JOSEPH NORKPLIM ATTAH – 3974318

SMART CITY: BUILDING DISASTER RESILIENT AND SUSTAINABLE CITIES USING SMART TECHNOLOGIES IN GHANA

Introduction

Rapid urbanization is transforming the world and the way we live and interact in our cities. By 2050 about 70% of the world would be living in cities. This urbanization is both an emblem of our economic and social progress and a challenging strain on the existing urban infrastructure that is already struggling to deal with problems resulting from rapid urbanization. Greater number of people in our cities can increase the number of disaster and their impact.

Smart Cities have the potential to solve the aforementioned problem faced by our cities. The concept of smart cities has emerged from the applications of Information and Communications Technologies to enhance the quality and performance of public services, help us gather and make sense of data from our cities, improve quality of life, engage more effectively with the city's residents and above all make our cities more sustainable and resilient against disasters.

Natural disasters are inevitable, man-made disasters on the other hand are not but are as destructive as natural disasters. Scientific research and advancement in technology has led planners, policy makers, engineers and all stakeholders involved in the planning and building settlements understand disasters better and how it affects life. The emergence and development of artificial intelligence, internet of things (IOT), GIS, robotics, automation, big data, cloud and other ICTs have placed the human race at a position of understanding disasters better and making more informed and data backed decisions in emergency situations.

Problem Statement

The strain on our cities as a result of rapid urbanization has increased the occurrence and effects of disasters on life in cities in Ghana. This has resulted in the unnecessary loss of life and property in emergency events. This study seeks to explore the numerous ways Ghanaian cities can take advantage of the wide range of smart technologies to create more resilient cities and make our already existing cities resilient against disasters. Substantive evidence in Ghana reveal that we still rely on traditional methods of disaster management planning and decision making. In this age of smart technologies, data driven automated systems should be the center force in decision making in our cities because computer systems are not inherently biased and do not possess the fragility of humans.

Evidence from smart cities all around the globe have shown that they provide improved monitoring, observation, analysis, modeling, testing and forecasting of disasters – before, during and after it strikes. These cities are mitigating, responding and recovering from emergency events faster than their counterparts.

Research Questions

1. Which processes are gone through to manage disasters?
2. How can we augment the disaster management process with smart technologies?

3. Which type of systems can be implemented in lower-middle income countries like Ghana?
4. Who are the stakeholders involved in designing, building and maintaining such complex network of systems?
5. How can the community and residents of cities be actively involved in the creation of smart resilient cities?
6. What are the possible ways of testing such critical systems to assert their ability to improve resilience of our cities against disasters?

Research Objectives

1. Develop solutions that use a data driven approach to improve preparedness, produce a more adjusted response and mitigate cascading effects of disasters in Ghana.
2. Create a roadmap to aid the creation of smart and fast response emergency systems in Ghana that help us plan, prepare and respond to emergencies better.
3. Develop interconnected systems that share data across all the sectors of the city to help stakeholders make better decisions related to disaster management.

Methodology

Arriving at a solution to the disaster management problem is based on different steps and at the middle of all this lies data driven smart systems connecting critical infrastructure and stakeholders to make better decisions regarding disasters. Although the final solution will have to be customized to work efficiently in the city it is deployed in, the following steps will be followed to develop a generic solution;

1. Gather historic data on disasters and emergencies in Ghanaian cities to understand how disasters have affected us and what has and can be done about it.
2. Conceptualize a model based on what has been learned from the historic data and basing the model's design on technologies that can be effectively implemented in a lower-middle income country like Ghana.
3. Simulation testing models to uncover any undefined behavior and identifying stress points to help make models more resilient against disasters.
4. Exploring the different ways to implement the models in our cities with the aim of improving the resilience of the city and the quality of life of city dwellers.

Conclusion

Disasters hinder social and economic progress of cities if they are not managed using the best tools that human progress presents us. And more still can lead to the complete destruction of settlements if they are neglected. Employing smart technologies with their data accumulation and analysis capabilities equips planners and stakeholders involved in the planning and building of cities to create systems that help plan/prepare, adapt, absorb, respond and recover from disasters better.