**DEVELOPMENT OF AN ONLINE CRIME REPORTING MANAGEMENT SYSTEM**

**A RESEARCH PROJECT**

**BY**

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## CHAPTER ONE

## INTRODUCTION

## 1.1 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 said 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.

## 1.2 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.

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 an online Crime Reporting Management 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.

## 1.3 Aim and Objective of Study

The aim of this research work is to develop an Online Crime Reporting Management System that will be easily accessible to people to report crime and any illegal actives 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 and MySQL as database.

## 1.4 Significance of Study

Developing an online crime reporting management 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.

## 1.5 Scope of Study

This research work will cover designing an online crime reporting system for Akwa Ibom State University, Security department that will provide a platform for students to report all manners of crimes or illegal activities within the school campus. The student will be able to freely report, and get feedback of the reported cases without fear or intimidation. The System will also have posts like announcements and even the wanted or expelled student.

## 1.6 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 discusses the general overview of Crime, Internet, Information System, and Crime Reporting Management System. Also discuss is, existing discourse, projects, journals and published articles related to online crime reporting system and various methods of implementation are reviewed comprehensively to evaluate results and theoretical conclusions reached.

## 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. Shodghangha (2011) 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. Tappan (2001) defined Crime as 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 *et. al.* 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 (2016) 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.

## 2.2 Internet and Web

## 2.2.1 History of the internet

The origin of the Internet can be trace back to 1957 when, in the shadow of the former Soviet Union's Sputnik program the United States established the Defense Advanced Research Projects Agency (DARPA) within the Department of Defense. Four years afterward, a Ph.D. student at MIT, Leonard Kleinrock, published the first paper on packet-switching theory. With packet switching a message that is sent from one computer to another is broken down into small packets of digital data. Each packet is given an address to travel to and is then routed to its destination. Packets can travel different routes to the point where they are reassembled into the complete message. In 1962 Paul Baran of the RAND Corporation published, "On Distributed Communication Networks" in which he formulated the concept of packet-switching networks having no single outage point. With these theoretical concepts in place, others could develop workable concepts. Two additional key elements, re-routing around outages and access by other networks, helped lay the necessary groundwork to create the theoretical basis for the inception of an Internet. The underlying motive for developing this technology was to streamline communication between military command centers, remote missile bases and other installations in the event of a preemptive nuclear attack. DARPA funds for developing packet switching in the late 1960s accounted for 60% of the computer research done in the United States at that time. Much of the concern during this period of the cold war was based upon a study done by the RAND Corporation that cited the lines of communication as the most vulnerable portion of U.S. military command. (Donnelly & Johnson, 2003)

## 2.2.2 Advantages of internet

The advantages of Internet are seen in the following areas

According to Kaushalya (2012), the advantages of the internet can be seen in the following areas;

1. Email: Electronic mail is one of the essential communication tools in everyday business. With e-mail someone can send and receive message instantly, unlike the traditional paper mail which has to move from one post office to the other. With email, messages are delivered instantly to people anywhere in the world, unlike traditional mail that takes a lot of time.
2. Information: Information availability is said to be the main advantage of the Internet. There are huge amount of information available on the Internet for every subject, ranging from government law and services, trade fairs and conferences, market information, new ideas and technical support, crime, etc. it can be said that there is no type of information that someone can’t find on the internet. These can be accomplished by using search engines like Google, yahoo, msn, etc.
3. Availability: Internet services are available, 24 hours a day and 7 days of the week for usage.
4. E-commerce: Apart from getting information on the Internet, one can also shop online. There are numerous online stores and shop sites that can be used to look for products as well as buy them using a credit card. With these, users do not have to leave their houses they can do all the shopping from the convenience of their homes.
5. Services: various services are provided on the internet like internet banking, job searching, purchasing tickets, hotel reservations, airline reservation, and guidance services on array of topics engulfing every aspect of life.
6. Entertainment: The internet also provides facility to access wide range of Audio/Video songs, games, etc. Many of which can be downloaded. One such popular website is YouTube.

## 2.2.3 Demerits of Internet

Kaushalya (2012) also highlighted the disadvantages of internet to include:

1. Theft of Personal Information: Electronic messages sent over the Internet can be easily snooped and tracked, thus revealing who is talking to whom and what they are talking about. When someone uses the Internet, the person’s personal information such as the name, address, credit card, bank details and other information can be accessed by unauthorized persons if the information is not secure.
2. Negative Effects on Family Communication: It is generally observed that due to more time spent on Internet, there is a decrease in communication and feeling of togetherness among the family members.
3. Internet Addiction: A lot of people especial students are addicted to social media; they spend hours chatting than reading. Though here is some controversy over whether it is possible to actually be addicted to the Internet or not. Some researchers have claim that it is simply people trying to escape their problems in an online world.
4. Virus Threat: In the world today, many hackers are using virus in carrying attacks on people computers and stealing user’s information. A virus is a program which disrupts the normal functioning of a computer system. Computers connected to Internet are more prone to virus attacks and they can end up crashing a system’s hard disk.
5. Spamming: Spamming is act of sending unsolicited messages. This multiple or vast emailing is often compared to mass junk mailings. It needlessly obstructs the entire system. Spam can be commercial advertising, often for dubious products, get-rich-quick schemes, or quasi-legal services.

## 2.3 History of the web

Distinct from the Internet, the World Wide Web refers to hypermedia using Hypertext Markup Language or HTML. This unique language allows information to be linked so when a person selects or clicks on one part of a link their browser automatically finds the designated information. Thus, the Web's unique characteristic is that it empowers the user to "click" on a word and be transported to a related web location. The development of this innovation is attributed to Tim Berners-Lee, a researcher at the CERN Institute of Geneva, Switzerland who is credited for the creation of the first links on the World Wide Web. In 1992 the University of Illinois introduced the first web browser, an online search tool that "surfs" all of the information on the Web, locates matches, and then ranks results. The web became more than just an interesting experiment in 1993 with the development of a graphical browser. Up until this point, even the World Wide Web was terminal-based, meaning that the user depended on the use of a keyboard. Marc Andreesen, who was working with a team at the National Center for Supercomputing Applications (NCSA) created the first graphical browser, one that was not terminal based, called Mosaic.

Andreesen and a few team members left NCSA in 1994 to commercialize the graphical browser and form the company Netscape Communications. Netscape's formation marks the onset of the commercialization of the World Wide Web. In 1995, the National Science Foundation gave up the exclusive control of the Internet backbone of routers and high-speed lines, allowing the development of commercial. Soon after, Microsoft also tried to capture a large portion of the Internet browsers market with Internet Explorer. By 1995, an estimated 50 million users were connected to the Internet worldwide. With the telecommunications act of 1996, the E-rate program came into existence with the goal of connecting millions of schools. Net-coalition was founded in 1999 to set standards for e-commerce, which was already blossoming. The business and media worlds were rocked in 2000 when Time- Warner and AOL announced their merger, making the marriage of the media industry and cyber space a reality. In 1994, during a strong period of innovation, the first cyber-age robbery occurred in Russia. The theft of millions of dollars from Citibank showed the world the ramifications of the misuse of this new technology. It did not take long for the world to realize that crimes could be perpetrated on the such as money- making scams and computer hacking.(Donnelly & Johnson, 2003)

## 2.3.1 How the web works

Before explaining how the web work, let understand some terms like clients and servers. Clients are the typical web user's internet-connected devices (for example, your computer connected to your Wi-Fi, or your phone connected to your mobile network) and web-accessing software available on those devices (usually a web browser like Firefox or Chrome). Servers on the other hand are computers that store webpages, sites, or apps. When a client device wants to access a webpage, a copy of the webpage is downloaded from the server onto the client machine to be displayed in the user's web browser.

**Client-side (Front-end**): In web development, frontend of a website is what you see and interact with on your browser. Also referred to as “client-side”, it includes everything the user experiences directly: from text and colors to buttons, images, and navigation menus. The three main languages used are:

**HTML:** HTML (Hypertext Markup Language) it is the fundamental coding language that creates and organizes web content so it can be displayed by a browser.

**CSS:** CSS is a language that accompanies HTML, and defines the style of a website’s content, such as layout, colors, fonts, etc.

**JavaScript:** JavaScript is a programming language used for more interactive elements like drop down menus, modal windows, and contact forms.

In addition to basic front-end languages, there are several frameworks like Bootstrap and Angular, React, Vuejs, as well as JavaScript libraries like jQuery, and CSS extensions like Sass and LESS. There’s a long list of resources like these, which support HTML, CSS, and JavaScript. Their purpose is simply to make code (and the process of writing it) more manageable and organized by providing various tools and templates compatible with common coding languages.

**Server-side (Back-end):** The backend (or “server-side”) is the portion of the website you don’t see. It’s responsible for storing and organizing data, and ensuring everything on the client-side actually works. The backend communicates with the front-end, sending and receiving information to be displayed as a web page. Examples of languages used on the backend are PHP, JavaScript, Python, Ruby, Java etc. In addition, there are also several frameworks like Laravel, Django, Rails, NodeJs, Express etc to simplify the process of development.

In-between the client making a request and the server processing and giving the appropriate response, several other things contribute to ensuring smooth communication. These are:

**Internet connection:** This allows you to send and receive data on the web. It's basically like the street between your house and the shop.

**TCP/IP:** Transmission Control Protocol and Internet Protocol are communication protocols that define how data should travel across the web. This is like the transport mechanisms that let you place an order, go to the shop, and buy your goods. In our example, this is like a car or a bike (or however else you might get around).

**DNS:** Domain Name Servers are like an address book for websites. When you type a web address in your browser, the browser looks at the DNS to find the website's real address before it can retrieve the website. The browser needs to find out which server the website lives on, so it can send HTTP messages to the right place (see below). This is like looking up the address of the shop so you can access it.

**HTTP(S):** Hypertext Transfer Protocol is an application protocol that defines a language for clients and servers to speak to each other. This is like the language you use to order your goods. HTTPS is a secure version of the same protocol where the data is encrypted and decrypted on sending and receiving.

**Component files:** A website is made up of many different files, which are like the different parts of the goods you buy from the shop. These files come in two main types:

**Code files:** Websites are built primarily from HTML, CSS, and JavaScript, though some other technologies may be involved.

**Assets:** This is a collective name for all the other stuff that makes up a website, such as images, music, video, Word documents, and PDFs. (Hurd, Mills, Pfeiffer, John, & Ross, 2019)

Brief overview of what happens: The browser goes to the DNS server, and finds the real address of the server that the website lives on. The browser sends an HTTP request message to the server, asking it to send a copy of the website to the client. This message, and all other data sent between the client and the server, is sent across your internet connection using TCP/IP. If the server approves the client's request, the server sends the client a "200 OK" message, which means "Of course you can look at that website! Here it is", and then starts sending the website's files to the browser as a series of small chunks called data packets. The browser assembles the small chunks into a complete website and displays it to you.

## 2.4 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 J. Paul, 2010).

According to (Patterson A, 2005) 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 K. and Laudon, J, 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 (Khanore S. et al 2011).

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 faud, 2010)



**Fig 2.0: Functions of an information system (Source: Sarmad faud, 2010)**

## 2.4.1 Components of Information Systems

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

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

* **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 equipments 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.

## 2.4.2 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 (Belle, J-P.V *et al,* 2001). 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 (O’Brien J.A. and Marakas G.M. 2007). According to (Patterson A, 2005), An EIS provides senior managers with a system to assist in taking strategic and tactical decisions. According to (Shim J.K 2001), an executive information system is designed to generate information that is abstract enough to present the whole company operation in a simplified version to satisfy senior management.

**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 A *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**

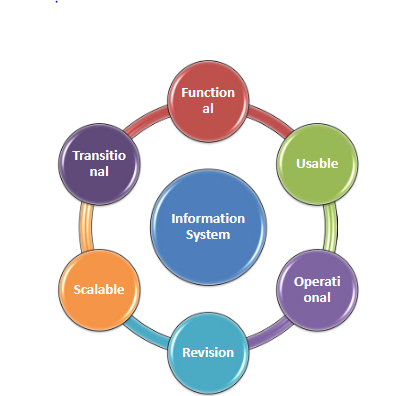
Management information systems are a kind of computer information systems that could collect and process information from different sources in institute decision- making in level of management (Heidarkhani, *et al,* 2013). Management information systems Provide information in the form of pre specified reports and displays to support business decision making (O’Brien J.A. & Marakas G.M. 2007). 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 (Belle, J-P.V *et al,* 2001). According to (Hasan,Y. *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, K. & Laudon, J, 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 (Belle, J-P.V *et al,* 2001).

## 2.4.3 Characteristics of a Good Information System

The elements of a good information system includes d following below (Kyle Duarte Antalya, 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

## 2.4.4 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.

## 2.5 Web-Based Information Systems

A (Web-based information system) not only disseminates information, but also proactively interacts with users and processes their business tasks to accomplish their business goals (Takahashi, K. and Liang, E, 1997). According to (Isakowitz, et al. 1998) "there is a clear difference between a set of Web pages and a WIS. The latter supports work, and is usually tightly integrated with other non-WISs such as databases and transaction processing systems." Going further, (Isakowitz, et al. 1998) identify several types of WISs: "Intranets, to support internal work, Web-presence sites that are marketing tools designed to reach consumers outside the firm, electronic commerce systems that support consumer interactions, such as online shopping, and a blend of internal and external systems to support business-to-business communication, commonly called Extranets. These WISs are supported by Web-based applications that can be grouped into two categories: informational applications (dissemination/presentation) and software applications. Even though there are similarities between traditional- and Web-based information systems, significant differences exist as well. Web-based information systems pose a variety of challenges to the developer who needs to deal with unknowns in terms of network set-ups and users, various types of data, and other issues such as content management, presentation and usability. Although Web-based information systems are platform independent in terms of information delivery, which is one of the reasons why they are so popular, web developers have to deal with very disparate networks and need to take them into consideration during the system development process. The users of a traditional information system are often employees working within a single organization or department. In contrast, analyzing the users' requirements for a WIS is far more challenging for the developers. Users "are more diverse, and are sometimes even unknown before the system development. Because of the global reach of WISs, users are not limited to an organization or a physical space but can be located anywhere around the world, creating a host of cultural, social, and legal issues for the developer (Yang H and tang H, 2003).The challenge resides in identifying users' requirements for the information system without having easy access to the users. Web-based information systems also deal with structured data such as data records, and non-structured data such as video or audio files. The choice between structured and non-structured data must be decided upon after a thorough analysis of the types of networks that will be encountered, which, in turn, is related to the types of users most likely to utilize the system. Another characteristic of Web-based information systems is the relationship between content, users, and presentation. Contrary to traditional information systems development, presentation and graphic design are significantly more important in the success of a WIS; Content alone is not sufficient. The way in which the information is presented plays an important role in the success of a Web-based information system. Therefore, "the development of a Web application is a multifaceted activity, involving not only technical questions, but also organizational, managerial, and even social and artistic issues (Fraternali p, 1999).

## 2.6 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 R. G *et al* 2014)

Over the years, several researches have been researching on Crime Reporting Systems, in the research work entitled **“Development of an Online Crime Management & Reporting System”, (Tomas U. Ganiron *et al*, 2019)** Proposed an online crime management and reporting system which helps citizens can report crime incident from an online platform. The authors draws 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.

**Web Based Online Crime Reporting System using Asp.Net (Selvakani S, Vasumathi K, and Harikaran M, 2019).** In this paper, the manual arrangement of the police headquarters is extensively studied and was identified as tedious. After a gritty investigation of the present framework, (Selvakani S.  *et al,* 2019) proposed another framework which dependent on the PC. The proposed framework is 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 are 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 proposed framework incorporates following highlights:

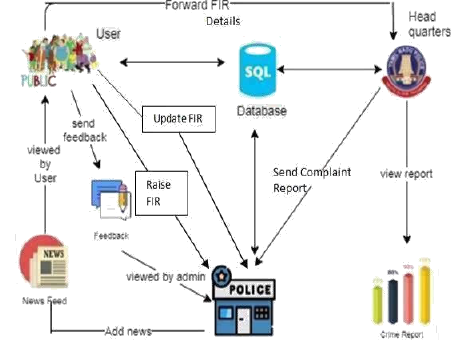
1. Citizens not have to go police headquarters to see the criminal's information.
2. They can legitimately observe data on location.
3. Visitor can without much of a stretch get the data about the crime.
4. Reduce the labor and time.
5. Member can see the present status of the crime reporting.

A straightforward working methodology is incorporated so the client can comprehend the distinctive capacities obviously and rapidly. At first as an initial step the executable type of the application is 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 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.

Crime reporting has long been a central part of news coverage in free press societies, because crime stories are usually newsworthy. For this reason, **(Yugandhar P. and Archana B Muni in 2018)** carried out a research entitled Crime Reporting System. The project titled as “Online Crime Reporting” is a web based application. This software provides facility for reporting online crimes, complaints, missing persons, show criminal details. This software is developed with scalability in mind. Additional modules can be easily added when necessary. The software is developed with modular approach. All modules in the system have been tested with valid data and invalid data and everything work successfully. Thus the system has fulfilled all the objectives identified and is able to replace the existing system. The project has been completed successfully with the maximum satisfaction of the organization. The constraints are met and overcome successfully. The system is designed as like it was decided in the design phase. The project gives good idea on developing a full-fledged application satisfying the user requirements. The system is very flexible and versatile. This software has a user-friendly screen that enables the user to use without any inconvenience. Validation checks induced have greatly reduced errors. Provisions have been made to upgrade the software. The application has been tested with live data and has provided a successful result. Hence the software has proved to work efficiently.

**(Jimoh R. G, *et al* 2014)** developed a Crime Reporting System. The research looked at the variousdefinitions of criminal statistics. Finally, a prototype crimereporting system was designed that relies on four reportingforms: 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 thusdeveloped 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.

Online Crime Reporting System is developed on C#, ASP and SQL Server and was designed by **(Archana M. And Durga S, 2016).**The main aim for this project is to provide all crime management solutions which are easily accessible by everyone. The system starts with every people who want to login a complaint through the internet so that it is very useful for police department and social worker to find out the problem in the society without making people to come to police station every time. The main purpose of the system is to manage criminal details in a centralized database and provide solution for public to give complaint through online. This project provides lot of features to manage all the data in well manner. The system has been developed to override the problems prevailing in the manual system. The project is supported to eliminate and reduce the hardships faced by the existing system.



**Figure 2.1: Architecture of online crime reporting system**

(Source: Archana M. And Durga S, 2016)

The victims can file the FIR through the website under various sections. The user can send photo evidence if any online. The police will have a criminal database through which they can access the records anytime. In this system, user’s information will be kept confidential and only users complain will be forwarded to the nearest police station. Users complain numbers are forwarded from the server side automatically and for identifying location and authentic person, concept of cookies and IP addressing has been used. While registering a case if at all the user has photo evidence he can send it too through the website for making a strong case .The users will be notified if the police have filed the FIR. This project is cop friendly too. The FIR in such cases will be registered quickly so that the doctors can start the treatment as early as possible.

In this paper, a completely integrated and compact system is developed that can be used by the common man as well as the police and this system would be like a win-win situation for both of them. This project will be widely used in the future by the police department, the common man, security agencies and even hospitals(for accident and assault victims).The greatest strength of this project is that it offers new features as well as retaining the original characteristics of the existing systems(for example: Criminal Database). The system did not implement the QR code scan for the privacy of the user while downloading the FIR details.

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| --- | --- | --- | --- |
| **Name of Authors** | **Title** | **What was done** | **Limitation** |
| Tomas U. Ganiron Jr *et al*, (2019)  June  Asia | *Development of an Online Crime Management & 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. The system was not designed as an android application version. |
| Selvakani S.  *et al*  (2019)  August | *Web Based Online Crime Reporting System using Asp.Net* | 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 was not custom-made towards availability (portable rendition), mindfulness and enhancement for the utilization. |
| Jimoh R. G.  *et al*  (2014) | *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. |
| Yugandhar P. and Muni B.Archana  (2018)  Archana M. And Durga S, (2016) | *Online Crime Reporting System*  *Online Crime Reporting System* | This software provides facility for reporting online crimes, complaints, missing persons, show criminal details. The software is developed with modular approach. Additional modules can be easily added when necessary.  The main purpose of the system is to manage criminal details in a centralized database and provide solution for public to give complaint through online. While registering a case if at all the user has photo evidence he can send it too through the website for making a strong case .The users will be notified if the police have filed the FIR. | More graphics can be added to make it more user-friendly and understandable.  Multilingual support can be provided so that it can be understandable by the person of any  language.  The system did not implement the QR code scan for the privacy of the user while downloading the FIR details. |

**Table 2.1: SUMMARY REVIEW OF RELATED WORK**

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