such as school massacres, terrorist attacks, and catastrophic events, show that campuses communities are vulnerable, and that technology may help safeguard them better. Following the 2007 Virginia Tech shooting, a number of institutions began developing their individual alert system technologies that could be utilized in any form of public emergency. Similarly, several institutions have emergency preparedness departments that assist students in preparing for an on-campus crisis (Thompson & Schlehofer, 2014). They use voice calls, Sms, social media posts, and statements on the schools' official websites as warning channels (Horton, 2012; Romano, 2013). However, little study has been done on how pupils react to those warning signals. The majority of past research has focused on how people use media to interact with one another amid a natural or technology emergency (Palen, Vieweg, Hughes, & Hughes, 2009; Procopio&Procopio, 2007). Cell phones and text messaging can be used to alert the public about a disaster as well as serve as supplementary crisis response tools to keep others informed about a continuing situation. Cell phones were utilized to communicate during September 11 terrorist strikes in the United States in 2001, for the short minutes that they worked, Once the planes had crashed, within the structures (Nelson, Sigal, & Zambrano, 2010). People continued to use text messaging after cell phone lines were disrupted during Natural Disasters in 2005. (Juric& Sylvester, 2007). However, several users claimed that the absence of details in the text messages caused them to be unclear about the threats and that they didn't learn how to defend themselves because of the brevity of the texts (McGee & Gow, 2012). Some of their findings can be explained by the dynamic capabilities concept (Daft & Lengel, 1984, 1986). Due to its own visual and social clues, such as body language and non - verbal, face-to-face communication is the richest medium. The second most valuable medium is telephones (Daft & Lengel, 1986). Low-richness media present less cues and limit feedback. In unpredictable times, communicators should utilize formats with a lot of variety (Trevino, Daft, & Lengel, 1990, p. 75). Despite being most public media source among college students and young adults, the significance of social media in emergency communications has been largely neglected (Pew Research Center, 2011; Sheldon, 2015). O'Reilly (2005) defines social media as "a collection of Internet-based apps that expand on the technical foundations of Web 2.0, allowing the production and interchange of user-generated content (UGC)." Any type of content created by customers is referred to as user-generated content. Social networks (Facebook, LinkedIn, Google+), blogging, forums, internet streaming and picture sharing websites (YouTube, Pinterest), and multimedia chatting services are all examples of social media technology (Skype). During natural catastrophes, public officials have successfully used social networking platforms, such as Facebook, as just a warning tool, particularly when seeking to reach out to those who are at danger (Sutton et al., 2014). Students could use social networking sites as a supplemental communication channel, encouraging them to share an alert message with someone else (Austin, Fisher Liu, & Jin, 2012).

V. METHODOLOGY

The system is built using various technologies such as Java Script, PHP (Hypertext Preprocessor), HTML (Hypertext Markup Language), CSS(Cascading Style Sheet), XAMPP server(as the local server.),SQL (Structured Query Language). Sublime Text was used as an Integrated Development Environment for coding of the user interface for coding of the user interface.

Then the system was tested by some of the students and lecturers in Computer Science Department of Federal College of Animal Health and Production Technology to know how easy and effective the system is.

The following are the procedures involved in system design:

- i. In order to make the planned Emergency Alert System user friendly, Hyper Text Markup (HTML) was utilized to build the graphical interface and layout. The HTML used enhanced the UI/UX (user interface and user experience) that the students enjoy while using the platform.
- ii. Coding and application design —It allows the application to function as a whole. Connecting the front end to the back end. The database coding was SQL (Structured Query Language) and PHP (Hypertext Pre - processor) was used to connect with the server so as to make it dynamic.

Figure 1.1 Program Flow Chart of EAMS

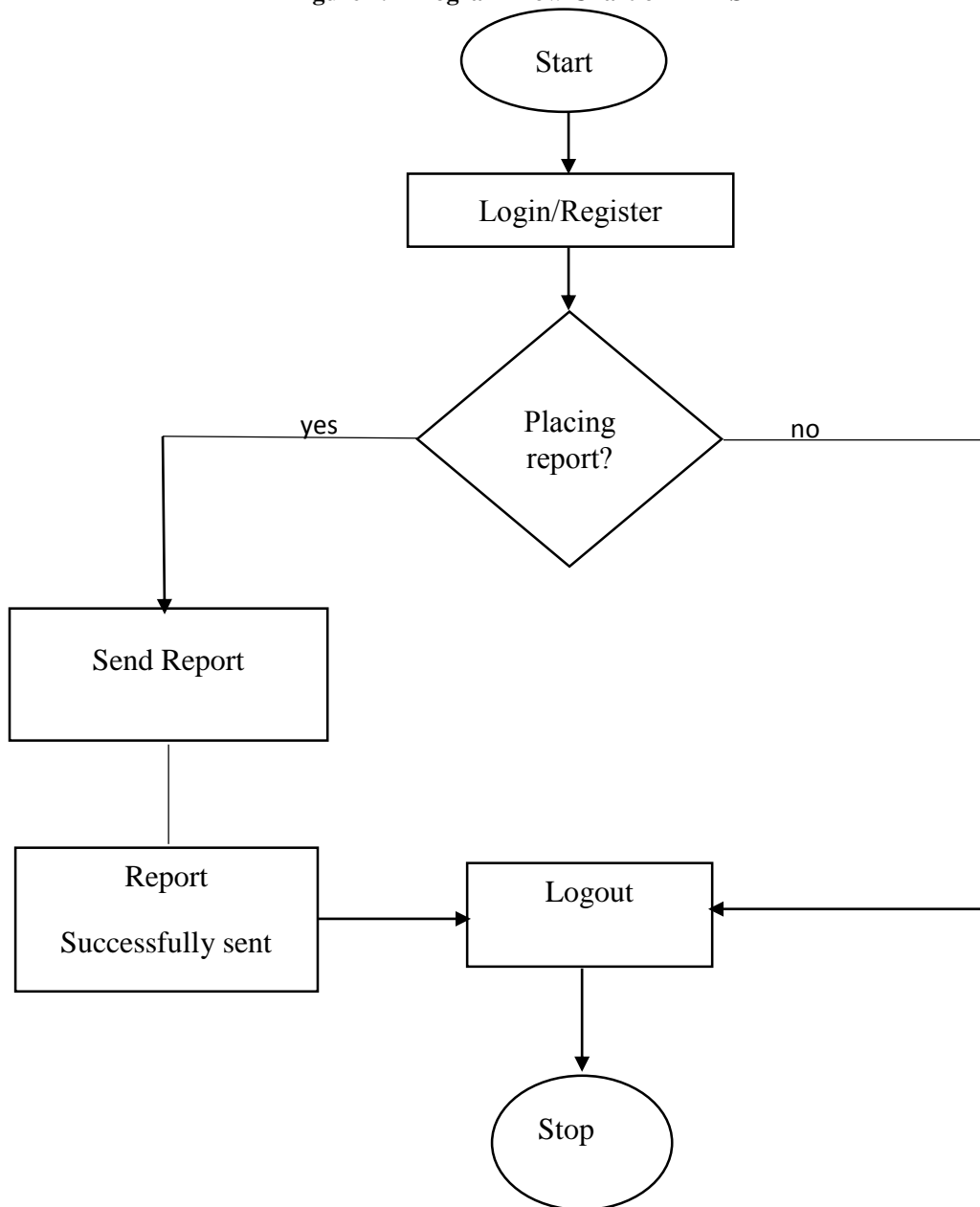
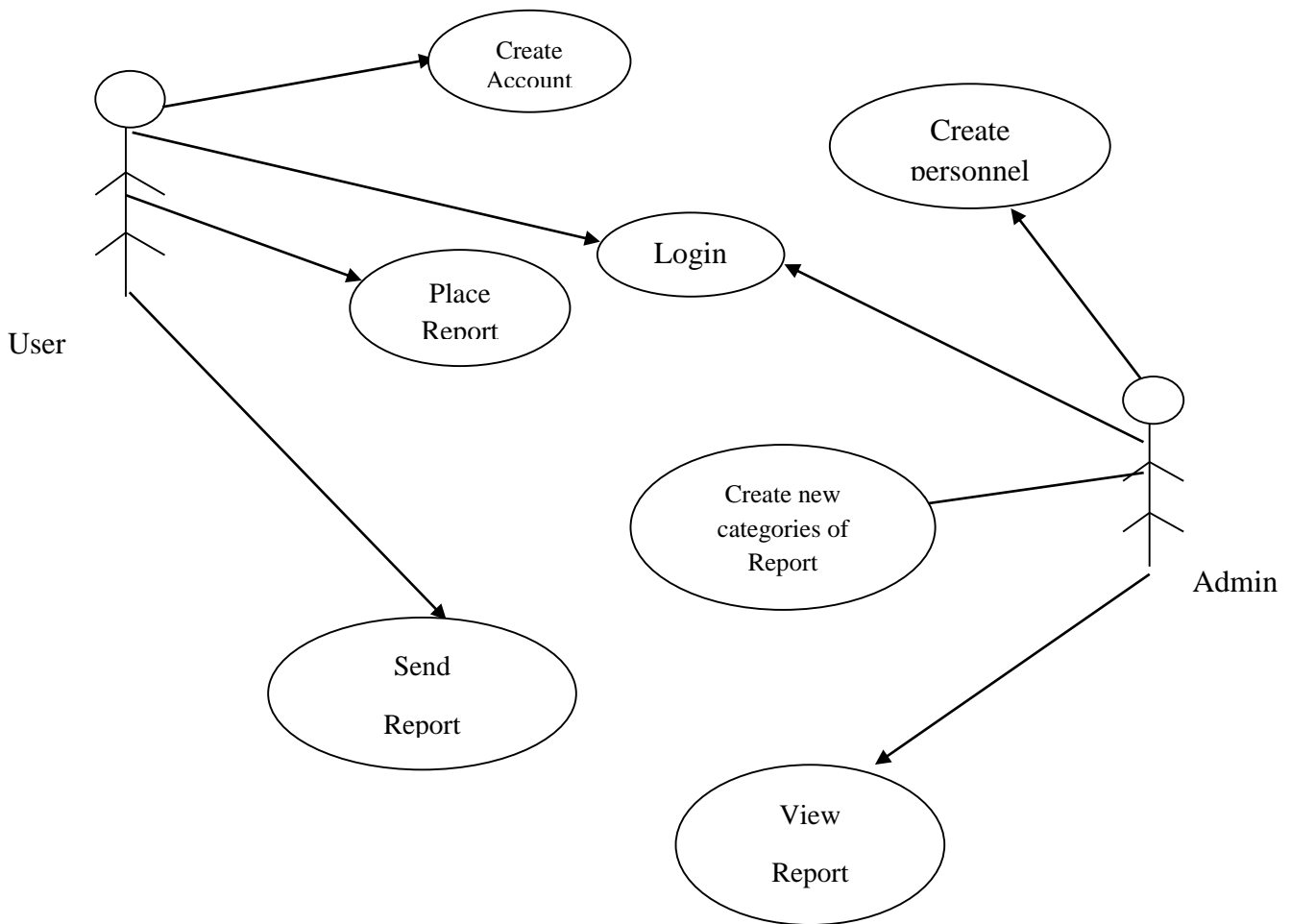


Figure 1.2 Program Use Case Diagram of EAMS



The figure 1.2 shows the functionality of the user and admin on the system. As shown above the user can only create account to be able to login and also perform other functions like placing report and equally sending the report. While the admin has more functions compare to the user, the admin can login to be able to create new personnel and report, the admin can also view history of reports placed by user. The relationship between the user and admin is they can both login.

Hardware and Software Requirement

The following are the system requirements for both the hardware and software materials required for the system to run and operate on.

Hardware Requirements

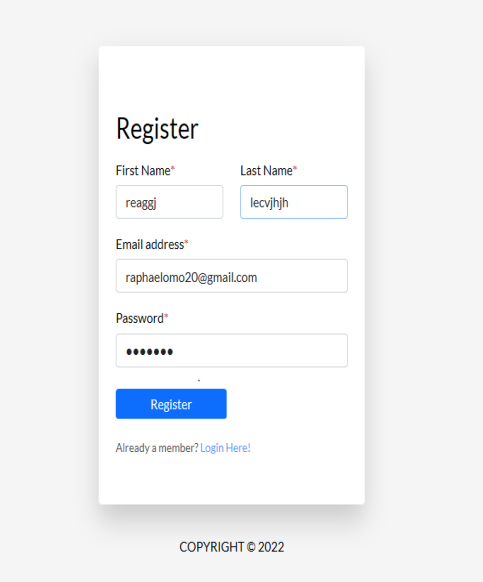
- i. Smart phone or Laptop/PC
- ii. Processor Speed: Pentium III-class processor, 600 MHz processor
- iii. Processor 1GHz
- iv. RAM (192 MB minimum)
- v. Hard Disk Space: 45 MB(minimum)

Software Requirement

- i. Web browser
- ii. Internet Connectivity

VI. RESULTS & DISSCUSSION

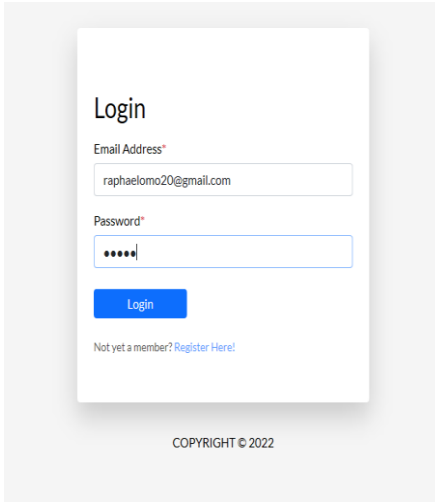
Figure 2.1 show that a user is inputting their details as shown below.



The screenshot displays a registration form titled "Register". It includes input fields for "First Name*" (containing "reaggj"), "Last Name*" (containing "lecvjhj"), "Email address*" (containing "raphaelomo20@gmail.com"), and "Password*" (masked with dots). A blue "Register" button is positioned below the fields. A link "Already a member? Login Here!" is located at the bottom of the form. The footer of the page reads "COPYRIGHT © 2022".

Figure 2.1 shows the user registration page

This Figure 2.2 shows that the user has successfully created an account and is ready to login



The screenshot displays a login form titled "Login". It includes input fields for "Email Address*" (containing "raphaelomo20@gmail.com") and "Password*" (masked with dots). A blue "Login" button is positioned below the fields. A link "Not yet a member? Register Here!" is located at the bottom of the form. The footer of the page reads "COPYRIGHT © 2022".

Fig2.2 shows the user login page

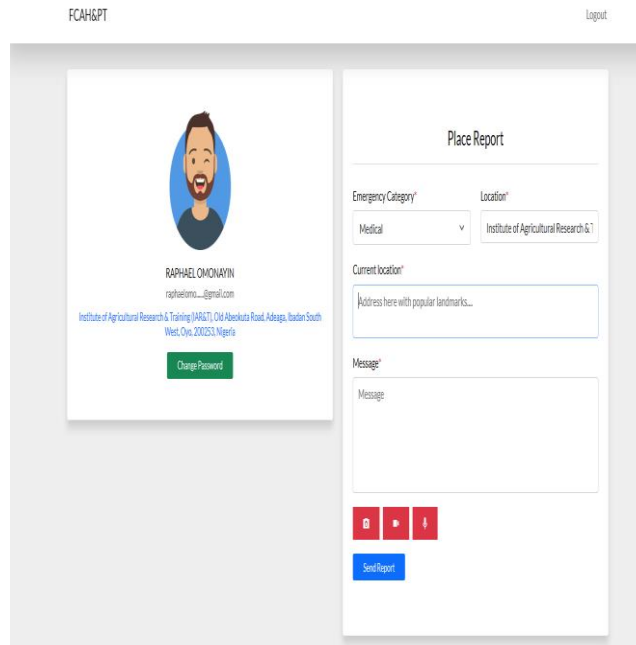


Figure 2.3 shows the user interface report page

This Figure shows the User Interface (UI) which comprises of the location, where user can select from the category of report to place and also input their report with text, image, audio and video.

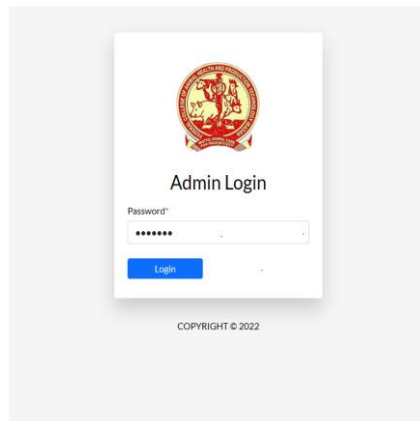


Figure 2.4 shows the admin login page

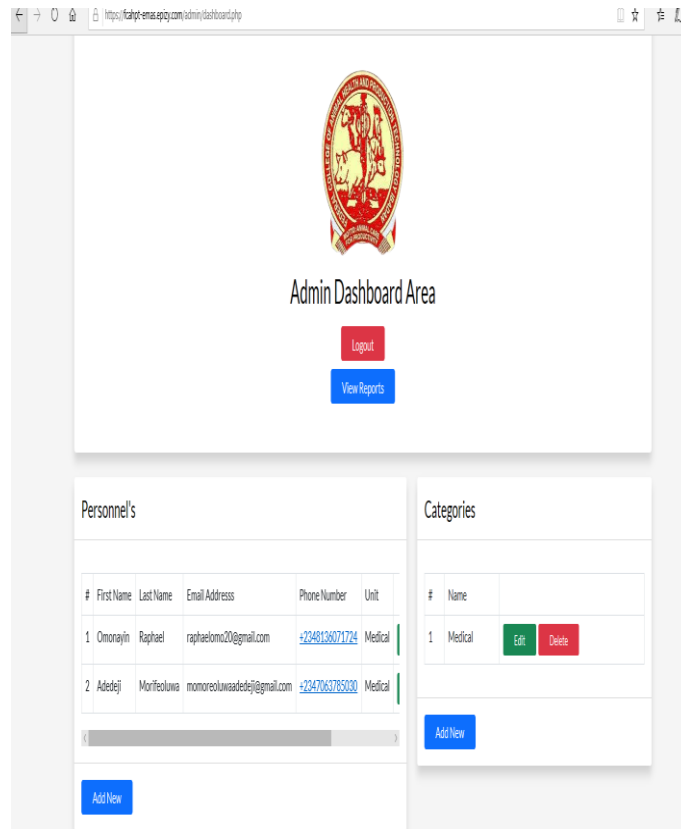


Fig 2.5 shows the admin dashboard areas

Figure 2.5 shows that the admin has login, while figure 2.5 shows the admin has successfully added new category of report and also added new personnel to respond to reports.

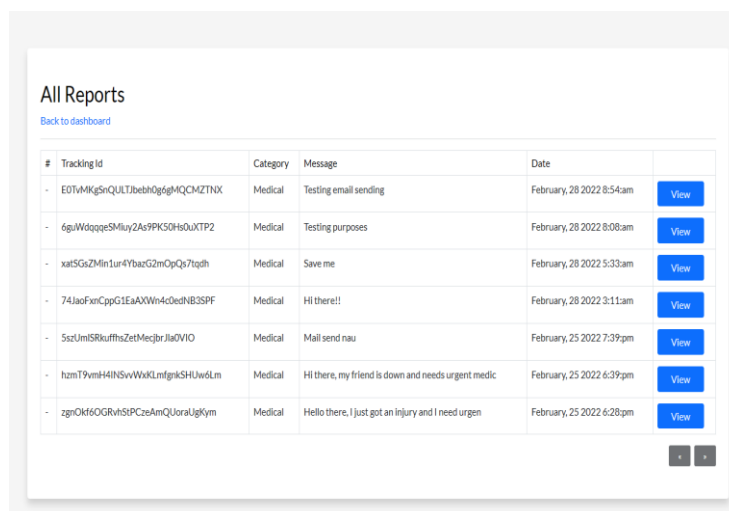


Figure 2.6 shows the history report page

This Figure2.6 shows history of all reports placed by users which can be only be accessed by the systems admin. Such report includes; tracking id, category, message and date of reports

FULL SYSTEM DESCRIPTION FOR USER AND ADMIN

USER

STEP 1: Firstly the user opens the web browser and type in the website url link (<https://fcaht-emas.epizy.com>) , after the user has successfully typed in the url link the user will be redirected to the registration page as seen in Fig 2.1

STEP 2: Secondly the user will create an account on the website to be able to have full access to the site

STEP 3: When the user has successfully registered, the user can now login as seen in Fig 2.2

STEP 4: After login the user dashboard will be displayed on the homepage.

STEP 5: The user can now place report as seen in Fig 2.3

ADMIN

STEP 6: The Admin will login as seen in Fig 2.4

STEP 7: After the admin has successfully logged in the admin dashboard will be displayed where the admin can create new category of report and also new personnel to respond to emergency as seen in Fig 2.5

STEP 8: The admin can also access the history of reports placed by users as seen in Fig 2.6

VI. CONCLUSIONS

The Emergency Alert Management System (EAMS), was successfully developed and is working as specified, the system can broadcast warning notifications to multiple devices simultaneously to the targeted personnel, student and the entire academic community. In the nearest future incorporation of security measures should be put in place in other to verify who is sending message or email or any form of alert to the system in other to curb unnecessary alert and adding automatic locator functions to the system in other to be able to verify whether the personnel that is getting the emergencies alert are within the academic environment.

REFERENCES

- [1]. Dobbs, L. Lou Dobbs. "Tampa Fire Department EMS dispatch details". Archived from the original on May 5, 2006. Retrieved 2007-05-30.
- [2]. BASHYNSKA, I. O., PETROVA, L. S., & POPOVYCH, K. F. (2015). The paper. Risk management,
- [3]. Dalai, T. (2013). Emergency alert and service for automotives for India. *International Journal of Advanced Trends in Computer Science and Engineering (IJATCSE)*, Mysore, India, 2(5), 08-12.
- [4]. Matthews, V. O., Uzairue, S. I., Noma-Osaghae, E., Enefiok, M. K., & Ogukah, P. J. (2018). Implementation of a community emergency security alert system. *Implementation of a Community Emergency Security Alert System*, 3(6), 475-483.
- [5]. Bhatnagar, A., Kumar, A., Ghosh, R. K., & Shyamasundar, R. K. (2016, January). A framework of community inspired distributed message dissemination and emergency alert response system over smart phones. In *2016 8th International Conference on Communication Systems and Networks (COMSNETS)* (pp. 1-8). IEEE.
- [6]. Romano, M., Onorati, T., Aedo, I., & Diaz, P. (2016). Designing mobile applications for emergency response: citizens acting as human sensors. *Sensors*, 16(3), 406.
- [7]. Turoff, M. (2006). The Design of a Dynamic Emergency Response Management. *Annual Review of Network Management and Security*, 101.
- [8]. Sheldon, P. (2018). Emergency alert communications on college campuses: Understanding students' perceptions of the severity of a crisis and their intentions to share the alert with parents and friends. *Western journal of communication*, 82(1), 100-116.
- [9]. Plan, P., & Directorate, F. G. (2001). Federal Ministry of Health. Health and Health Related Indicators. Addis Ababa: Federal Ministry of Health.
- [10]. May, P. J. (1985). FEMA's role in emergency management: examining recent experience. *Public Administration Review*, 45, 40-48.
- [11]. McClelland, D. G. (2000). Complex Humanitarian Emergencies and USAID's Humanitarian Response (No. 27). Center for Development Information and Evaluation, US Agency for International Development.
- [12]. Nnadi, G. O., Ezeani, O. E., & Nnadi, H. C. (2020). The National Emergency Management Agency (NEMA) and the challenge of effective management of internally displaced persons in north eastern Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 25(5), 1-14.
- [13]. J. Li, Q. Li, C. Liu, S. Ullah Khan, and N. Ghani, "Community-based collaborative information system for emergency management," *Computers & Operations Research*, vol. 42, pp. 116-124, 2// 2014
- [14]. U. Varshney. (2009, January, 2018). Pervasive Healthcare Computing.
- [15]. M. Khalemsky and D. G. Schwartz, "Emergency Response Community Effectiveness: A simulation modeler for comparing Emergency Medical Services with smartphone-based Samaritan response," *Decision Support Systems*, vol. 102, pp. 57-68, 10// 2017.
- [16]. Drj. (2001, January). Short Message Service (SMS) (3446 ed.)
- [17]. S. J. Iribarren, W. Brown Iii, R. Giguere, P. Stone, R. Schnall, N. Staggers, et al., "Scoping review and evaluation of SMS/text messaging platforms for mHealth projects or clinical interventions," *International Journal of Medical Informatics*, vol. 101, pp. 28-40, 5// 2017.
- [18]. F. Palmieri, M. Ficco, S. Pardi, and A. Castiglione, "A cloud-based architecture for emergency management and first responders localization in smart city environments," 2016.
- [19].] L. Atzori, G. Morabito and A. Iera, The Internet of Things: A survey, *Computer Networks: Volume 54, Issue 15, 28 October 2010*
- [20]. IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications Amendment 6: Wireless Access in Vehicular Environments, IEEE Standard 802.11, July 2010.
- [21]. L. Le, A. Festag, R. Baldessari, and W. Zhang, "Vehicular wireless short-range communication for improving intersection safety," *IEEE Commun. Mag.*, vol. 47, no. 11, pp. 104-110, Nov. 2009.
- [22]. Schöning, J.; Rohs, M.; Krüger, A.; Stasch, C. Improving the communication of spatial information in crisis response by combining paper maps and mobile devices. In *Second International Workshop on Mobile Information Technology for Emergency Response; Lecture Notes in Computer Science; Springer: Berlin, Germany, 2009; Volume 5424, pp. 57-65.*
- [23]. Yuan, W.; Guan, D.; Huh, E.N.; Lee, S. Harness Human Sensor Networks for Situational Awareness in Disaster Reliefs: A Survey. *IETE Tech. Rev.* 2013, 30, 240-247.
- [24]. Malizia, A.; Bellucci, A.; Diaz, P.; Aedo, I.; Levialdi, S. eStorys: A visual storyboard system supporting back-channel communication for emergencies. *J. Visual Lang. Comput.* 2011, 22, 150-169.
- [25]. Manoj, B.S.; Baker, A.H. Communication challenges in emergency response. *Commun. ACM* 2007, 50, 51-53.

- [26]. Malizia, A.; Onorati, T.; Diaz, P.; Aedo, I.; Astorga-Paliza, F. SEMA4A: An ontology for emergency notification systems accessibility. *Expert Syst. Appl.* 2010, 37, 3380–3391
- [27]. Kunreuther, H., and A. Lerner-Lam, "Risk Assessment and Risk Management Strategies in an Uncertain World, Executive Summary," Columbia/Wharton Roundtable, April 12-12, 2002.
- [28]. Michaels, Sarah, "Digital Disaster Assistance: How and Why selected Information Technology Firms Contributed to Recovery Immediately after the September 11 Terrorist Attack," Quick Response Report 141, 2001, National Hazards Research and Applications Center, University of Colorado.
- [29]. Smith, C.A.P., and S. Hayne, "A Distributed System for Crisis Management," *Proceedings of the 24th HICSS*, 1991, 3, pp. 72-81.
- [30]. Kopel, D. E., Sims, V. K., & Chin, M. G. (2014). Taking emergency warnings seriously. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting September*, 58, 1129–1133
- [31]. Thompson, S. C., & Schlehofer, M. M. (2014). Undermining optimistic denial reactions to domestic and campus emergency warning messages. *Applied Psychology: Health and Well-Being*, 6(2), 192–213.