



## The Design of Real Time Crime Reporting System

<sup>1</sup>Esiefarienrhe Michael Bukohwo, <sup>2</sup>Atu Myom Michael

<sup>1,2</sup>Math/Statistic/Computer Science Department, University of Agriculture,  
Makurdi, Benue State, Nigeria

**Abstract:** Crime rate is on the increase and the ways in which criminals perpetrates their criminal activities has also gone sophisticated. It is quite unfortunate that there cannot be a society that is void of crime hence efforts must be geared towards crime prevention. This research seeks to present a real time crime reporting system in a bid to reduce criminal activities and possibly bring crime perpetrator to justice. The system tracks reporters IP addresses for Geo-location lookup as they report crime, enabling law enforcement agencies to locate the crime scene on time, and also provide a platform for employers to perform a pre/pro background checks on their employees to ascertain their criminal status. An Object Oriented Methodology was utilised to develop the software. PHP scripting language was used to develop the frontend while the backend uses MYSQL. The system was tested using the local map of Federal University of Agriculture Makurdi's South-Core Campus where real time crime alerts were generated. Criminal activities were able to be reported at various locations with the download of reporters Geolocations for easy tracking of crime scene.

**Keywords:** Criminal investigation, Geo-location lookup, law enforcement, Criminal records

### I. Introduction

The war against crime and criminality is a global war which is even getting more sophisticated with the use of various kinds of hi-tech weapons and devices. As the criminals are getting more technical, so the agencies responsible for the prevention and control of crimes are getting more sophisticated in both their approach and equipment. It is also true that the more populated and complex a society becomes, the wider the range of anti-social conducts and activities that must be monitored and controlled. Crime is part of human activities that must be managed as no human society has ever been totally free of criminals and it is unlikely that society will ever be [6]. Crime occurs because there are criminals and criminals are ordinary person with personality likes every normal human beings although there may be certain traits or super traits within a structured model of personality which may be linked to such *antisocial behavior* [10]. In ordinary language, the term crime denotes an unlawful act punishable by a state [5]. The term "crime" does not, in modern criminal law, have any simple and universally accepted definition [5], though statutory definitions have been provided for certain purposes. The most popular view is that crime is a category created by law; in other words, something is a crime if declared as such by the relevant and applicable law. One proposed definition is that a crime or **offence** (or **criminal offence**) is an act harmful not only to some individuals but also to a community, society or the state. Such acts are forbidden and punishable by law [3].

There is a general consensus that acts such as murder, rape and theft are to be prohibited exists worldwide, but what precisely is a criminal offence is defined by criminal law of each country. While many have a catalogue of crimes called the criminal code, in some common law countries, no such comprehensive statute exists.

Law enforcement agencies have, for years, explored new ideas to provide more effective policing services and devise ways in which the police could serve more areas of the community with the same number of officers. This has yielded positive results to a greater extent however crime rate is still on the increase due to poor reporting system, high-tech standard of criminal activities and inability of the police to cover large areas at the same time. This inadequacy of facilities and expertise to cover large geographical areas and its mitigation therefore provided the motivation for this research.

This research will explore the use of technology to assist the Police and other law enforcement agencies in their efforts to reduce crime. In a vast and highly populated country like Nigeria, when criminal records are documented against perpetrator and perhaps made available for public consumption, it will reduce the rate of criminality. This work incorporate IP Geo-location lookup which will overcome the problem of poor streets naming convention in Nigeria and aid crime investigative agencies locate the crime scene as soon as they are reported.

## II. Related Literature

The Uniform Crime Reporting (UCR) Program was based upon work by the International Association of Chiefs of Police (IACP) and the Social Science Research Council (SSRC) throughout the 1920s to create a uniform national set of crime statistics, reliable for analysis. In 1927, the IACP created the Committee on Uniform Crime Reporting to determine statistics for national comparisons. The committee determined seven crimes fundamental to comparing crime rates: murder and non-negligent manslaughter, forcible rape, burglary, aggravated assault, larceny and motor vehicle theft (the eighth, arson, was added under a congressional directive in 1979) [8].

According to [9] in their report at the Australian Institute of Criminology; the crime surveys conducted by the Australian Bureau of Statistics (ABS) in six jurisdictions found 606,800 victims of robbery, assault or sexual assault for the year from May 1994 to April 1995. The surveys found that only 227,000 of these victimizations became known to the police. Regarding break and enter, the surveys found 335,900 self-reported victims, with 244,300 reporting to the police. They concluded that the level of reporting is a measure of community participation in crime prevention and control; and of public confidence in the criminal justice system. They suggested that the reporting rate is an indicator of the level of public responsiveness, literacy of people in interacting with the police, inability of the people to see police as a friend and to a lesser degree of how well the criminal justice system meets public expectations. In the existing systems, criminal records are partially automated in developed countries but completely manual in most developing countries. Every states in the US has some form of crime reporting system which serves their local needs and are also linked to the court record system for criminal checks. Such reporting systems are most times linked to the National Incident-Based Reporting System (NIBRS), the FBI database and other intelligent agencies responsible for crime management. This is the standard in most developed economies. Faulty crime data has far greater implications than just numbers on a spreadsheet, [7]. For example, police departments use the statistics to develop crime-fighting strategies and make hiring decisions. One of the prevailing factors that affect crime reporting rate is the attitude (literacy) of the people towards the police – a good number of people, especially in developing countries, see police as enemies and to some extent; as been corrupt. This has gone a long way to affect the attitude of people towards crime reporting. We believe that, with an online reporting system where people interact indirectly with the police, citizens will be encouraged in reporting crime to a greater extent.

Reference [11] proposed a mobile communication infrastructure to help the police and the general public fight crime within a metropolis. The infrastructure serves as a common platform for both the police and the general public to interact and exchange information about criminal activities and to track crime perpetrators. For effective use, the system must ensure ready and up to date information of crime suspects and criminal activities in all localities within the metropolis; facilitating the tracking down of crime perpetrators.

In a similar line, [2] proposed Crime Automation and Reporting System that will take advantage of Software as a Service (SaaS) cloud tool for administering. This system provides interfaces for police as well as the public however; the public only have the privilege to report crime but not to carry out background checks on individuals.

According to [6], in their study, 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.

All these online reporting systems solved very vital problems however; they did not provide a platform for organizations to carry out background lookup of her employees (both pre/pro) and there are no Geo-Location lookup on reporters IP addresses for easy tracking of locations.

Although IP addresses are not static they can be reassigned, relocated within the same provider or being forwarded using mechanism like vpns or other tunnels hence there shall be a database consisting of geolocation information about IPs which has to be updated and maintained on a regular base. Due to the large and increasing number of used IP addresses, this is a task which is nearly impossible to be maintained manually. However with Topology Based Geolocation (TBG), we can have as much information as possible about the topology of the network (we are concern with the possible physical location of an IP address); hence improving the geolocation process [1].

## III. Methods

This research uses the Object Oriented methodology in its design. This method uses self- contained modules or objects that can be easily replaced, modified, and reused.

The following tools were used to create the system design namely:

- i. PHP scripting language and Application Server
- ii. HTML5, Cascading Style Sheet (CSS) and JavaScript (JS) for interface design and client side programming.
- iii. MYSQL 5.0 as the backend (i.e. Database)

### A. Input Source and Specification

The following are the sources of input for this system:

- Self-Registration: members of the general public whom are willing will register themselves on the platform.
- Reporters IP address: during reporting the reporters IP address will be captured for Geo-location lookup
- The General Public (Citizens): citizens who are registered can report any crime or criminal activity.
- During reporting users are expected select the approximate location from where they are. These locations are ordered by the region specified by user's IP address. This is very important because even when IP geo-location lookup fails to realized the appropriate region, the location selected by the reporter will still provide enough information on crime scene location.

### B. Output Source

The system produced the following as output

- Crime Alert: once a crime is been reported the crime investigation department will receive an alert which prompts for the next line of action.
- The incorporated map showing the location of the reporter
- Crime Records in report format
- Crime Scene images archives.
- Background checks, any organization can perform a pre or pro background investigation on her employees.

### C. System Algorithm

Step 1: Register/signup on the system

Step 2: Report a crime or criminal activity

Step3: Department of criminal investigation get the alert from step 2

Step4: The system downloads reporter's location using IP Geolocation technique

**Figure 1: The System Use case design**

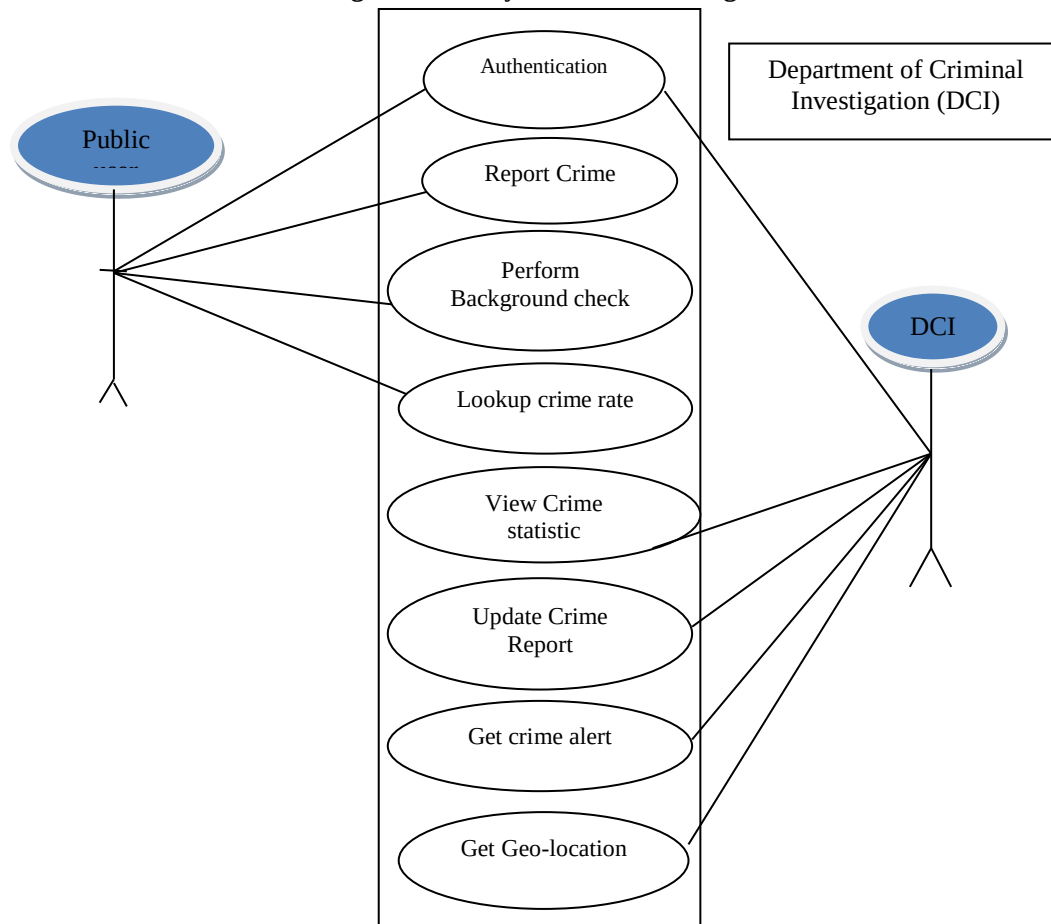


Figure 2: The System Class diagram

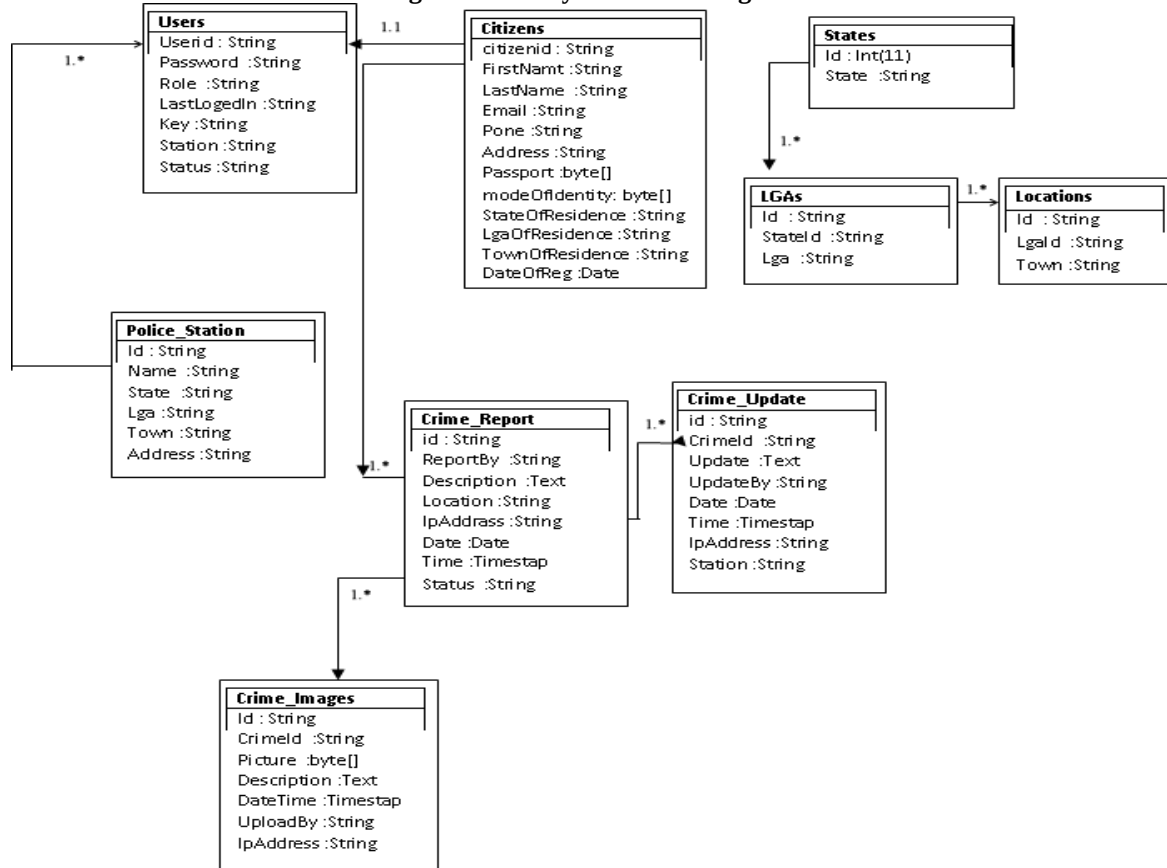
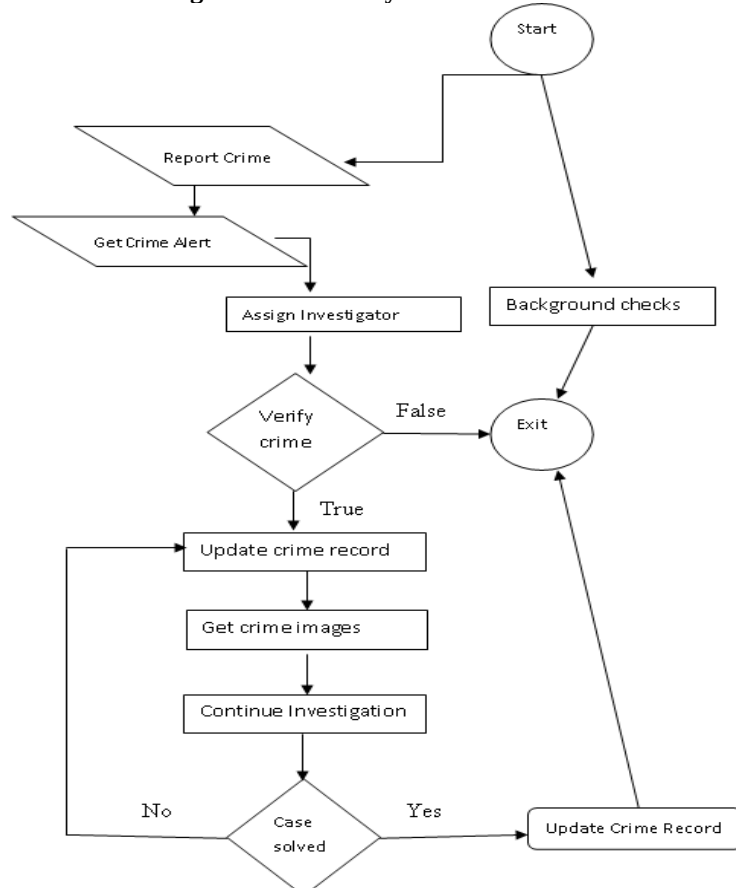


Figure 3: Overall System Flow Chart



#### IV. Results and Discussion

The process of crime or incidence reporting to the police has been made easy by this application. The user logon to the system and enters the crime location, describe the type of crime that is taking place and upload pictures captured at the crime scene. Such a reporter would have previously registered with the system as that his or her profile can be verified.

**Figure 4: Crime Reporting Form**

The screenshot shows a web application titled "Crime Reporting and Investigation". The main content area is a form titled "Report a crime". It contains three fields: "Location (Required Field)" with a dropdown menu showing "Block 8 South", "Describe Crime (Required Field)" with a text input area, and "Crime Scene Photograph (optional)" with a "Browse..." button and the text "No file selected.". A "Report" button is at the bottom right of the form. On the right side, there is a "Side Links" section with a "Report History" link. The footer shows "© 2015 - UAM".

From figure 4, a user is reporting a crime and usually during crime reporting a user is expected to select the crime location from a pool of locations stored in the database, describe the crime and possibly upload any crime related photographs.

**Figure 5: Downloading Reports with Geolocation**

The screenshot shows a web application titled "Crime Reporting and Investigation". The main content area is divided into two sections. The left section is titled "Downloading Report" and displays a report for a fire incidence in Block-8, reported by Abu Michael on 2015-12-24 at 12:28 PM. It includes a "First result" section with details like status, IP address, country, region, city, zip code, latitude, longitude, and time zone. The right section is titled "Geolocation" and shows a map of Lagos, Nigeria, with a red pin indicating the location of Block 8, South-4th. The footer shows "© 2015 - UAM".

As soon as a crime is reported the Crime Investigation Department receives the report and immediately proceeds to download it. As shown in figure 5, the report comes along with the crime scene geolocation. This feature enables the security agency to easily locate the crime scene. However, taking a closer look at the geolocation information, you will notice that the city is showing Lagos, this is because IPgeolocation works with public IP's. Since most ISP's are mobile networks (at least in Nigeria), the public IP's are hosted in Lagos. This has made it a bit challenging to realize reporter's location approximation which is the reason why we incorporate location during crime reporting as shown in Fig 4. These locations are closely associated with the local maps of the system implementation environment

**Figure 6: Performing Background check Form**

The screenshot shows a web application titled "Crime Reporting and Investigation". The main content area is a form titled "Background search". It contains a text input field for "Enter Candidates Name(s)" and a "Search" button. Below the input field, there is a text area displaying the result: "Blessing Igha was involve in the fire break out at block 8". On the right side, there is a "Side Links" section with a "Report History" link. The footer shows "© 2015 - UAM".

As shown in Fig 6, this form enables any organization or any institution to carry out a background search on individuals, employees or business associates. This is to enable the organization verify the criminal status of her associates or employee prior to engagement or employment.

## V. Conclusion

Considering the high rate of criminal activities globally, it is obvious that the government alone may not be able to effectively curtail criminal activities, as we already know that the government through her Law enforcement agencies have been investing a lot of efforts towards security but the results archived so far are not commensurate with the efforts and resources expended.

We strongly believe that if criminal records of perpetrators are brought to the public domain, it will avail everyone including corporate organisations, schools and other institutions of government the information required to become even law enforcement agent themselves and help combat crime at all levels. Most importantly, it will avail the families of such criminals information about their activities which we believe will help curtail criminality.

In this paper, we presented the design and test implementation results of a Real Time Crime Reporting System which enables individuals report crime unanimously to the Crime Investigation Department. The system also incorporated devices for tracking geo-location information for easy crime scene location. With this system, we strongly believe criminality will be reduced and our societies will be almost crime free.

## References

- [1] M. Amir, "IP Geolocation. Seminar on Internet Measurement", Technische Universität Berlin. Unpublished, 2007. Available at: [http://fholzhauser.de/wp-content/uploads/2006/10/ip\\_geolocation\\_handout.pdf](http://fholzhauser.de/wp-content/uploads/2006/10/ip_geolocation_handout.pdf), retrieved 2015-09-20
- [2] J. Anil, G. Neeta, L. Pooja, S. Shikha, S. Ramesh, "Crime Automation & Reporting System", International Journal of Science and Modern Engineering (IJSME).vol.1, 2013, pp 5-6
- [3] A. Elizabeth, *Oxford Dictionary of Law* (7<sup>th</sup> Ed.). Oxford: Oxford University press, 2003, ISBN 0198607563.
- [4] K. Ethan, P. John, A. John, W. David, A. Thomas, C. Yatin, "Towards ip geolocation using delay and topology measurements", In IMC '06: Proceedings of the 6th ACM SIG- COMM on Internet measurement, 2006, pp 71-84, New York, NY, USA. ACM Press.
- [5] Farmer, Lindsay, "Crime, definitions of", in Cane and Conaghan (editors), *The New Oxford Companion to Law*, Oxford University Press, 2008, (ISBN 978-0-19-929054-3), p 263
- [6] R. Jimoh, T. Ojuluri, A. Enikuomehin, "A Scalable Online Crime Reporting System", African Journal of Computing & ICT vol 7, 2014, pp.11-20
- [7] E. John, E. Silverman, "The Crime Numbers Game: Management by Manipulation", Published by CRC Press, 2012, ISBN: 9781439810316.
- [8] R. Lawrence, The Creation of the Uniform Crime Report, Social Science History. Federal Bureau of Investigation, U.S. Department of Justice. Washington, D.C, 1995. Available at <http://www.jsonline.com/watchdog/watchdogreports/>. Retrieved on 2008-03-30.
- [9] K. McGregor, L. Renshaw, H. Andreovski, "ACT victims of crime referral project: Final Report", Australian Institute of Criminology, 2013, ISBN 978 1 922009 34 0. pp. 1-78. Available at: <http://www.aic.gov.au> retrieved 2015-09-12
- [10] J. A. Reid, "Crime and Personality: Personality Theory and Criminality Examined", *Student Pulse*, vol. 3, 2011, Retrieved from <http://www.studentpulse.com/a?id=377>
- [11] A. William, A. Milliscent, "Mobile Solution for Metropolitan Crime Detection and Reporting", Journal of Emerging Trends in Computing and Information Sciences, Vol. 4, 2013, pp 916-921