

A REVIEW ON THE USE OF INNOVATIVE TECHNOLOGIES IN MONITORING CRIMINAL ACTIVITIES IN NIGERIA

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Abstract

Crime is a product of insecurity. The incessancy of insecurity in Nigeria can be attributed to inability of Nigerian government to tap potentials in technologies (hardware and software) to fight insecurity which has led to different categories of crimes in our societies. This study examines the various innovative technologies that can be used in monitoring criminal activities in Nigeria. This is a review paper, as such; there is no specific study area. The study adopted descriptive method to explain some issues relating to crimes and various software and hardware tools that can be used in monitoring them and subsequently fight the crimes. Secondary data sourced from published and unpublished works as well as the internet were used. Thus, the paper x-rays, hardware technologies, such as, closed circuit television or surveillance cameras, spy balloon, drones and spy satellite and how these gadgets work for developed nations. Software such as, crime mapping, Geographical Information System (GIS), Global Positioning System (GPS) and their applications in fighting crimes were also highlighted. The paper recommends that there is need for government to embrace the use of hardware and software techs in fighting the insecurity which has been a major problem in the country.

Keywords: Crime, Closed Circuit Cameras, Drone, GPS/GIS, Insecurity and Spy Satellite.

Introduction

The level of insecurity in Nigeria today is increasing daily to the extent that citizens cannot sleep with their two eyes closed. Many reports have indicated that one crime or the other is dwelling in all the six geo-political zones in the nation. Commenting on these criminal activities in the country, Kawai and Samson (2011) expressed that religious crisis is common in some parts of Northern Nigeria, kidnappings and armed bandits in the North-West, North-Central (Ojewale, 2021), South-South and South-East, while in the North-East, there is continuous Boko Haram insurgency, making Nigeria to be one of nations with highest crime rates, (Ayoola, Adeyemi & Jabaru, 2015). However, in the South-West zone, sectarian clashes, cultism and armed robbery are common crimes. The issue of crime is a

global phenomenon that differs in certain degrees from one nation to another. In essence, no nation is totally free from crime. What is considered as a crime, for example, prostitution, homosexuality and adultery between two consenting adults in Muslim dominated countries of the world (for instance, Saudi Arabia) today has been expunged from crime records in the United States of America (USA) (Ayoola, Adeyemi & Jabaru, 2015).

Crime is a product of insecurity because when there is absence of security, different crimes emerge and increase daily. Looking at crime from another angle, Oni (2016) explained that the basis of crime and criminality can be expressed as motivation plus opportunity, expressing this mathematically, Crime = Motivation + Opportunity. This implies that before any

crime is committed, a motivation (reason for committing such crime) is set in, then, followed by any available opportunity to perform the act. Therefore, for a crime to occur, according to Ejemeyovwi (2015), there must be a victim, offender, properties located at a point over a given period of time and opportunity to perpetrate the act. Okon, Agorye and Aov (2021) observe that the rate at which crime increases in the world is alarming and raises questions as to what the situation would be in the nearest future if urgent preventive and controlled measures are not drastically and effectively taken.

However, with the advancement in technologies, the activities of criminals can be curtailed using various innovative technologies (hardware and software). In fact, potentiality in using these technologies in fighting crimes is huge if they are well-harnessed. Many developed countries are making use of these technologies in combating insecurity.

Types of Crime

In the world today, there are several types of crime and many criteria make a crime different from one society to another, but in general, as expressed by Sowmyya (2014), crimes are classified into eight categories, namely:

- (i) Personal crimes
- (ii) Property crimes,
- (iii) Victimless crimes
- (iv) White-collar crimes
- (v) Organized crimes,
- (vi) Juvenile delinquency
- (vii) Computer crime and
- (viii) Violation of public safety.

Causes of Crime

Several authors have attributed crime in many parts of Nigeria to many reasons or causes. For instance, Adegoke (2014), Ukoji and Okolie (2016), Jonathan, Olusola, Bernadin and Inoussa (2021) and Ojewale (2021) summarized the following factors as causes of criminal activities:

- (i) Porous borders
- (ii) Bad governance
- (iii) Corruption

- (iv) Level of Poverty
- (v) Unemployment rate
- (vi) Illegal mining activities
- (vii) Illiteracy level / Lack of Education
- (viii) Injustice and Oppression
- (ix) Marginalization
- (x) Use of Illicit Drugs and Low Self-Esteem

Related Works

To ease discussion in this paper, innovation techniques are broken down into two; software and hardware (Byrne & Marx, 2011). Software are the developed computer programs that are implemented on hardware to make them work effectively and efficiently, whereas hardware are those gadgets that can be used in monitoring as well as preventing crime before it happens.

Software Innovative Techniques Crime Mapping, Information Systems and GIS/GPS

Many researchers have conducted studies on how to use crime mapping and other software applications in pinning down the criminal events in different locations. For instance, Ramos, Israel, Bautista, Gumogda, Recto and Sular (2017) developed a crime mapping software which can serve as bulletin board to share information relating to crimes between law enforcement agencies and people in the community so as to strategize more on nailing down the criminals in the society.

Also, Okon, Agorye and Aov (2021) studied the significance of crime mapping in Makurdi metropolis using GIS applications to enhance identification, mapping and presentation of crime patterns and trends. Similarly, Ahmadi (2003) conducted study on crime mapping and spatial analysis where it was pointed out that the application of GIS is used in mapping, controlling and preventing crimes.

An information system was developed and implemented by Dabhere, Kulkarni, Kumbharkar, Chhajed and Tirth (2015) known as "Crime Area Detection and Criminal Data Record" using Information and Communication Technology for crime

reporting with the aid of Internet Cloud. The developed software is an android based and the application is provided for police during their investigation and in the same way, mobile application is also produced for user (crime incident reporter) so as to speed up process of capturing the reported criminals in the specified location.

In the same vein, Sharma and Shahnawaz (2014) implemented a Crime Records Management System (CRMS). That application was tailored to cut across all police stations in India. With the developed system, implementation method was adopted phase by phase which was in the first instance tested in cities and towns and later interlinked to all detective police where they gain access to software to detail crimes across the country thereby helping speedy and successful apprehension of criminals. The software was very robust with distributed architecture and centralized storage of the database. It has six modules; station, citizen, crime, search, administrators and avocation. The criminal database was handled using constructs of SQL server at backend and all the user interfaces were developed using Microsoft ASP.NET.

Furthermore, Ugwuishiwu, Ugwu and Inyiamah (2013) experimented an online real time crime information system for NDLEA in Nigeria. The system architecture provides some key functionalities that communicate between the segments in the program. This system is made up of an informant, NDLEA Head Office, branch offices across the nation, Database Management System (DBMS) and a web based app. The system is used to report any drug related crime when it is detected by an informant. The informant sends message using a mobile phone or personal computer through a web application to NDLEA office through NDLEA website. The message is delivered at NDLEA state office (local level) by showing alert on the screen which signifies officer in charge that a crime has occurred at a particular location indicated by the sender. Then, NDLEA officer will mobilize officers to commence crime investigation process. In an event the case

cannot be adequately handled by state branch, it will be immediately referred to headquarters for necessary action. The crime information contains the location of the crime, time it occurred, date of the incident, name of suspect if available and the type of crime committed. A copy of the information is stored in the NDLEA local database server. Delivery report is also sent back to the informant acknowledging that the message has been successfully delivered. The NDLEA Database contains all the NDLEA crime information which can be used when the need arises.

In another development, software was designed by Shah, Fayaz, Shah, and Shah (2016) for police station in Pakistan to effectively manage and maintain record of crimes in the police custody. The application software was designed to work in a way that data storage and retrieval were made easy when compared with existing system, that is, manually system of data handling. The software was tested using flow of automated testing activities technique. The five stages of automated testing activities used were prioritizing test cases, dividing test cases into different categories, selection of testing tool and environment, coding & simulation and perform validation & verification. The result of the tested software indicated that it is efficient, reliable, portable and can be easily maintained by the police officers.

Again, Okonkwo and Enem (2011) carried out a research on crime and terrorism fighting using data mining techniques. This technique was seen as a tool that can be used in tracking the activities of criminals. Available different algorithms and techniques of data mining to analyze and scrutinize data were highlighted in the work which include the following; classifications, link analysis, clustering, etc. The authors positioned in the paper that if data mining techniques are imbibed by government with expert ideas, the activities of criminals and terrorists can be curtailed.

In the same vein, Kawai and Samson (2011) developed a criminal record information system to aid Nigerian police in their bid to have criminal records with their

updated information as well as the mode of their operations in attempt to reduce criminal activities in a given locality. Structured system analysis and design methodology (SSADM) was employed with intention to capture all necessary detail from the police, develop and implement the system. The software was implemented in Vb.net programming environment to design user interface at frontend and Microsoft Structured Query Language (SQL) server was used at the backend. All the segments in the implemented software produced desire results.

A research conducted by Adebayo, Onifade, Akinmosin, Yusuf and Dada (2011) on combating terrorism with the use of biometric authentication specifically face recognition. In the study, images of some known terrorists were trained by employing Principal Component Analysis (PCA) algorithm and feature-based technique. Some key features, such as, red, green and blue colours of the eyes, the breadth and height of the eyes together with ratios between them were extracted. The weights for each captured images were estimated and stored in the database bearing the name of person that owned the features. These feature weights were added to the weights evaluated from PCA and were used as the final weight to perform recognition. The system was used to authenticate any immigrant face by comparing with the faces of the known terrorists in the database. The system was used to authenticate terrorists that if a match is found with the faces in the database, then the person is a terrorist and would be arrested and prosecuted by security personnel.

Hardware Innovative Techniques

Hardware are physical gadgets which can be used in monitoring crimes. These devices are known to be very effective in crime monitoring and prevention if they are well managed. Many scholars have reported the use of different technologies like CCTVs, (Alles, 2014), mobile phones, Simson (2011) and computers (desktops and laptops) to connect to the internet for purpose of crime monitoring. Other technologies are metal

detectors/scanner, GPS tracker, biometric scanner, bomb detectors, spy satellite, spy balloons, drones, to mention but a few (Byrne & Marx, 2011).

It is evident that many researches have been conducted on the effectiveness of these tools in monitoring and preventing crimes all over the world. For instances, a computer-based security framework for crime prevention in Nigeria was carried out by Ogunleye, Adewale, Alese and Ogunde (2011) to address community perception on the effectiveness and acceptability of Closed Circuit Television (CCTV) tool in public places. The CCTV records would-be image of criminal without his/her prior knowledge. The stored images can later be analyzed by crime forensic experts to visualize the criminal's trespass into a building, hall or office. It was reported that respondents gave good indicators in supporting the implementation of the tool. This work strictly looked at CCTV camera as a measure for crime prevention in Nigeria. It was also reported that Governor Fashola during his regime had implemented the use of surveillance cameras in strategic locations in Lagos state to monitor criminals in their hideout. A similitude of a street CCTV camera is shown in figure 1 below.

Also, Ackerman (2011) reported that United States military employed about \$1 billion worth of balloon-mounted cameras and other intelligence, surveillance and reconnaissance gear to monitor Taliban's anticipated re-spring up in Afghanistan. Furthermore, Dorn (2016) expressed that inexpensive products such as high-zoom digital cameras, web cameras (web cams) and camcorders have become common household items. Closed-circuit television (CCTV) and digital video networks are making shops, houses and streets safer in cities around the world.



Figure 1: An illustration of Installed Street CCTV Camera

Spy satellites are used to monitor things happening on the ground. Satellite images are used to observe information that is usually invisible, like the growth levels of a country's crops or the heat given off by certain buildings and hideout of criminals on the earth. Also, Times of Israel (2014) reported that in Jarusalem, police forces have been flying surveillance balloons over the city's eastern sector and Old City - the location of its most sensitive holy sites - to monitor protests and move in on them quickly. The Israeli company that makes the Skystar 180 aerostat system says the balloons can stay long in the sky for three days (72 hours) and can effectively carry highly sensitive cameras. A typical example of spy balloon mounted in space is illustrated in figure 2.

Another technological device which can be used in monitoring criminals' illegal acts in the country is drones. Drones are the monitoring devices that if well-used can monitor criminal activities in our society. It provides users with a bird's eye which can be activated and used almost anywhere and at any time (Yaacoub, Noura, Salman & Chehab, 2020). Many countries in the world are employing drones for monitoring purposes, for example, countries like United States of America, Israel, Russia, to mention but a few have adopted this technology. Hence, Nigerian government can liaise with these 'super power' nations with our local engineers on its development and deployments for criminal monitoring purposes. Figure 3 depicts the structure of a drone.



Figure 2: An illustration of Spy Balloon mounted in space. Source: Times of Israel (2014)



Figure 3: Structure of a Drone Device
Source: <https://www.google.com/search>

Police and other forces with the vehicle checking mandates can employ the use of metal and bomb detector along Nigerian highways. This will prevent any criminal-minded citizens to bring dangerous weapons into the nation, thereby reducing level of criminality. Figure 4 below depicts metal and bomb detector devices. In the absence of such devices, criminal-minded citizens can go undetected with these weapons into the society and later use them to perpetrate crimes in the society which may have devastating results on citizens.



Figure 4: Illustration of Bomb and Metal Detectors

Furthermore, a spy satellite can be used to monitor criminal activities from the orbit unto the earth. It works like television satellite receiver in our various homes. Nigerian government can liaise with the developed nations to design home-made spy satellite that captures criminal activities on

the ground and in turn transmit these criminal events to coalition of security agents who that in turn swift into action to apprehend the criminals after details have been monitored on the screen attached to spy satellite receivers. Figure 5 below illustrates an-orbit based spy satellite



Figure 5: Illustration of the usage of spy satellite in monitoring criminal activities

Conclusion

In this paper, efforts have been made to review different innovative soft and hard technologies that are being used in monitoring criminal activities in the world which can also be adopted in Nigeria to arrest menace of criminals in our various communities. The paper highlighted soft techniques which include crime mapping system, crime reporting solutions and crime detection and authentication software. The major hard techs that can be used in monitoring crimes are spy balloons, drones, CCTV /surveillance cameras, bomb and

metal detector device as well as spy satellite. The paper reviews different works of scholars on the various hard and soft techs that can be used in monitoring and preventing crimes all over the world, thus recommends to Federal government in employing the services of experts in the areas of crime monitoring, prevention and deterring in order to reduce crimes in our society.

Recommendations

After critical reviews of works on different hard and soft innovative techs which can be used in monitoring crimes, the following recommendations are made:

1. Governments at all levels; local, state and federal as a matter of urgency should install CCTV cameras on our roads, especially roads linking every street together in the towns, since crimes are concentrated in major towns. Individuals who are well-to-do can install CCTV cameras in their various homes.
2. Spy balloons can be adopted during elections to monitor all election activities.

3. Police, customs and immigration officers monitoring our highway and borders should be provided with bomb and metal detectors so as to easily detect any weapons that may be transported to the country by criminals.

4. Spy satellite should be installed on the earth orbit to monitor activities of criminals on earth, and in turns be transmitted to security agents that will organize for the arrest of the criminals from scene of crimes.

5. Federal government should also liaise with respective authorities to grant our security agents permission to deploy drones for usage in the nation for crime combating.

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