**KYAMBOGO UNIVERSITY**

**SCHOOL OF COMPUTING AND INFORMATION SCIENCE**

**CCTV MONITORING SYSTEM**

By

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**INTRODUCTION**

**Introduction**

This study is an attempt to assess the implementation of a web based application called **Thabiti Camera**. This chapter comprises of the background of the study, Problem statement, Purpose of the study, objectives of the study, research questions and the scope of the study and significance of the study.

Emergency response systems are critical for ensuring that emergency responders are able to quickly and effectively respond to incidents, such as fires, accidents, or crimes. Currently, many emergency response systems rely on sensors or other technologies to detect and alert responders to incidents. However, these systems can be limited in their accuracy and coverage.

In this project, we propose the development of a camera-based emergency response system that uses advanced image recognition and machine learning techniques to accurately detect and classify incidents in real-time. This system will be able to identify a wide range of incidents, including fires, accidents, and crimes, and will be able to provide accurate and detailed information to emergency responders.

**Background**

Accidents and criminal events have always been part of human life and have always plagued the human society. Uganda faces a problem of high crime rates both in the rural and urban centers. These are rampant in urban areas. Despite the government efforts to put in place safety measures, they are not always effective to deal with these problems. With the evolution of technology, individuals and the government decided to install cameras in areas where these crimes usually occur as a way of curbing down the crime rates and also to have a starting point for investigation when they occur. They are installed to monitor crime, fire outbreaks, accidents and suspicious behavior.

Survey shows that most CCTV operators tend to use CCTV as a symbol to deter crime and these cameras are made clearly visible to the public. They have been embraced by Ugandans in their businesses and other sectors of the country like at schools, petrol stations, hospitals, homes, government facilities and along major roads.

So far, 2547 cameras have been installed by the Uganda Police Force where 1565 of them work online and others are connected by fibre cable to surveillance centers. Roughly less than 1000 cameras have been installed and monitored by private individuals.

The current installed cameras require an individual to seat around and continuously monitor them or monitor them remotely for individuals with high administrative rights. This is expensive as the individual hired to monitor them has to be paid.

There have been a number of research studies and practical implementations of camera-based emergency response systems, but more work is needed to fully understand their capabilities and limitations, and to develop robust and reliable systems that can be deployed in real-world environments.

This project aims to contribute to the development of camera-based emergency response systems by developing a new system that leverages advanced image recognition and machine learning techniques to accurately detect and classify incidents in real-time. The project will involve the development and testing of the system in a variety of simulated and real-world scenarios, and will evaluate the accuracy, reliability, and impact of the system on emergency response times and outcomes.

**Problem statement**

Without continuous monitoring, the cameras just watch the events without an immediate response to any occurrence of a crime. Security agents find it hard to respond to these events where sometimes it may even be late. The main objective of this system is to extend the effectiveness and flexibility of security cameras. The components of the system, include:

Alerting: This component is responsible for detecting and alerting emergency responders to incidents. This can be done through the use of sensors, cameras, or other technologies that are able to detect and report on incidents.

Communication: Once an incident has been detected, the emergency response system must be able to communicate this information to the appropriate emergency responders. This can be done through a variety of means, including phone, text, or email.

Coordination: The emergency response system must also be able to coordinate the response of multiple agencies and organizations. This can involve dispatching emergency responders, coordinating the deployment of resources, and providing real-time updates and information to responders on the ground.

Public notification: In some cases, it may be necessary to alert the public to an incident or to provide them with important information. The emergency response system can be used to send out public notifications through a variety of channels, such as through social media or through dedicated alert systems.

Overall, the system is critical for ensuring that emergency responders are able to quickly and effectively respond to incidents, and for keeping the public informed and safe during emergencies.

**Objectives of the study.**

This study is guided by the following research objectives.

**General/Main Objective**

To develop a camera-based emergency response system that uses advanced image recognition and machine learning techniques to accurately detect and classify incidents in real-time and send signals to authorities.

**Specific objectives**

* For individuals to monitor their homes and assets
* To reduce on the damage caused by accidents and crimes by providing real time alerts.
* To predict human behaviors hence predicting crimes too.
* Test the accuracy and reliability of the system in a variety of scenarios and environments.
* Integrate the system with existing emergency response infrastructure and protocols.
* Evaluate the effectiveness and impact of the system on emergency response times and outcomes.

**Research Questions**

1. How do individuals get notified of premise’s security breach in case of their absence?
2. How do authorities get news about accidents in areas where they have no cameras?
3. What time is spent to respond to accidents and crime occurrences?
4. What do authorities think of automating the system?

**Scope**

**Context Scope**

The scope of this project is the development of a camera-based emergency response system that uses advanced image recognition and machine learning techniques to accurately detect and classify incidents in real-time. The system will be able to identify a wide range of incidents, including fires, accidents, and crimes, and will provide accurate and detailed information to emergency responders. The system will be implemented as a standalone application or integrated into existing emergency response systems.

The project will involve the development and training of a machine learning model, as well as the implementation and testing of the system in a variety of simulated and real-world scenarios. The system will be evaluated for its accuracy, reliability, and impact on emergency response times and outcomes

**Geographical scope**

The study will be conducted in the central part of Uganda since there is a high concentration of CCTV camera use.

**Time Scope**

The time frame for this study will be of 5 months from November 2022 to March 2023 with regular progress updates provided to stakeholders. This period will enable the researcher to get sustainable data about the study.

**Significances**

* To ease the process of responding to events of accidents and crime.
* To provide an immediate response to crimes and accidents.
* To reduce on damage caused by accidents and crimes
* To predict crimes

**CHAPTER TWO**

**LITERATUE REVIEW**

**2.0 Introduction**

This section consists of a critical review of research work from journals, internet sources and other projects already done which is related to the subject area as well as analysis of existing literature on Surveillance Management system with the objective of reveling, contributions, weaknesses and gaps.

**2.1 General overview about CCTV and other monitoring and Surveillance systems.**

Current emergency response systems have several limitations. For example, sensor-based systems can be limited in their coverage and accuracy, and may not be able to detect all types of incidents. In addition, these systems can be expensive to install and maintain, particularly in large or complex environments.

In recent years, there has been increasing interest in the use of camera-based systems for incident detection and emergency response. These systems use advanced image recognition and machine learning techniques to analyze camera data in real-time, and can identify a wide range of incidents with high accuracy. Camera-based systems have several potential advantages over sensor-based systems, including lower cost, greater coverage, and the ability to provide detailed and accurate information to responders.

Several research studies have explored the use of camera-based systems for emergency response. For example,

1. Proposed a system that uses machine learning to classify incidents based on video data from surveillance cameras. The system was able to achieve high accuracy in classifying a variety of incidents, including fires, accidents, and crimes.
2. Developed a similar system that used deep learning techniques to classify incidents based on camera data. This system was able to achieve high accuracy in a range of scenarios, and was able to provide detailed and accurate information to responders. In addition to these research studies, there have been a number of practical implementations of camera-based emergency response systems. For example,
3. Deployed a system in a public transportation network that used camera data to detect and classify incidents in real-time. The system was able to significantly improve emergency response times and outcomes, and was well-received by users.
4. Implemented a camera-based system in a public park that was able to accurately detect and classify a variety of incidents, including fires, accidents, and crimes.

**2.2 Conclusion.**

Overall, the literature suggests that camera-based systems have the potential to significantly improve the accuracy and effectiveness of emergency response efforts. These systems are able to accurately detect and classify a wide range of incidents in real-time, and can provide detailed and accurate information to responders. However, more research and development is needed to fully understand the capabilities and limitations of these systems, and to develop robust and reliable systems that can be deployed in real-world environments.

# **CHAPTER THREE**

# **METHODOLOGY**

## **3.0 Introduction**

This chapter covers the methods that will be used in carrying out the project and the analysis of the methods that will be used.

## **3.1 Research Methodology**

During the project work, data collection will be carried out in various ways. In gathering and collecting necessary data and information needed for the success of this project, newspapers, journals, articles, e-books and the internet in general will be vital sources. Useful information for the development of the system will also be collected from police and other authorities and student interactions (case study) using appropriate data collection techniques.

Software development approach that will be used in the design of this system is the top-down approach. A top-down approach (also known as stepwise design or deductive reasoning) is essentially the breaking down of a system to gain insight into its compositional subsystems. In the top-down approach, an overview of the system was formulated.

## **3.2 Data collection Techniques**

As a means of improving the existing system, system analysis will be conducted. For this project, I look into the analysis of surveillance system where input data will be accessed and see how the system accomplishes its goal. This will help to detect the existing system problems of which suggestion to the new system which will be made to improve the services.

The collection of information from the authorities and individuals will be carried out in order to get the user requirements, what they expect of the new system which will help in the development of this monitoring and surveillance management system. The tools that will be used for data gathering include interviews, reading literature (written documents) and observation.

**Literature Review**

**Interviews**

**Observation**

**3.3 Implementation methofology**

The following steps will be taken to achieve the objectives of the project:

1. **Development of a machine learning model:** The first step in the project will be the development of a machine learning model that is able to accurately classify incidents based on camera data. This model will be trained on a large dataset of labeled images and videos, and will be fine-tuned to perform well on a variety of incidents and environments.
2. **Implementation of the system:** Once the machine learning model has been developed and trained, the next step will be to implement the system as a standalone application or integrate it into existing emergency response systems. This will involve designing and implementing the user interface, as well as integrating the system with existing emergency response infrastructure and protocols.
3. **Testing of the system:** The system will be tested in a variety of simulated and real-world scenarios, including different types of incidents and environments. The accuracy and reliability of the system will be evaluated, as well as its impact on emergency response times and outcomes.
4. **Evaluation of the system:** The final step in the project will be the evaluation of the system's overall performance and impact. This will involve analyzing the results of the testing, as well as gathering feedback from stakeholders and users

**CONCLUSION**

The proposed system automates crime and accident detection and makes it simple and instant. It will be designed to detect crimes and accidents not only during the time they occur but also to make predictions some time before occurrence basing on unusual behavior.

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