**MULTILINGUAL CRIME REPORTING SYSTEM**

**RESEARCH PROJECT**

**BY**

**ETUKUDOH, UNWANA THERESA**

***AK15/NAS/CSC/022***

**SUBMITTED TO**

**DEPARTMENT OF COMPUTER SCIENCE**

**FACULTY OF PHYSICAL SCIENCES**

**AKWA IBOM STATE UNIVERSITY**

**IKOT AKPADEN, MKPAT ENIN LGA.**

**AKWA IBOM STATE, NIGERIA.**

**AUGUST, 2020.**

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In Partial Fulfillment of the Requirements for the Award of Bachelor of Science (B.Sc.) degree in Computer Science

**MARCH, 2020.**

**CERTIFICATION**

This research work titled ‘**Multilingual Crime Reporting System**’ was carried out by **Etukudoh Unwana Theresa (AK15/NAS/CSC/022)** of the Department of Computer Science, Faculty of Physical Sciences, Akwa Ibom State University. “This work has not been presented elsewhere for the award of a degree, except as reference, this is an original work by me”

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**APPROVAL PAGE**

This research work titled ‘M**multilingual Crime Reporting System**’ by **Etukudoh Unwana Theresa (AK15/NAS/CSC/022)** has been approved by the Department of Computer Science, Faculty of Physical Sciences, Akwa Ibom State University as a document of the Department by:

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**DEDICATION**

I dedicate this research work to Almighty God who alone is the source of my inspiration, divine wisdom and defense.

**ACKNOWLEDGEMENT**

I must particularly acknowledge the invaluable contribution of my supervisor, Dr. Etebong Isong. He took time to find appropriate research directions and constructively critic every approach before adoption.

My family members have been particularly supportive most especially my grandfather Otuekong Paulinus Etukudoh and Mr. Etukudoh Michael Usoro for their support towards the pursuit for academic excellence. They have not ceased to shower on me their gracious prayers and moral advice.

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## CHAPTER ONE

## INTRODUCTION

## 1.0 Background of study

Crime is an unlawful act punishable by a state or other authority. The term "crime" does not, in modern criminal law, have any simple and universally accepted definition, though statutory definitions have been provided for certain purposes (Addington, 2006). Crime can say to be an offense (or criminal offense), an act that is harmful not only to some individual but also to a community, society or the state ("a public wrong"). Such acts are forbidden and punishable by law.

In other hand, security is becoming a serious concern transversely several countries in the world. The hunt to control the rate of crime and breakdown of law and order increases. The society grows and diversity of human intentions and interactions abound. An ideal society is governed by laws and regulations that are collectively agreed upon and measurable consequences that will be meted out for any member of the society that is found culpable to have floated any specific component of the legal infrastructure.

The legal infrastructures decide the extent to which law enforcement agents can act or protect the common interests of individuals in the society. Members of the society have several responsibilities to the government of which such include reporting any incidence of breakdown of law and order to the appropriate civil and security agency. Such incident cases reported are supposed to be smartly collected, analyzed and investigated to a more conclusive and justifiable conclusion. Investigations are carried out without fear or favour, any attempt to prevent due process during crime investigation is in itself a crime and it is also punishable under the law.

Until lately, the process of reporting a crime case is tedious as it is manually done. An individual who may have some complaints will need to work into any offices of the security agents (e.g. Police) to inform and write in statement issues that may need their attention. At these offices, the security agents will raise an incidence form and ask the reporter to fill some appropriate section. The security agents will also ask some questions from the reporter to help make notes for preliminary investigations.

However, the introduction of technology has set a new front of opportunities of leveraging on the assorted benefits of information technology to crime reporting. Our local communities are filled with many crimes, including sexual assault, drugs and violent crimes, robbery, cultist activities, all of which endanger the public. While some people may be willing to actively report illegal acts, others choose not to do so, as they are worried about the fallibility of the policing, reporting and criminal justice systems, based on previous failings in all three departments (Tzay-Farn, Chin-Ling, Bo-Yan, & Yong-Yuan, 2019).

People are afraid for their own safety should those they report identify them. Moreover, people who are afraid of intimidation may choose not to offer information, or stand as a witness to criminal acts, despite a high reward being offered for such information. All of these concerns, have in the past contributed to an environment in which crime is more difficult to address, and in which crime is more likely to be committed. However, recent years have seen rapid developments in Internet technology, which have made possible an online crime reporting system.

There are various technology platforms that have been developed to assist how crime incidences are reported, the technological applications have gone from telegraph, special radio communication, and dedicated phone lines to a more responsive and more pervasive technological application platforms (web and mobile software applications). Majority of the members of the society nowadays have mobile devices that can easily access the internet. This makes the web approach the most economical and open approach for reporting crime with a far-reaching benefits and coverage.

## 1.1 Statement of Problem

Crime and illegal human activities have always been part of the society. These crimes are being committed in various locality including tertiary institutions. These crimes are being committed every day and the crime rate keep increasing at a high speed, because most of these crimes committed were unreported to the authorities because of the fear of getting involved. Some people fail to report a crime due to the costs and time incurred in travelling to police stations that are situated far from their homes and workplaces.

In other occasion, residents might wish to report a crime incident but would not want to when considering lengthen processes involve in laying crime incident statement at the station. These processes include, waiting for the inspector to be in office before the crimes are reported.

Furthermore, language differences are another problem. A witness might wish to report an incident that he/she witness but due to the fact that he or she can’t understand or speak the language of that locality the case goes unreported.

However, considering school environment, there has been acknowledged increase in crime within tertiary institutions environment ranging from robbery, sexual harassment, rape, cultic activities, etc. with most of them not being reported or the reporting done too late and the cases go unresolved and victims have limited options of acquiring justice. Many of this incident are not being reported to the school authority because of fear of intimidation, time, and or who to report to.

Given these facts, in this research study we present the development of a Multilingual Crime Reporting System. With the use of the system, students/residents would easily report the ongoing crimes and issues in their area. The system would also lessen the fear of the students/resident who witnessed the crime, which is one of the factors why some cases take too long to be solved.

It is essential to have well organized and widely available method for reporting criminal activities to the relevant authorities and support for quick response units. This information needs to be transmitted instantly and remotely without the technical and the cumbersome need to physically access security department.

## 1.2 Aim and Objectives of Study

The aim of this research work is to develop a Multilingual Crime Reporting System; A System that will be easily accessible to people to report crime or any illegal activities within one’s locality.

The objectives are as follows:

1. To design a system that is easily accessible by the people for making crime report.
2. To design a database for proper safekeeping of data (crime record)
3. To develop a prototype system using PHP programming language, MySQL as database and bidirectional recurrent neural network for language translation.

## 1.3 Significance of Study

Developing a Multilingual Crime Reporting System in this research study will greatly aid in crime reporting by the public. Furthermore, substituting the manual police statement with an online platform will make crime reporting easy and safe, as many people would not want to go to the police station to make statement with reasons that they might have to spend a lot of time at the station. Also, introducing well designed electronic database will make information retrieving and modification easy.

## 1.4 Scope of Study

This research work covers developing a Multilingual Crime Reporting System for a private security agency for reporting all manners of crimes or illegal activities. It covers translating text from English, French, Hausa and Igbo and vice versa. Furthermore, it will also provide feedback progress of the reported crime to the reporter, report statistics generating and information dissemination to the public.

## 1.5 Definition of Terms

*Security*: the state of being free from danger or threat.

*Information System*: A computer system or set of components for collecting, creating, storing, processing, and distributing information to solve business problems.

*Crime*: a crime is an unlawful act punishable by a state or other authority.

*Expelled*: To force something or someone out, or to kick someone out of a social club, school or other group

*Database*: A data structure that stores organized information.

## CHAPTER TWO

## LITERATURE REVIEW

## 2.0 Introduction

This chapter provides an insight into the State-of-the-Arts and looks at the contributions from several authors on this research subject matter. It gives a brief overview of crime, crime reporting system, management information system, its merits and demerits, Neural Networks

## 2.1 General Overview

Crime persists as long as human society exist, consequently there is a continuous effort and legitimacy to report, investigate and render convincing evidences to prosecute individuals who commit any criminal activity. The word Crime originated from a Latin word Crimen dubbed charge or offence. Shodhganga (2017) projected Crime as a function of the adoption of standards by the society rather than individualistic standards, that is to say, the society gradually determine what is perceived as good value and bad acts and proscribe possible consequences. Crime is an intentional act in violation of criminal law which is without an excuse. Crime at time is not only just harmful to some individuals but also to the state or general public.

Determining what is obnoxious or sane is determined through a long and continuous complex interactions and reactions among members of a society. As society varies so what is considered as crime varies from people to people. But the dynamism of culture and unpredictability of human make it unlikely to have a general set of rules for all human societies. There is no continent that is left out when it comes to crime; (Ukoji, & Okolie-Osemene, 2016) reported that Africa is considered as a flash point for high crime. He further noted that the giants of Africa like Nigeria and South Africa now have high records of violent crimes in recent time. America also record high crime index while some places in Europe have been able to crime index by few digits.

Crime investigation and prosecution is another important constituent in the justice system. The general cognition of what Crime comprises is not enough without ultimately punishing the offender to serve as deterrent and freeing the falsely accused persons in such occasions. The general justice system constitutes the laws; which indicate what Crime is, the law apparatuses like security agencies, people and processes that are followed to implement justice. The people who are to be served by the justice system may soon begin to lose confidence and under-report or result to jungle justice to redress their anger if existing justice system continues to fail with time. Criminal justice system also comprise the system of practices and institutions of Government directed at ensuring social control, deterring and mitigating crime or sanctioning individuals who violate laws with criminal penalties and rehabilitation efforts.

However, the conceptualization of criminal justice system in Nigeria is usually put in poor light because of rapid and failing structures of the justice system. Tosin, Adedeji, & Sulaiman (2017) reported that Amnesty international has always rated Nigeria justice system poorly and it is represented as a conduit for injustice from start to end. The actors in the justice system have also not helped the situation to start acting as expected by the lofty positions they hold and the important role they play in the process of dispensing justice. There is a sentiment about law makers having vested interest thereby making inadequate laws that do not really server the interest of the general public.

The process of the justice system is very important as it determines if the people who are served will accept the outcome of the process and continue to support the system. An important aspect of the justice system is being able to report cases, investigate and prosecute based on laws and get sentencing. Until recently, most communities report crime incidences on papers, which make the process vulnerable to alteration, theft; mutilation and erase of evidences that could have made the system apportion justice appropriately. With the advent of information technology, crime reporting has taken a new turn, has many cases can be reported independently and security agencies can easily access them and act promptly.

In Nigeria, there are few electronic platforms for reporting crimes and are isolated and not been visited by the Nigerians majorly because of the distrust towards the process of justice, no feedback on reported cases and isolated crime reporting (mainly for financial crimes). There is a need to increase the awareness of an encompassing electronic platform that will accommodate all crime incidences, open to all and does feedback to the members of the public. This strengthens our legal infrastructure and justice system.

## 2.1.2 Elements of crime

For an act of crime to be accomplished, the following four elements are needed:

1. *Individual***:** The first and the most important element for commission of a crime is an individual who has an intention and is prepared to commit a crime.
2. *Mens rea: Mens rea* in Latin means “guilty mind”. For a crime to be committed, a criminal intention is an essential element.
3. *Actus rea***:** *Actus rea* in Latin means “guilty act”. For a crime to be committed, along with a criminal intention there should also be an external act.
4. *Injury/hurt:* The criminal act should be accompanied by an injury or hurt which is physical, mental or monetary which violates a law of state.

## 2. 1.3 Stages of committing a crime

The commission of crime involves four stages:

1. *Intention:* For the commission of crime, the first important stage is criminal intention. However, just having a criminal intention is not punishable until it is conveyed to someone else in words or by acts. Example: An intention to kill someone.
2. *Groundwork:* To commit a crime, prior preparation is necessary if the crime is intentional. It is difficult for the court to punish an individual purely based on a preparation plan until and unless it is executed. For example, murder, dacoit.
3. *Preliminary crime:* An attempt to commit a crime is considered as preliminary crime. An attempt should include a criminal intention, an act towards committing a crime and an act of crime which is not completely accomplished. Example: Attempt to murder
4. *Completion of crime:* This is the last stage in commission of crime. The criminal completes the crime. A suspect is guilty of an offence only if he succeeds in his criminal activity. Example: Successful accomplishment of murder

## 2.1.4 Causes of crime

No individual is a born criminal, it is the situations and the conditions around the individual which make him act as a criminal. There are several causes which make an individual turn into a criminal. The main causes of crime are:

1. Social causes
2. Economic causes
3. Psychological causes
4. Biological causes.
5. Geographical causes

**2.1.4.1 Social causes of crime**

The social causes of crime include the following:

1. *Family disorganization:* Family plays the most important role in an individual’s life. In olden days, there were joint families and there was always a family control on the children. In urban areas today, each member of the family is busy pursuing their own paths. The children are neglected and family control is lifted up and hence there are no restrictions. Individuals who are a part of nuclear families and broken families resort to crimes due to lack of love, affection and proper attention.
2. *Upbringing of the individual:* Too much strictness causes heavy influence on minds of the children. Scolding and abusing children causes humiliation and irritation in children and they become delinquents. Moral values are imported to children by their parents. It is the duty of the parents to nourish their children in healthy circumstances. If the parents resort to illegal acts, the children will also do the same. A child is first influenced by his parents and then by his own brothers and sisters. If they resort to illegal acts such as selling block tickets at cinema theatres, the younger ones also tend to do the same acts.
3. *Defective education:* Lack of proper education results in poor judgment and the individual will fail to distinguish between right and wrong. Ethical and religious education has no place in the modern education system. Even after completing education, many individuals remain unemployed. Late employment leads to late marriage increasing criminal activity.
4. *Hype created by media:* Cinemas and newspapers have led to an increase in criminal activity. The hype created by the media relating to different crimes, modus operandi and the consequences motivate young individuals to resort to crimes.
5. *Drinking and drug use:* The consumption of alcohol and use of drugs of abuse are the most important causes of crime. Under the influence of alcohol and drugs, the person loses his sense of discrimination between good and bad, right and wrong and hence commits crime. This not only affects the individual but also his entire family.
6. *Unhappy marriages and dowry system:* A marriage where a girl or boy dislikes his partner & remains unhappy and may force individuals to commit suicides. Dowry system is also a main cause of crime.

**2.1.4.2 Economic causes of crime**

The economic causes of crime include:

1. *Poverty:* Money is the centre of life. Everything and every relation in this world is dependent on money. Poverty is the mother of crime. The poor people are unable to fulfill their basic necessities. To fulfill the basic necessities, they resort to crimes like burglaries, murders, suicides.
2. *Unemployment:* Many young individuals who are continually unemployed resort to suicides due to frustration. Some others resort to thefts, pick-pocketing, robberies. Hence, unemployment is a major cause of crime.
3. *Industrialization and urbanization:* Urbanization is the result of industrialization. The long working hours and the petite amount of money they get, results in individuals resorting to crime.

**2.1.4.3 Psychological causes of crime**

The psychological causes of crime include:

1. *Intellectual weakness:* Weak minded persons tend to criminal activities very easily. Intellectual weakness is a cause of crime.
2. *Mental diseases:* The person who suffers from mental disorders tends to do illegal and violent activities. Such individuals become unsocial zed, irritable, cruel, obstinate, suspicious, self-centred, lonely, full of feelings of revenge, backward and hypersexual or uncontrolled in their behaviour. Such individual does not repent for his violent acts.
3. *Characteristics of personality:* Due to social, economic or psychopathic reasons, an individual may turn into a psychic. An abnormal person possesses degree of freedom, irresponsibility, revolt, homicidal tendency, suspicion, lack of control, sadism, emotions, social maladjustment, ill-behavior, immaturity. He tends to do violent acts. He becomes naughty, explosive, disobedient and unsocial. He indulges in gambling, cigarette smoking, narcotic drug consuming, breaking things, absconding from house, prostitution, thieving.
4. *Emotional instability:* An abnormal individual possesses emotional instability. He does not like discipline. He suffers with inferiority complex. He indulges in criminal behavior. He does violent acts with emotions. If his hero steals a diamond from Government treasury, he sees the picture several times and repeats the same act.

**2.1.4.4 Biological causes of crime**

Many biological factors like age, gender, hormones, etc. act as causes of crime.

1. *Age:* Crime is more prominently committed by individuals in the second and third decades of life.
2. *Gender:* On a whole, males commit more crimes when compared to females.
3. *Body type:* Muscular body type individuals are found to commit more crimes.
4. *Hormonal causes:* Testosterone hormone is the hormone which is correlated to criminality.

**2.1.4.5 Geographical causes of crime**

Cities or counties with larger populations have higher crime rates. Poorly maintained neighborhoods correlate with higher crime rates. High residential mobility is associated with a higher crime rate. More taverns and alcohol stores, as well as more gambling and tourist establishments, in an area are positively related to criminality. There appears to be higher crime rates in the geographic regions of a country that are closer to the equator.

## 2.2 Types of crime

Based on the medium which is being affected, crimes are of the following types:

1. *Personal crimes:* Personal crimes are those crimes which target an individual person. These include murder, assault, sexual assault, etc.
2. *Assault:* Illegally attacking an individual with weapons like gun, knife, etc. in a severe manner is called assault. Assault results in severe injury. Domestic or family violence also involves assault.
3. *Homicide:* Unlawfully killing an individual is called homicide or murder.
4. *Sexual assault:* Sexual assault involves rape.
5. *Property crimes:* Property crimes are those crimes in which the target is a materialistic property.
6. *Burglary:* Illegally entering into a property and committing theft is called burglary.
7. *Theft:* Illegally taking away one’s property without force and without the notice of the owner. Example: Pick pocketing, Shoplifting, Stealing bicycles, etc.
8. *Arson fires:* Deliberately putting one’s property such a building, motor vehicle, etc. on fire is called arson fires.
9. *Automobile theft:* Unlawful theft or attempted theft of a motor vehicle.
10. *Vandalism:* Damaging public or private property without permission is referred to as vandalism.
11. *Victimless crimes:* These are acts against moral values of an individual. Commissions of crime like prostitution, illegal gambling, illegal drug use, etc. are examples of victimless crimes. Since these crimes do not have an identifiable victim, they are called victimless crimes.
12. *White-collar crimes:* Crimes committed by individuals belonging to high society. The crimes are committed to a large extent in their work place.
13. *Embezzlement:* Misusing money or property of an organization for an individual’s personal use.
14. *Identity theft:* Unlawfully using a person’s social security number, credit card number, etc. for financial gain is termed as identity theft.
15. *Fraud:* Deception of one party by another party for personal or financial gain is called fraud.
16. *Corruption:* is the use of power by government officials for illegal private gain. It includes bribery, embezzlement, etc.
17. *Organized crimes:* Organized crimes are defined as acts which are committed by two or more criminals as a joint venture in an organized manner. These crimes involve kidnapping, dacoities, marketing of illegal or prohibited goods, money laundering, trafficking people, buying votes, etc.
18. *Juvenile delinquency:* This is also called as youth crime. It is the crime committed by an individual under the age of 18years.
19. *Computer crime:* Cyber-crime is an act of crime that involves computer and a network. The computer may have been used in the commission of a crime, or it may be the target. Net crime refers to criminal exploitation of the internet. Examples of the computer crime include cyber terrorism, cyber warfare, harassment on the internet, spam, internet fraud, etc.
20. *Violation of public safety:* The violations of laws which threaten public safety are included under violation of public safety.
21. *Disorderly conduct:* This is the acting in a manner potentially threatening oneself or other people.
22. *Driving under influence of drinks and drugs:* Driving under the influence of alcohol or drugs may prove threatening to the individual as well as the public. Constant checks are conducted by police officials in whom the alcohol testing devices are used.
23. *Terrorism:* Violence against the normal people living in the society.

## 2.3 Information Systems

The term information system refers to the specific application software that is used to store data records in a computer system and automates some part of the information-processing activities of the organization (Ray, 2010).

An information system is a group of interrelated components that work to carry out input, processing, storage, output and control actions in order to convert data into information that can be used to support forecasting, planning, control, coordination, decision making and operational activities in an organization. Every business organization in this era needs an information system (IS) to keep track of all business activities, right from business planning, till the product delivery via manufacturing and quality cycles (Nowduril S. and Al-Dossary S, 2012). An information system can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making, coordination and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products (Laudon & Laudon, 2006). Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By information we mean data that have been shaped into a form that is meaningful and useful to human beings. Data, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

An information system can be defined as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products. Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output. Input captures or collects raw data from within the organization or from its external environment. Processing converts this raw input into a more meaningful form. Output transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require feedback, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage. (Sarmad, 2010)



***Fig. 2.1: Functions of an information system***

**(Source: Sarmad, 2010)**

## 2.3.1 Components of Information Systems

The component of information systems includes: (Sarmad, 2010)

1. *Resources of people***:** (end users and IS specialists, system analyst, programmers and data administrators.

* *End users***:** (also called users or clients) are people who use an information system or the information it produces. They can be accountants, salespersons, engineers, clerks, customers, or managers. Most of us are information system end users.
* *IS Specialists***:** people who actually develop and operate information systems. They include systems analysts, programmers, testers, computer operators, and other managerial, technical, and clerical IS personnel. Briefly, systems analysts design information systems based on the information requirements of end users, programmers prepare computer programs based on the specifications of systems analysts, and computer operators operate large computer systems.

1. *Hardware***:** (Physical computer equipment and associate device, machines and media)

* *Machines***:** as computers and other equipment along with all data media, objects on which data is recorded and saved.
* *Computer systems***:** consist of variety of interconnected peripheral devices. Examples are microcomputer systems, midrange computer systems, and large computer systems.

1. *Software***:** Software Resources includes all sets of information processing instructions. This generic concept of software includes not only the programs, which direct and control computers but also the sets of information processing (procedures). Software Resources includes:

* *System software*, such as an operating system
* *Application software*, which are programs that direct processing for a particular use of computers by end users.
* *Procedures*, which are operating instructions for the people, who will use an information system. Examples are instructions for filling out a paper form or using a particular software package.

1. *Data***:** Data resources include data (which is raw material of information systems) and database. Data can take many forms, including traditional alphanumeric data, composed of numbers and alphabetical and other characters that describe business transactions and other events and entities. Text data, consisting of sentences and paragraphs used in written communications; image data, such as graphic shapes and figures; and audio data, the human voice and other sounds, are also important forms of data. Data resources must meet the following criteria:

* *Comprehensiveness***:** means that all the data about the subject are actually present in the database.
* *Non-redundancy***:** means that each individual piece of data exists only once in the database.
* *Appropriate structure***:** means that the data are stored in such a way as to minimize the cost of expected processing and storage.

The data resources of IS are typically organized into:

* Processed and organized data-Databases.
* Knowledge in a variety of forms such as facts, rules, and case examples about successful business practices.

1. *Networks (communications media and network support)***:** Telecommunications networks like the Internet, intranets, and extranets have become essential to the successful operations of all types of organizations and their computer-based information systems. Telecommunications networks consist of computers, communications processors, and other devices interconnected by communications media and controlled by communications software. The concept of Network Resources emphasizes that communications networks are a fundamental resource component of all information systems. Network resources include:

* *Communications media***:** such as twisted pair wire, coaxial cable, fiber-optic cable, microwave systems, and communication satellite systems.
* *Network support***:** This generic category includes all of the people, hardware, software, and data resources that directly support the operation and use of a communications network. Examples include communications control software such as network operating systems and Internet packages.

## 2.3.2 Types of Information System

*Executive Support System (ESS)***:** Executive Information Systems have been developed, which provide rapid access to both internal and external information, often presented in graphical format, but with the ability to present more detailed underlying data if it is required. Executive information systems provide critical information from a wide variety of internal and external sources (from MIS, DSS, and other sources tailored to the information needs of executives) in easy-to-use displays to executives and managers. An EIS provides senior managers with a system to assist in taking strategic and tactical decisions.

*Decision Support Systems (DSS)***:** A Decision Support System is a computer based system intended for use by a particular manager or usually a group of managers at any organizational level in making a decision in the process of solving a semi structured decision(Asemi*et. al.,*2011). According to (Heidarkhani*et. al.,* 2013) Decision Support Systems are organizational information computerize systems that help manager in decision making that needs modeling, formulation, calculating, comparing, selecting the best option or predict the scenarios. According to (Khanore *et. al.,*2011) Decision-support systems are specifically designed to help management make decisions in situations where there is uncertainty about the possible outcomes of those decisions. According to (Shim, 2000) a decision support system is a computer-based information system that assists managers in making many complex decisions, such as decisions needed to solve poorly defined or semi-structured problems.

**Management Information Systems**

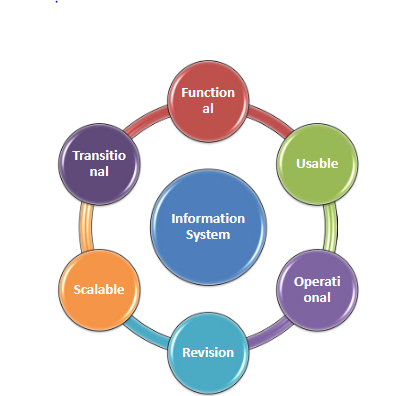
Management information systems are a kind of computer information systems that could collect and process information from different sources in institute decision- making in level of management (Heidarkhani, *et al.,* 2013). Management information systems Provide information in the form of pre specified reports and displays to support business decision making. The next level in the organizational hierarchy is occupied by low level managers and supervisors. This level contains computer systems that are intended to assist operational management in monitoring and controlling the transaction processing activities that occur at clerical level. Management information systems (MIS) use the data collected by the TPS to provide supervisors with the necessary control reports. According to (Hasan*et. al.,* 2013) management information system is type of information systems that take internal data from the system and summarized it to meaningful and useful forms as management reports to use it to support management activities and decision making.

**Transaction Processing Systems**

Transaction processing systems (TPS) are the basic business systems that serve the operational level of the organization. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to the conduct of the business (Laudon & Laudon, 2006). At the lowest level of the organizational hierarchy we find the transaction processing systems that support the day-to-day activities of the business.

## 2.3.3 Characteristics of a Good Information System

The elements of a good information system include the following below (Kyle, 2013)



**Functional Characteristics**

1. Adopts/conforms to industry best practices
2. Reduces data burden on users
3. Promotes evidence-based decision making reports, indicators/KPIs
4. Cost effective

**Usability Characteristics**

1. *Correctness*: The software should meet all the stated specifications.
2. *Usability/learnability***:** The amount of effort or time required to learn how to use the software; how user-friendly the software is.
3. *Integrity***:** Software should not have/create any adverse side effects.

**Operational Characteristics**

1. *Reliability***:** Software should be defect-free. It should not fail during execution.
2. *Efficiency:* Software should make effective use of resources.
3. *Security***:** Software should not cause ill effects on data and hardware. The data should be kept secure from external threats.

**Revision Characteristics**

1. *Maintainability***:** Software maintenance should be easy for any kind of user.
2. *Flexibility***:** Changes in software should be easy to make.
3. *Testability***:** Testing the software should be easy.
4. *Extensibility***:** Enhancing functionality should be easy.

**Scalable Characteristics**

1. *Scalability***:** Easily upgradeable for more work or for larger number of users
2. *Extensibility***:** Accessible across multiple platforms/devices.
3. *Modularity***:** Separate independent units/modules that can be modified and tested independently

## 2.3.4 Advantages of Information System

Information systems majorly provide the right information to the right people at the right time. It is used to track, store, manipulate and distribute the information from gathered data to appropriate persons when necessary. Its advantages are clearly explained below;

1. *Communication* – with help of information technologies the instant messaging, emails, voice and video calls becomes quicker, cheaper and much efficient.
2. *Globalization and cultural gap*– by implementing information systems we can bring down the linguistic, geographical and some cultural boundaries. Sharing the information, knowledge, communication and relationships between different countries, languages and cultures becomes much easier.
3. *Availability* – information systems has made it possible for businesses to be open 24×7 all over the globe. This means that a business can be open anytime anywhere, making purchases from different countries easier and more convenient. It also means that you can have your goods delivered right to your doorstep with having to move a single muscle.
4. *Creation of new types of jobs* **–** one of the best advantages of information systems is the creation of new and interesting jobs. Computer programmers, Systems analyzers, Hardware and Software developers and Web designers are just some of the many new employment opportunities created with the help of IT.
5. *Cost effectiveness and productivity*– the IS application promotes more efficient operation of the company and also improves the supply of information to decision-makers; applying such systems can also play an important role in helping companies to put greater emphasis on information technology in order to gain a competitive advantage. IS has a positive impact on productivity, however there are some frustrations can be faced by systems users which are directly linked to lack of training and poor systems performance because of system spread.

**2.4 Language Translation**

One of the earliest goals for computers was the automatic translation of text from one language to another. Machine translation is perhaps one of the most challenging artificial intelligence tasks given the fluidity of human language. Earliest, rule-based systems were used for this task, which were replaced in the 1990s with statistical methods.

More recently, neural network models have come to achieve state-of-the-art results in this field that is aptly named neural machine translation (NMT). Machine translation is the task of automatically converting source text in one language to text in another language. Let see how language translation work using; (a) Word-for-word translation. (b) Neural Machine translation (Neural networks)

**2.4.1 Word-for-word translation**

Word-for-Word translation involves matching every single word in the source language sentence and finding the corresponding word in the target language.

To do word-for-word translation, all we need is an accurate database with our targeted language and then match every word with it. For instance let say we are translating from English to French, for every English word, we simply look up the corresponding French word in the database. We repeat this process for every word in the sentence.

For example, we want to translate the sentence “**How old are you”** from English to French language. First we will first take every word in the English sentence for every word in the corresponding French word translation then split it out and repeat this for every word in the sentence.

Word-word translation

How old are you?

Comment vieux sont vous

English Sentence

French Sentence

|  |  |
| --- | --- |
| How | Comment |
| Old | Vieux |
| Are | Sont |
| You | Vous |

This approach of translating is simple and easy to implement, but generally does not construct proper sentences, as seen above. Generally, Languages are composed of two important components:

1. **Token**: which is the smallest unit of a language
2. **Grammar:** which defines how this token should appear to make sense (ordering of tokens).

Every word in a sentence is a token. If languages were only constructed with tokens and grammar did not matter, then the word-for-word translation approach would be good enough and the problem of language translation would be easily implemented. In the example “How old are you” have four (4) words token.

Grammar is basically a guide or a set of rules that define the ordering for these words.

1. Adjectives follow adverbs
2. Nouns follow adjectives
3. Conjunctions can link two (2) ideas

Unfortunately, grammar is the key in making sense of sentences. Grammar must be incorporated into a translator’s logic. In order to incorporate grammar, there are things needed to consider:

1. Syntax Analysis: These are basic structure, it is basically asking the question, “Does this structure of the sentence look correct”
2. Semantics analysis: Semantic analysis basically deals with meaning. And it asks the question does the sentence make sense in context. If we don’t follow this we will just be outputting gibberish.

Instead of explicitly defining our grammar; we can use another approach (Using Neural Network) and let the machine neural network do it for us. Neural network are components that learn to solve problem by learning from hundreds and thousands of examples (Woodford, 2020).

## 2.4.2 Neural Machine Translation (Neural Networks)

Neural Machine Translation (NMT) is an end-to-end learning approach for automated translation, with the potential to overcome many of the weaknesses of conventional phrase-based translation systems mentioned above. It is a machine translation approach that applies a large artificial neural network toward predicting the likelihood of a sequence of words, often in the form of whole sentences. Unlike word-for-word translation, neural machine translation, NMT, trains its parts end-to-end to maximize performance.

Neural network learns to solve problems by looking a vast amount of examples. Thus, they can be used to define grammar for a translator. They are trained with language patterns and eventually are able to translate a given English sentence into French all on their own.

Training sample input

Training sample output

**Neural Network**

Comment vieux sont vous

How old are you

***Fig. 2.2: Simple neural network translator***

With our example of English to French translation of the sentence “**How old are you**”, a neural network takes an English sentence or sequence of words as an input and gives a French sentence or sequence as an output. In order for this input to be interpreted by a neural network, it will first need to be converted into a format it understands, i.e. a vector or matrix.

Vectors and matrices are collection of numbers representing data. This conversion from sentence to vector is called the Vector Mapper, and it is the first part of the network.

English input

**Neural Network**

0.93

0.16

0.61

0.59

0.46

Vector

***Fig. 2.3: Simple Vector Mapper***

Since translator deals with sequences of words or sentences, Recurrent Neural Network (RNN) can better up the translator. RNNs are networks that learn to solve problems that involve sentences (Amidi & Amidi, 2020). When our English sentence is translated into vector, it needs to be translated into a French sentence. This vector mapping is done with a second neural network. Since we are dealing with sentences, another RNN can be used. Together, these two neural networks make the basic foundation of a language translator which is called the Encoder-Decoder Architecture.

English

Input

Recurrent Neural

Network

**Vector**

0.93

0.61

0.59

0.46

Recurrent Neural

Network

French

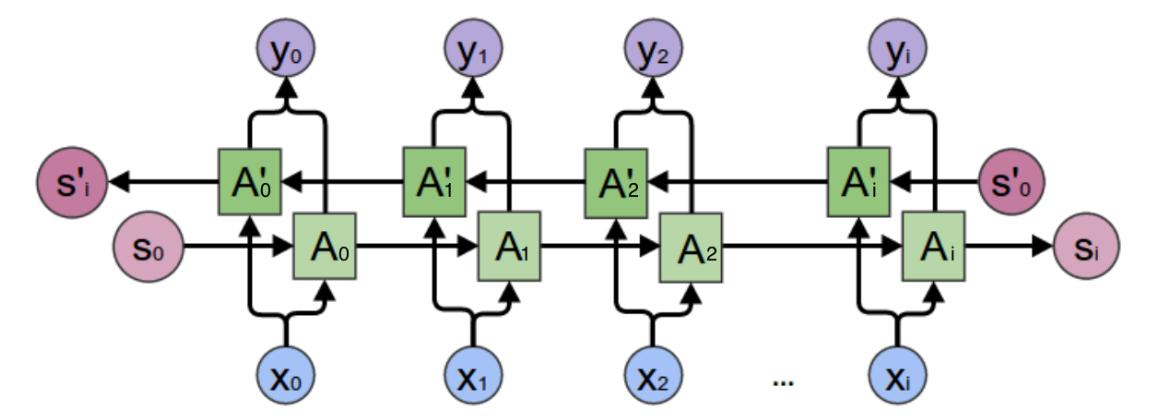
Output

***Fig. 2.4: Encoder-Decoder Architecture***

Recurrent Neural Network (RNNs) is designed to take sequences of text as inputs or return sequences of text as outputs, or both. They are called recurrent because the network’s hidden layers have a loop in which the output and cell state from each time step become inputs at the next time step. This recurrence serves as a form of memory. It allows contextual information to flow through the network so that relevant outputs from previous time steps can be applied to network operations at the current time step. These RNNs are called “Long Short-Term Memory Recurrent Neural Networks” (LSTM-RNN). LSTM networks are capable to deal with longer sentences fairly well.

The encoder-decoder architecture works well for medium-length sentences (around 15–20 words). Nevertheless, LSTM-RNN encoder-decoder structures do not fair as well with longer sentences. RNNs are not able to address the complexity of grammar in longer sentences. RNNs use persisted past information to make decisions about the present. This means that while translating the 8th English word to French, the RNN looks back to the previous 7 words that were translated to make a decision. However, in language, a word depends not only on the words that come before in a sentence but also the words after as well. In order to look in both directions, forwards and backward, a normal RNN is replaced with a bi-directional recurrent neural network.

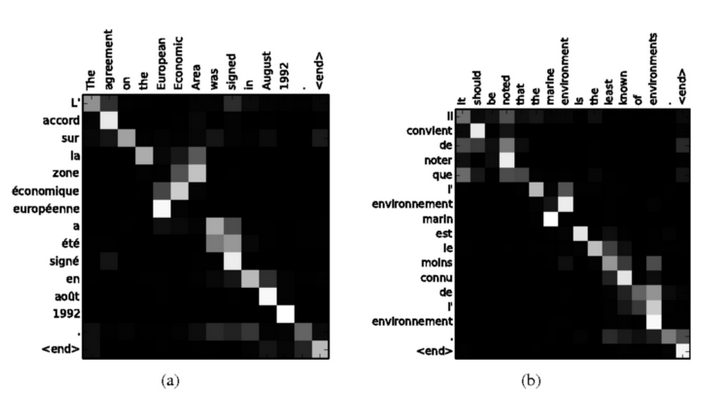
## 2.4.3 Bi-Directional Recurrent Neural Network

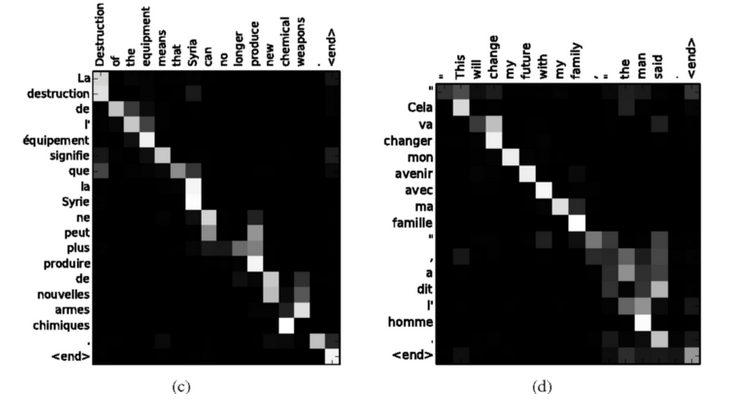


***Fig. 2.5: Bi-directional recurrent neural networks structure*** (Programmersought , 2016)

Bi-directional recurrent neural networks were introduced in 1993 but gained popularity recently with the emergence of deep learning. Since we are performing English to French translation, while joining some word in the French translation, we are looking at words that come before it and words that come after it. With a bi-directional network, we are able to do this. This solves a big problem but also brings up a new issue: is every word in a sentence pivotal to the structure of the previous and next word? Which words should we focus on more in a large sentence?

(Bahdanau, Cho, & Bengio, 2016) Introduced a method to figure this out by learning to jointly align and translate words. The alignment refers to the order of the words as well as an individual word’s weight in affecting previous and post words.





***Bahdanau et al., (2016)***

In the figure above the vertical axis are the French words and the horizontal axis are the English words. The squares shaded from black to white represent the weight of the alignment. White squares are the words that need to have more emphasis on and affect their surrounding word structure. This alignment is taught to an extra unit called an “Attention Mechanism” Bahdanau *et al., (2016).* It learns which English words to focus on while generating the words of the French translation. It sits between the encoder and decoder.

## 2.4.3.1 How Does Bi-Directional RNN model works

An English sentence is fed to an encoder. Then the encoder translates the sentence to a vector (numbers). After which the vector is sent to the Attention Mechanism (AM). The AM decides which French words will be generated by which English words. Then the decoder will then generate the French translation, one word at a time, focusing its attention on the words determined by the AM, producing the French sentence.

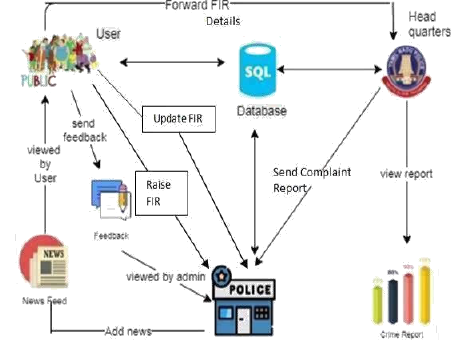
This model performs better than the original encoder/decoder architecture. Through using the bidirectional recurrent neural network, the incorporation of the various components of language is perfectly observed. We don’t just do word to word translation but also consider tokens and grammar (syntax and semantic analysis).

## 2.5 Related Literature

The review of literature is a critical crossroad in any research effort as it presents new windows of opportunities to re-assess the knowledge base for the purpose of expanding the frontiers of intellectual horizon. Knowledge cannot and does not exist in an intellectual vacuum, a rigorous blend of knowledge through the review of other scholarly works add a touch of value to the research activity by giving it a crucial underlay of thoroughness thereby providing an escape route from merely restarting knowledge. It provides the researcher an opportunity to add to the existing stock of knowledge with subsequent sustenance of the upward trend of the knowledge base and thus opens a wholly new vista for knowledge accumulation. (Jimoh, Ojulari, Enikuomehin, 2014)

**Jimoh *et al.,* (2014)** developed a Scalable Online Crime Reporting System. The research looked at the various definitions of criminal statistics. Finally, a prototype crime reporting system was designed that relies on four reporting forms: a complaint or dispatch reporting form, a crime event report form, follow-up investigation report form, and an arrest report form. The system consists of three functional modules: a data capture module, a report management and control module, and a data utilization module. The system maintains an event or case file and a police activity file. The conceptual crime reporting system design and data elements thus developed must now be tested and evaluated in an operational environment. He recommended that the Future work on crime reporting system can be tailored towards accessibility (mobile version), awareness and improvement on the usage.

**Archana & Durga, (2016)** developed an Online Crime Reporting System using C#, ASP and SQL Server. The main purpose of the system was to manage criminal details in a centralized database and provide solution for public to give complaint through online. The project provided lot of features to manage all the data in a well manner.



**Figure 2.2: Architecture of online crime reporting system**

(Source: Archana *et. al.,* 2016)

The system was implemented in such a way that the victim can file the FIR through the website under various sections. The user can also send photo evidence if any. In the system, user’s information was kept confidential and only users complain will be forwarded to the nearest police station. Users complain numbers were also forwarded from the server side automatically and for identifying location and authentic person, concept of cookies and IP addressing were also being used.

In this paper, a completely integrated and compact system was developed that can be used by the common man as well as the police. One of the weaknesses of the system was that the system did not implement the QR code scan for the privacy of the user while downloading the FIR details.

**Yugandhar & Muni (2018)** in a research entitled Crime Reporting System; the authors reported that crime has long been a central part of news coverage in free press societies, because crime stories are usually newsworthy. For this reason, they developed a crime reporting system. This software provides facility for reporting online crimes, complaints, missing persons, show criminal details. This software was developed with scalability in mind. In that regards, additional modules can be easily added when necessary. The software was developed with modular approach. All modules in the system were tested with valid data and invalid data and everything work successfully. Thus the system had fulfilled all the objectives identified and was able to replace the existing system. The project was being completed successfully with the maximum satisfaction of the organization. The constraints were met and overcome successfully. The researchers recommended integrating multilingual support so that the system could be understandable by any person using the language.

**Tomas, John, Ronalyn & Jeromme (2019**) proposed an online crime management and reporting system which helps citizens to report crime incidents from an online platform. The authors draw their motivation from the inconvenience of going to the police station and personal belief of the weak investigative capabilities of the authorities to resolve petty crimes and limited spreading of crime information to the community. The main aim of their work was to give report of crime including the location of the incidence and to secure and make the privacy of crime-related data over manually data storage. The system had functionalities such as the complaint registration, the area of the incident where it happens and the type of crime. The result of the system showed that the potential users where willing to participate and already recognized the usefulness of the system. The willingness of the police to use the system and their recognition of its usefulness was enough to try the system for community use according to the authors. Based on the result of the study, the researchers recommend the work for further study; they suggested email verification can be integrated. The researchers also recommend that the Crime Management and Reporting System be designed as an android application. In the work the authors make used the Modified Waterfall methodology in the development of the system.

**Selvakani, Vasumathi & Harikaran (2019)** proposed A Web Based Online Crime Reporting System using Asp.Net. In this paper, the manual arrangement of the police headquarters was extensively studied and was identified as tedious. After a gritty investigation of the present framework, Selvakani *et al.,* 2019 proposed another framework which dependent on the PC. The proposed framework was planned to evacuate every one of the downsides and impediments of existing framework and make progressively mindful to the client and the administration needs. The real targets of the proposed framework was to give the quicker methods for Crime Grievance Report. It will diminish the time devoured motel planning of reports and get the opportunity to profit by the most recent innovation of PCs.

The researcher’s framework incorporates following highlights:

1. Citizens not have to go police headquarters to see the criminal's information.
2. They can legitimately observe data on location.
3. Visitor can without much of a stretch get the data about the crime.
4. Reduce the labor and time.
5. Member can see the present status of the crime reporting.

A straightforward working methodology was incorporated so that the client can comprehend the distinctive capacities obviously and rapidly. At first as an initial step the executable type of the application was to be made and stacked in the regular server machine which is available to the whole client and the server is to be associated with a system. The device includes five practical modules: a police station registration module, victim FIR register module, investigating evidence register module, department module and report module. The machine keeps an occasion or case report and a police activity record. The conceptual crime reporting device layout and facts elements for that reason evolved ought to now be examined and evaluated in an operational environment. The system has a few loopholes which the researchers recommended for future scope, which are; This Framework being online and an endeavor of Digital Security Division should be altogether tried to discover any security holes and a comfort for the server farm might be made accessible to enable the work force to screen on the locales which were cleared for facilitating amid a specific period.

|  |  |  |
| --- | --- | --- |
| **Authors/Date** | **What they did** | **Limitations** |
| Jimoh *et. al.,*  (2014) | The researchers conducted a research work on a Scalable Online Crime Reporting System*.* The system consists of three functional modules: a data capture module, a report management and control module, and a data utilization module. | The system was not tailored towards accessibility (mobile version), awareness and improvement on the usage. |
| Archana M. And Durga S, (2016) | Online Crime Reporting System. The main purpose of the system was to manage criminal details in a centralized database and provide solution for public to give complaint through online. The users will be notified if the police have filed the FIR. The system was implemented using using C#, ASP and SQL Server | The system did not implement the QR code scan for the privacy of the user while downloading the FIR details. |
| Yugandhar & Muni (2018) | Crime Reporting System. The authors developed software that provides facility for reporting online crimes, complaints, missing persons, show criminal details. The software was developed with modular approach. | Multilingual support can be provided so that it can be understandable by the person of any  Language. |
| Tomas, John, Ronalyn & Jeromme (2019) | Development of an Online Crime Management and Reporting System. The main aim of their work was to give report of crime including the location of the incidence and to secure and make the privacy of crime-related data over manually data storage. The system had functionalities such as the complaint registration, the area of the incident where it happens and the type of crime. | The system didn’t give room for email verification. Also the system was not tailored towards accessibility (mobile version). |
| Selvakani, Vasumathi & Harikaran (2019) | A Web Based Online Crime Reporting System. The framework comprises of three useful modules: an information catch module, a report the board and control module, and an information usage module. | The system lacks Multilingual. |

**Table 1: SUMMARY REVIEW OF RELATED WORK**

## CHAPTER THREE

## SYSTEM ANALYSIS AND METHODOLOGY

## 3.0 Introduction

This chapter discusses the analysis and methodologies used in Online Crime Reporting Management System. It also presents the existing system architecture, problems of the existing system and proposed system architecture. Additionally, justification of the research methodologies.

This chapter takes overviews on the system analysis and various research methodologies and the entire research work.

## 3.0.1 System Analysis

System analysis is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. System Analysis also includes subdividing of complex process involving the entire system, identification of data store and manual processes (Soni, 2010).

Analysis specifies what the system should do. Systems analysis is the process of observing systems for troubleshooting or development purposes.

## 3.1 ANALYSIS OF THE EXISTING SYSTEM

The existing system that is being used as a bench mark for this research is a research undertook by Tomas *et al.,* (2019) presented in the paper Development of an Online Crime Management & Reporting System.

## 3.1.1 Existing System Architecture

The aim of the existing system was to help the residents/citizens to report crime incidents to the police station. The existing system consists of basically four components which are; the police module, General Public module, application unit module and the database

**Police module**: This module is where the police use to manipulate the system. First and foremost, the police needs to login with his username and the password. After logging into the application, police was provided with the features like reporting incidents. He can view user reported incidents. After the verification of the incident, the database was updated and the notification was being broadcasted to all the users who were using this system. Police were given privilege to do the criminal database manipulations via the application unit.

**General Public module:** This module was designed for the public for reporting cases. First and foremost, the users had to do one time registration before using the application. After registration, the user was provided with the facilities like report incidents, view the their reported crime status, feedback and some information such as telephone number and address of the nearby police station, hospital, fire station.

**Application unit module:** Application unit process the information entered by the users (Police and general public), store it to the database and also retrieved the information when query.

**Database module:** MySQL was used for storing data. The database helped to provide the facility of remote access. As mentioned in the police user application, the username and the password used by the police and the public was cross-verified with the ones stored in the database.

User Interface

* Register
* Login
* Report incident
* View status
* View feedback
* View other reported case

User Interface

General Public Module

Application Unit

Database

Police Module

* Login
* View reported incident
* Verify incident
* Provide feedback
* Manipulate database

**Figure 3.1: Conceptual Architecture of the existing system**

(Tomas *et al.*, 2019)

## 3.1.2 Problems of the Existing System

After scrutinizing the existing methods of crime reporting system, the following loopholes were identified;

1. The system was not tailored towards accessibility (mobile version), awareness and improvement on the usage.
2. Multilingual support was not included in the design of this system so that it cannot be understood perfectly by the person of any language.
3. The system didn’t add email verification.

## 3.2 RESEARCH METHODOLOGY

This is a procedure for resolving the problems of the current system by building a new system that addresses the flaws of the existing system. A system development methodology is the framework that is used to structure, plan and control the process of developing the online crime reporting management system.

The research methodology adopted for this research work is the secondary data source collection. The secondary data collection is the collection of an already made data, information obtained from sources like journals, textbook, magazines, internet. In order to achieve these research objectives, the below procedures will be followed;

1. Conducting a preliminary study on the existing systems.
2. Designing the system using UML diagrams.
3. Developing the system using agile software development model.
4. Implementing a prototype system using PHP, JavaScript, Java as programming languages, and MySQL for database, and Visual Studio Code IDE, Google Neural Machine translation API for language translation.

The system development methodology employed in this research work is the Agile Methodology approach. Agile methodology is a software development process framework that adopts the iterative approach, open collaboration, and process adaptability throughout the life-cycle of the project. This iterative agile approach is more flexible and its short time-span iterations seek improvement for the project in small release, with minimal planning, rather than plan at length. This helps to minimize the overall risk, and allows the project to adapt to changes more quickly.

Agile software development life circle (SDLC) model is a combination of iterative and incremental process models with focus on process adaptability and customer satisfaction by rapid delivery of working software product (Sami, 2012). Agile Methods break the product into small incremental builds. These builds are provided in iterations. Every iteration process involves cross functional teams working simultaneously on various stages of the Agile SDLC.

The steps involved in agile software development process are presented in Figure 3.2.

Planning

Requirement Analysis

Design

Coding

Testing

Iteration(s)

**Figure 3.2: Agile software methodology**

## 3.2.1 Principles of Agile software methodology

The Following are the Agile Manifesto principles;

1. **Individuals and interactions**: In Agile development, self-organization and motivation are important, as are interactions like co-location and pair programming.
2. **Working software**: Demo working software is considered the best means of communication with the customers to understand their requirements, instead of just depending on documentation.
3. **Customer collaboration**: As the requirements cannot be gathered completely in the beginning of the project due to various factors, continuous customer interaction is very important to get proper product requirements.
4. **Responding to change**: Agile Development is focused on quick responses to change and continuous development.

## 3.2.2 Advantages of Agile development software methodology

1. It is a very realistic approach to software development.
2. Promotes team-work and cross training.
3. Functionality can be developed rapidly and demonstrated.
4. Responding to change over following a plan.
5. Delivers early partial working solutions.
6. Good model for environments that change steadily.
7. Early release, better stakeholders' feedback.
8. Improves stakeholders' confidence and reduce uncertainties.

## 3.2.3 Justification of the Research Methodology

In other to permit a code-and-fix approach to program implementation, the agile software development methodology is employed. This method is very good for medium projects whose requirements may change at any time. This method allows the programmer to effectively manage change in requirement by either modifying an existing design or adding to (updating) an existing design with a reduced cost.

## 3.3 ANALYSIS OF THE PROPOSED SYSTEM

The Architecture of the proposed multilingual crime reporting system is shown in figure 3.3; it shows the various components of the system and how they interact with each other. Just as the existing system architecture, the propose system consist of various modules; the web browser, android application, language translator, application unit and the database.

Http

Request

Web Browser

**Crime Reporting System**

Application Unit

Database

Android Application

**Language Translator**

(Using bidirectional recurrent neural network)

Http Response

Retrieve

Information

Store Data

**Figure 3.3: Proposed System Architecture**

## Description of key components

1. *Web browser module:* The web browser act as an interface where users (security agency/general public) can use to interact with the system. Both the security agency and the general public can choose to use the web browser or the android application to interact with the system. Before the police can use the system manipulate the system, but first and foremost, the police needs to login with his username and the password. After logging into the system, he is provided with a dashboard with features like reporting incidents. He can view user reported incidents and verify it. After the verification of the incident, the database will be updated and the user who reported the crime incident and see the status of the reported incident. Police will be given privilege to do the criminal database manipulations. The general public on the other hand before he can report an incident, first and foremost, the users has to do one time registration before using the application. After registration, user will be provided with the facilities to report incidents, view the their reported crime status, feedback and some information such as telephone number and address of the nearby police station, hospital, fire station.
2. *Android Application:* Just like the web browser the android application has an interface which the users (security agency/general public) uses it to interact with the system. This interfaces is use to perform queries (sending and retrieving information) from the database server. This is an interface where the user use to key in complains to the system.
3. *Language translator:* Before the information is render to the user via the user interface, the language translator helps translate the information entered or retrieved by the user to any language of his choice. The language translator uses Bidirectional Recurrent Neural Network to translate this information.
4. *Application unit:* Application unit process the information entered by the users (Police and general public), store it to the database and also retrieved the information when query. Application unit helps manipulates the database.
5. *Database:* The database is where all the information entered by the user is being stored. Information retrieval is also from the database.

**Fig. 3.4: Flowchart of the proposed Multilingual Crime Reporting System**

Choose Language

Registered?

Login

Register

Login

Failed

Success

No

User

Security Agency

General Public

View Public Notice

View Report Status

Report Incident

View Reported Incident

Update Public Notice

View/Manipulate Record

Incident

Status

Public Notice

Crime Record

Yes

## 3.3.2 Justification of Proposed System

After carefully analyzing of the existing system, the proposed system will greatly fill in the loopholes of the existing crime reporting management system. The system will reduce the rate of unreported crime cases to the law enforcement thus reducing the level of crime in the society. Some of the importance of the proposed system is highlighted below:

1. The system will eliminate the problem of time wasting in the law enforcement office during crime reporting. This is being tackled through making this system web-based, which a user can stay in his or her house and make a report to the station.
2. The system will equally tackle the problem of intimidation during crime reporting as the user does not really need to physically visit the law enforcement office.
3. Making the system Multilanguage will aid users in reporting crime with their fluent language.
4. With the aid of the android app the user can report any crime incident anywhere and anytime.
5. The system will also make information saving and retrieving fast and easy.

Considering the lapses of the existing system, the result of the system can be seen efficient than that of the existing system.

**CHAPTER FOUR**

**SYSTEM DESIGN AND IMPLEMENTATION**

**4.0 Introduction**

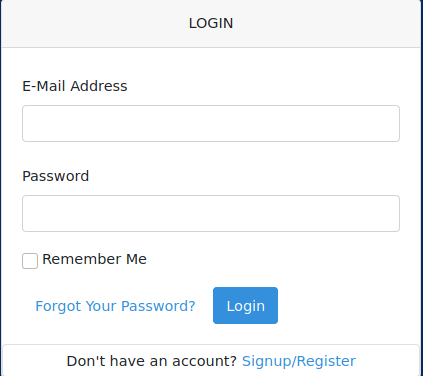
This chapter focuses on system design, system requirements, and justification of programming languages, system implementation, system testing, evaluation and discussion of results.

**4.1 System Design**

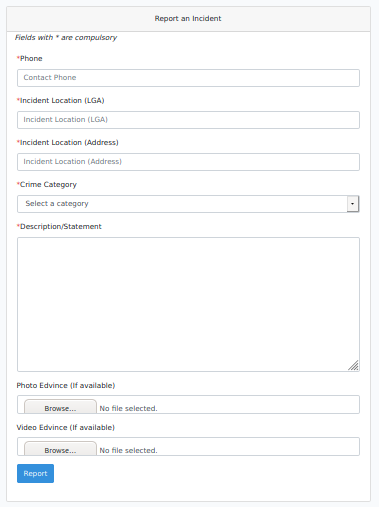
This is the process of defining the element of a system architecture, components, interfaces, module and data, to satisfy specific requirements. System design is also the application of system theory to product development and the system configuration that meets an identified or required set of requirements.

## 4.1.1 Input Design

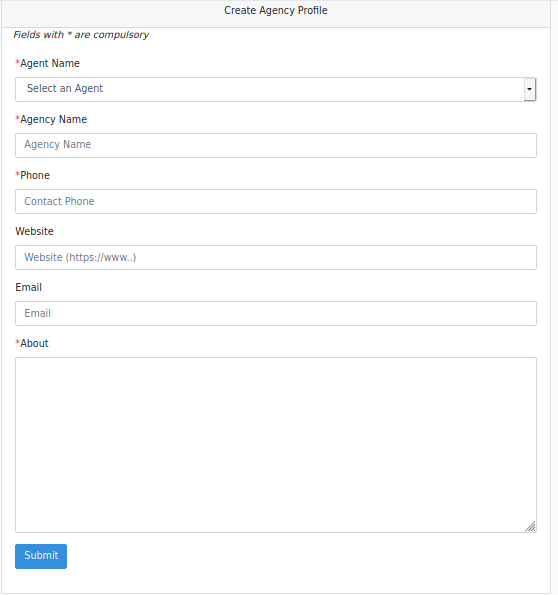
When designing a system, it is very essential to that data are inputted into the computer for processing. The multilingual Crime Incident Reporting system accepts input using web forms. The form is make up of various input fields and a submit button which trigger the action for the data on the form for processing. The various input screenshots is below:



**Fig. 4.1: Login Form**

****

**Fig. 4.2: Incident Report Form**



**Fig. 4.2: Create Agency Profile Form**

## 4.2 Database Design

A database is a structured collection of records. Databases make retrieval and manipulation of data fast and easy. In this system we will be making using of MySQL database. Below is the database schema for our online crime incident reporting system.

**Table 2: User table schema**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | FIELD | DATA TYPE | ACTION |
| 1 | Id | Bigint | Primary key |
| 2 | Name | Varchar(255) | - |
| 3 | Email | Varchar(255) | - |
| 4 | Password | Varchar(255) | - |
| 5 | Gender | Varchar(24) | - |
| 6 | Phone | Varchar(14) | - |
| 7 | Photo | Blor | - |
| 8 | Status | Bool | - |
| 9 | Role | Varchar(14) | - |

**Table 3: Crime Category table schema**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | FIELD | DATA TYPE | ACTION |
| 1 | Id | Bigint | Primary key |
| 2 | Category\_Name | Varchar(50) | - |

**Table 4: Incident table schema**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | FIELD | DATA TYPE | ACTION |
| 1 | Id | Bigint | Primary key |
| 2 | Reporter\_id | Bigint | Foreign key |
| 3 | Crime\_Category\_id | Bigint | Foreign key |
| 5 | LGA\_of\_incident | Varchar(100) | - |
| 6 | Address\_of\_incident | Varchar(100) | - |
| 7 | Incident\_description | Text | - |
| 8 | Evidence\_photo | Blor | - |
| 9 | Evidence\_video | Blor | - |
| 10 | Status | Varchar(50) | - |

**Table 5: Feedback table schema**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | FIELD | DATA TYPE | ACTION |
| 1 | Id | Bigint | Primary key |
| 2 | Incident\_id | Bigint | foreign key |
| 3 | User\_id | Bigint | Foreign key |
| 4 | Comment | Text | - |

**Table 6: Agency table schema**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | FIELD | DATA TYPE | ACTION |
| 1 | Id | Bigint | Primary key |
| 2 | Agent\_id | Bigint | foreign key |
| 3 | Agency\_name | Varchar(255) | - |
| 4 | Phone\_number | Varchar(15) | - |
| 5 | Website | Varchar(100) | - |
| 6 | Email | Varchar(100) | - |
| 7 | About | Text | - |

**Table 7: Public notice table schema**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | FIELD | DATA TYPE | ACTION |
| 1 | Id | Bigint | Primary key |
| 2 | Title | Varchar(225) | - |
| 3 | Announcement | Text | - |
| 4 | Status | Bool | - |

## 4.3 Design Architecture

Design architecture entails the various software component and their interfaces to establish the framework for the development of a whole system. This includes; system block diagram, use case diagram, activity diagram, etc.

## 4.3.1 System Block Diagram

System block diagram shows the major components of the system. Fig.4.x depict the block diagram of Multilingual crime incident reporting system.

**Crime Reporting System**

Choose Language

Security Agency

Login

General Public

Login

Registration

Logout

Check Public Notice

Login

Logout

Manage Public Notice

Check Status

## *Fig. 4.x Block diagram*

## 4.3.2 Use Case Diagram

A use Case diagrams graphically depicts the interactions between the system and external systems and users. The purpose of the use case diagram is to help visualize the functional requirements of a system, including the relationship between an actor and the essential processes. Fig.4.x shows the use case diagram for the proposed of Multilingual crime incident reporting system.

Choose Language

Register

Login

Report Incident

Check Incident Status

Manage Case

Manage Public Notice

Check Public Notice

Manage Crime Records

View Crime Records

Manage Users Account

Log out

**User**

**Security Agency**

**Super Admin**

**Other Agency**

## *Fig. 4.x Use Case Diagram*

## 4.3.3 Activity Diagram

Activity diagram are used to graphically depict the sequential flow of activities of either a business process or a use case. It shows the flow from one activity to another.

## *Fig. 4.x Activity diagram for Security Agency*

No

Yes

Successful

Login

Validation

Manage Case

Manage Crime Record

Manage Public Notice

Logout

## *Fig. 4.x Activity diagram for user*

Registered?

Yes

No

Yes

Successful?

No

Yes

No

Login

Validation

Check Public Notice

Check Status

Report Incident

Logout

Register

## 4.4 System Requirements

System requirements are the configuration that a system must have in order for a hardware or software application to run smoothly and efficiently. Failure to meet these requirements can result in installation problems or performance problems.

Below are the minimum requirements to use this system:

## 4.4.1 Hardware Requirements

1. A computer system with 32/64-bit operating system and a processor speed of 1.8GHz.
2. The random access memory (RAM) should be at least 1GB.
3. The system should have a hard disk of at least 120GB.
4. The System should be equipped with E.G.A/V.G.A, a colored monitor.
5. An uninterrupted power supply (UPS).
6. It should be internet enabled.
7. Android phone with version 4.2 and above

The listed configurations are the minimum requirements, but if the configurations are higher the reports derived will definitely be better and the program will run much faster.

## 4.4.2 Software Requirements

The software specifications require on the computer system are:

1. Browser
2. Android OS

## 4.5 Justification of programming language

The programming language chosen for the development of this system are; the front-end of the system will be implemented using HTML, CSS, and JavaScript. In addition, bootstrap library will be use to ensure best practices and responsiveness while styling the user interface of the system. The back-end of the project will be implemented using PHP. PHP, Hypertext Preprocessor (PHP) is a programming language that allows web developers to create dynamic content that interacts with databases. In addition Laravel framework will be so as to maintain MVC practices. MySQL will be use for database querying. Java programming language will be use for implementing the android Application.

## 4.6 System Implementation

This concept has to do with the project sample implementation input and output snapshots.

## 4.6.1 System Implementation input Snapshot

**Login form:** This is module that capture the user’s login details and check whether they are valid or not and redirect the user to it appropriate page based on their role (normal user, System Admin, security officer or other agency). This is shown n Fig.4.x, Appendix B

**Registration form:** This module captures the user data for registration and stores the Details into the database. This is shown in Fig.4.x, Appendix B.

**Other agency Registration form:** This module captures other agency data for registration and stores the Details into the database. This is shown in Fig.4.x, Appendix B.

**Incident report form:** This module captures the user data for reported incident and stores the Details into the database. This is shown in Fig.4.x, Appendix B.

**Agency feedback form:** This module captures the feedback/progress of investigation data for reported incident and stores the Details into the database. This is shown in Fig.4.x, Appendix B.

## 4.6.2 System Implementation output Snapshot

**Public Notice output:** lorem

**User feedback output:** lorem

## 4.7 System Testing

System testing can be stated as the process of validating and verifying that a software program or application or product, meets the business and technical requirements that guided its design and development. The system has been tested and the technical requirements have been met.

## 4.7.1 Method of System Integration

System integration is the process of replacing the old system with the new system. There are four different ways of replacing the old system with the new system. The reason for choosing one implementation type over another depends upon some variables. They, amongst others include; how swiftly the change-over 'should happen? How important is it to prevent data loss? What will the cost of the changeover be?

1. Direct changeover: In this system the old system is no longer available and everything must run on the new system. Problems with the new system can cause major problems for the business, only suitable for non-critical systems.
2. Phased implementation: Takes longer to complete the implementation but the risks to the business are less than for direct changeover. The new system can be split into separate working parts e.g. incident reporting, police database, etc. part of the old system is replaced with the new one until the replaced part is working properly. Continue the process until the entire old system has been replaced by the new system.
3. Parallel Running: Highly fault tolerant, new system and the old system are used with extra staffs recruited to run the new system but it is very expensive. Both systems continue to run until the new system us working properly then the old one is discarded.

The system integration method recommended and chosen for this research work is the parallel running so that the users can be acquainted with the new system.

**4.8 Discussion of Results**

Lorem ipsum

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter presents a brief summary of this research work. It discusses the review of achievements, Contribution / Areas of Application of the Work and as well as Recommendations Suggestions for Future Research

5.1 Review of Achievements

This research work was embarked on with the task of providing a better, easy and reliable way of reporting crime incident without time wastage or language barrel. This problem of language barrel is being tackled using bidirectional recurrent neural network instead of the word-for-word model for translating text to target language. Furthermore, the problem of time wastage is tackled via providing an online platform which user can use to report crime incident no matter where they may be.

So far, this system has been able to translate the content of the page to the user prefer language. The user uses the language option button provided to switch it language. On selecting the prefer language a post request is send to the Google Neural Machine Translation API which then return a callback translating the content to the users prefer language. The system has also been able to allow users report crime incident cases from where ever they are, getting feedback from the security agency, able to access history of their reported crime, see statistics and equally receive announcement/updates from the agency. Furthermore other agency can access crime records, and the security agency can equally generate records of reported crimes.

5.2 Conclusion

Security is every man’s business and so those every citizen has a responsibility of reporting crime incident/illegal activities to the law enforcement officers. Having an efficient channel of reporting these incidents to the law enforcement without any barrel is necessary. Government also have responsibility of making budget in the security sector and equally has responsibility of providing proper equipments to the law enforcement but they can’t do these if there is no data to know which angle to tackle. The proposed multilingual crime incident reporting system has immense potential to help tackle these various challenges and improve the security challenges in the country.

5.3 Contribution/Area of Application of the work

This research work contributes to knowledge as it eliminate issues of unreported crime incidents due to time wastage at the security agency office, cost of transportation to agency office, fear of intimidation and language barrier.

In addition to contribution to knowledge with regards to the approach taken in tackling the task of language translating, the proposed system uses bidirectional recurrent neural network to improve the efficiency of the translation.

These system can be used by the;

1. Security agencies (Police, Navy, Army, etc. )
2. Private Security Agency
3. Institutions (Colleges, Universities, polytechnics) and similar organizations.

5.4 Recommendation

Based on the scope of this research work this system is recommended for tertiary institutions (colleges, polytechnic, and universities, small private security agencies). It can also be recommended for law enforcement agencies (Police, Navy, and Army). It will help tackled problem of unreported crime incidents.

5.5 Suggestions for Future Work

In ICT field, improvement/advancement of existing Technology/Systems are inevitable, future research work should look into making the system more robust and allow user report incident in real-time. In addition, GPS can be integrated to the system to track incident actual location.

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## APPENDIX A: PROGRAM LISTING

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## APPENDIX B: SAMPLE SNAPSHOT