Deploying Electronic Roadside Vehicle Identification Technology to Intercept Small Arms and Ammunition on Nigeria Roads

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Abstract

*The challenge of insecurity of life and property in Nigeria has assumed a frightening dimension. The security situation keeps degenerating daily in spite of government's acclaimed effort to contain the situation. This implies that Nigeria of today has a complex security management challenges to handle in order to liberate her citizens from the bondage of insecurity of lives and property, ranging from kidnapping, armed robbery, militancy, suicide bombing, ritual murders and human parts selling. The arms being used in perpetuating some of these criminal acts are conveyed by the criminals using our roads. These security lapses are still possible in spite of huge security personnel presence on Nigeria road checkpoints. This implies that the present system of "**stop and search"** operation is defective and inefficient to handle current security dynamics. To ensure effectiveness of roadside policing, there is need to carry out this "stop and search" operation using electronic security system. The objective of this paper, therefore, is to present a model archetype that would be capable of sweeping through commercial and private vehicles on the move automatically using Wireless Sensor Networks, Vehicular Ad Hoc Networks (VANETS), OCR, transponders linking all sensitive security observatories to a central data base for verifications, security alerts to the security agencies for prompt action and national security control. The paper presents a data base network and communications architecture from a roadside observatory through to the computer control room and then security personnel on duty. The present practice of **stop and search** fails to capture most vehicles conveying sensitive and dangerous security exhibits such as chemical, small and light arms. Moreover the present system is cumbersome, stressful, time consuming thus reducing the desired reliability, accuracy of roadside policing.*

Key Words: small arms and ammunitions, transponder, scanners. Sensors. RFID

Introduction

Security is the degree of protection against danger, damage, loss and criminal activities. It is the state of being free from danger. It is the measure taken as a precaution against theft, espionage or sabotage [1]. In other words, security must take into account the actions of people attempting to cause destruction. Security as a form of protection is a structure and processes that provide or improve security as a condition. It involves freedom from risk, or danger, doubt, anxiety or fear. More so, security provides safety and confidence in the people of any nation as well as foreigners. However, perception of security by criminals will deter malicious behaviour especially with visual signs of security protections such as video surveillance, alarm systems, closed circuit television (CCTV) and other automated Roadside Vehicle monitoring. This is physical security that describes measures that prevent or deter criminal attackers from accessing a facility

illegally. These monitoring technologies assist in fortifying national security.

However, it is very important to be secured and so all security policies must be enforced by mechanisms that are strong enough with sense of commitment. There are organized methodologies and risk assessment strategies to assure completeness of security policies and ensuring that they are completely enforced. Hence, security enforcement is very vital for the economic development of any nation like Nigeria. It is when this is assured that humans and goods can be easily transported from one location to another. To have effective security in the nation, there is need to check physically the content of any vehicle on transit. The present "stop and search" operation done manually to track arms and ammunition on Nigeria roads has not achieved the desired security objective. It is then necessary to use electronic means to do actualize this goal. This will help in tracking down small arms and ammunition being conveyed by vehicle since road is the major means of transportation in Nigeria.

Arms

Small arms is a term used by arms forces to denote infantry weapon an individual soldier may carry [2]. The description is usually limited to revolvers, pistols, sub-machine guns, carbines assault rifles, rifles, sniper rifles, squad automatic weapons, high machine guns, and sometimes hand grenades. Short guns, general purpose machine guns, medium machine guns, and grenade launchers may be considered small arms or as support weapons, depending on the branch of the armed forces. Small arms typically do not include infantry support weapons. In the U.S military, small arms refer to hand guns or other firearms less than 20mm in caliber, and including machine guns [3]. The North Atlantic Treaty Organization (NATO) definition in [4], extends to "all crew-portable direct fire weapons of a caliber less than 50mm and will include a secondary capability to defeat light armour and helicopters". Though there is no civilian definition of small arms, but the term encompasses both small arms and light weapons.

Ammunition

Ammunition is a generic term derived from the French Language *La munitions* which embraced all material used for war, but which in time came to refer specifically to gun powder and artillery. The collective term for all types of ammunition is *munitions* [5]. In the widest sense of the word it covers anything that can be used in combat that includes bombs, missiles, warheads and mines. The purpose of ammunition is predominantly to project force against a selected target. However, since the design of the cartridge, the meaning has been transferred to the assembly of a projectile and its propellant in a single package.

Current Security Scenario in Nigeria

For some time now, the issue of insecurity of life and property in Nigeria has assumed a frightening dimension. The security situation keeps degenerating day by day and getting sophisticated with every Sunday bombing. This implies that Nigeria of today has a complex security management challenge to handle in order to liberate her citizens and foreigners alike from the bondage of insecurity of lives and property, ranging from kidnapping, religious disturbances, political gangsters, armed robbery, militancy, suicide bombing, arms proliferation and movement.

Nigeria is a developing democratic country in West Africa and the most populous black nation in the world. It has the largest population on the continent of Africa. The population is estimated at 149 million people. However, the country has experienced a number of crimes, political, religious and cultural instabilities. This usually involves violence, destruction of properties and human life using arms and ammunition. One tends to wonder how these weapons of mass destruction reach the civilians in the village that enable them to

use it at the slightest provocation. This demonstates that the security situation of this great country is in poor management state and therefore requires retooling.

Radio Nigeria reported on Wednesday, 18th August, 2010 [6] in its seven o'clock network news in the morning, that fire arms were discovered in a 504 Peugeot saloon car, traveling from Maiduguri to Kaduna and that these fire arms were neatly parked beneath the car's seats. This was discovered at a police checkpoint. It is only a case out of many cars having such arms passing through the checkpoints in Nigeria undetected. It further highlights that most of such arms and ammunition are transported through road using vehicles which is the major means of transportation in Nigeria.

On 15th June, 2010, the Department of State of USA, [7] warned U.S. citizens through a document titled "Travel Warning for Nigeria" circulated through the net that it is highly risky to travel to Nigeria. The Department of State recommended that while in the country the US citizens should avoid all but essential travel to some states of Nigeria. This shows how the international communities are seeing the security situation in the country. Furthermore, the document came up because of high rate of crime in the country carried out with arms and ammunition. The crimes includes kidnapping, armed robbery, suicide bombing and other armed attacks. Crimes in Nigeria are done by individual criminals and gangs, as well as some persons wearing police and military uniforms.

In Nigeria, the citizens and foreigners have experienced armed muggings, assaults, burglary, carjacking, rape, kidnapping and extortions involving violence. Home invasions remain a serious threat, with armed robbers accessing even guarded compounds by scaling perimeter walls, following or tailgating residents or visitors arriving by car into the compound, subdoing guards and gaining entry into homes or apartments. However, Nigerians and expatriates have been victims of armed robbery at banks, gas stations, grocery stores and on airport roads during daylight or evening hours. These criminal acts are performed by people carrying arms and ammunition in their vehicles passing law enforcement checkpoints unnoticed and undetected of the arms and ammunition. This is a big security problem throughout the country. It gives a sense of insecurity which casts an aspersion on the Nigeria security system.

Present System of Tracking Arms and Ammunition on Nigeria Roads

Presently, the detection and tracking of arms and ammunition on Nigeria roads is done manually, through what t Nigeria Police call "***stop and search***" operation. In most cases the police and other law enforcement officers will block the road thereby forcing motorists to stop at the check points. The officers will then approach the stopped vehicle and ask the drivers what they are carrying in their vehicle boots and then peep into the vehicle to observe contents. The officer may ask the driver to come down and open the boot to enable him see the content of the boot. When opened, the officer will usually look into the boot without searching and then may ask the vehicle to go. In some situations, proper searching of the vehicle will be done while some will not be searched at all. Government vehicles, politicians' vehicles and rich men's vehicles are not usually stopped for searching. Motorists who give, the law enforcement officers money are sometimes not searched. Motorists having any arms or ammunition usually never stop at checkpoints. Sometimes they wait until the law enforcement officers have left the checkpoints to pass since the law enforcement officers do not render twenty fours service. This is a serious breach on security system of this country. However, the advantages in this present system are that:

- It is cheaper since no special instrument is acquired in carrying out the operations apart from the usual gun.

- It does not involve special training of security personnel apart from the usual training given to them at the Police College.

Weaknesses of Present System of Tracking Arms and Ammunition on Nigeria Roads

From the analysis of present system of tracking arms and ammunition on Nigeria roads, it is very obvious that the security operations at Nigeria checkpoint is very porous and ineffective in tracking arms and ammunitions. The "***stop and search***" operations carried out on vehicles at checkpoint is done manually. This approach isly it is very stressful, cumbersome, and involves tiredness on the part of the security agents and road users. It also creates traffic jams and makes travelling very uncomfortable. At this stage, the security agents usually allow some vehicle to pass unchecked. This implies that some vehicles with dangerous arms and ammunitions can be allowed to pass safely undetected. On the part of the road users, they become unnecessary aggressive to the security agents and some will start disobeying the security agents. Some military officers, police officers, politicians etc pass the checkpoint without being stopped to be searched. How are we sure that they are not having illegal arms or ammunition with them?

When the "stop and search" operation is being done, most of the road users are impatient with security agents. They will start to drive recklessly which usually end up with avoidable motor accidents leading to some deaths of people. However, the stop and search" operation goes with traffic jam which is usually not acceptable to the road users. At times the operation of "stop and search" is not properly done due to bribery and corruption or not done at all at the checkpoints. Some security agents at checkpoint collect money from motorists and other road users without searching their vehicles which has negative implications to the security of the nation. Refusal to offer bribery may lead to killing of innocent citizens by the security operatives. This was the case on Saturday, 13th August 2011 at Nwagu Junction, Agulu, Anambra State, where a 26-year old man was shut dead by a police man because he refused to offer bribe of twenty naira [8].

These weaknesses are very dangerous to the security of the entire nation. Although there are cases of getting these arms and ammunition at checkpoints, the number passed undetected is believed to be higher since road is the major means of transportation in Nigeria. These problems and more can be avoided if automated road side vehicle identification system is deployed at the road sides. This will track down any arms or ammunition being transported through our roads.

Proposed Technology Solution

In the new system, introducing the use of electronic road side vehicle identification system, for tracking small arms and ammunition movement at the checkpoint, will contribute positively to the security of the nation. The "stop and search" operation that is done manually by security agents will be carried out automatically by this device. The device will be mounted at the checkpoint having a transponder fixed overhead. It will use the overhead transponder to scan the approaching vehicle which will also have transponder fixed on it. On reaching the checkpoint the vehicle will slow down, while the transponder connected with the electronic road side vehicle identification system (RSVIS) will scan the vehicle. The image and vehicle content will be transmitted to the computer monitoring screen kept beside the road in a house. If the vehicles has no metallic arms the vehicles continues his movement with green light showing. But if the vehicle is having any arms or ammunition the image of the arm will be shown on the monitoring screen and at the same time blow alarm with red light blinking or showing. The security officers at the checkpoint will then park the vehicle and properly search the vehicle now. The vehicle particulars, driver's personal data, the

vehicle owner's data, description of the weapon will be obtained and typed into the database through the computer system attached with the RSVIS. After taking these data the security officer hands over the vehicle, driver etc to the police for further investigation and prosecution.

In-dept analysis of Nigeria road transportation system have shown that it is possible to deploy electronic RSVIS for tracking small arms and ammunition movement on Nigeria roads. This system will remove or minimize human inadequacies affecting negatively the manual searching of vehicles at checkpoints. It will ensure and introduce fairness, fastness, objectivity and accuracy up to eighty percent in checkpoint searching thereby reducing violent crime through proactive measures.

Overall Data Flow Diagram of the New System: The overall data flow diagram (ODFD) of the Proposed new system is shown below:

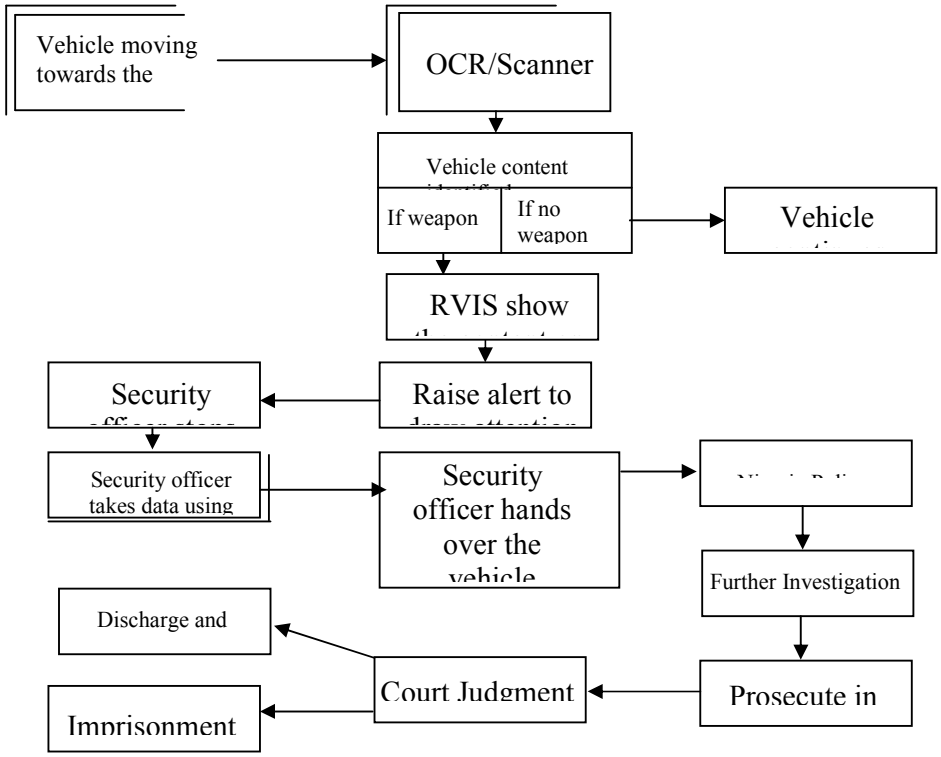

Figure 1.1: ODFD of the new system

The Flowchart of the New System: This is shown below

Overall Data Flow Diagram of the New System: The overall data flow diagram (ODFD) of the new system is shown below

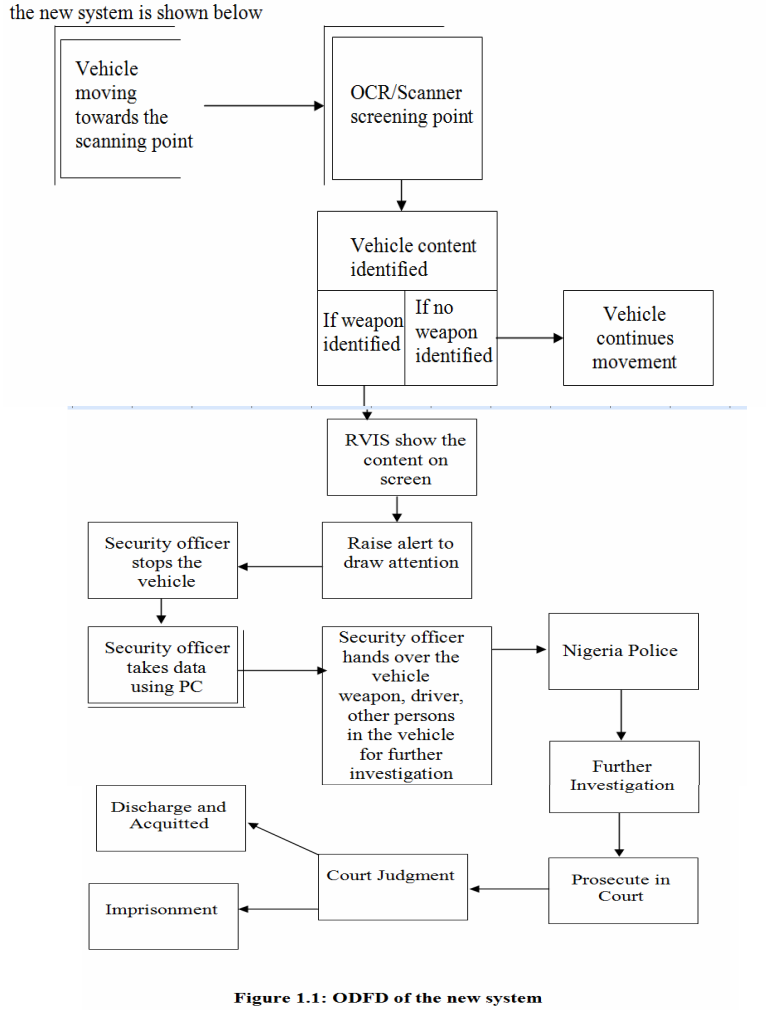

Figure 1.1: ODFD of the new system

We propose here for adaptation a hybrid ITS safety architecture that combines vehicle-to-vehicle communication and vehicle-to-roadside sensor communication [9]. Opposed to dedicated roadside units, which require major investments for purchase, installation and maintenance, roadside wireless sensor and networking technology represents a cost-effective solution and can leverage the deployment of the system as a whole. Among the various services of the hybrid communication system proposed here include accident prevention and post-accident investigation. Presented here also is a system and protocol architecture with a fully distributed concept for efficient and secure storage of sensor data. For deployment, this architecture will likely be combined with an alternative approach using dedicated road-side units as a centralized network element for communication and data storage. For the proposed system, we describe the main components (radio, networking and services, security). Finally, we describe our prototype implementation and experimental tested featuring hardware and software platforms for vehicle on-board units and sensor nodes. Figure 1.3 presents the proposed WSN architecture with distributed and centralized data storage

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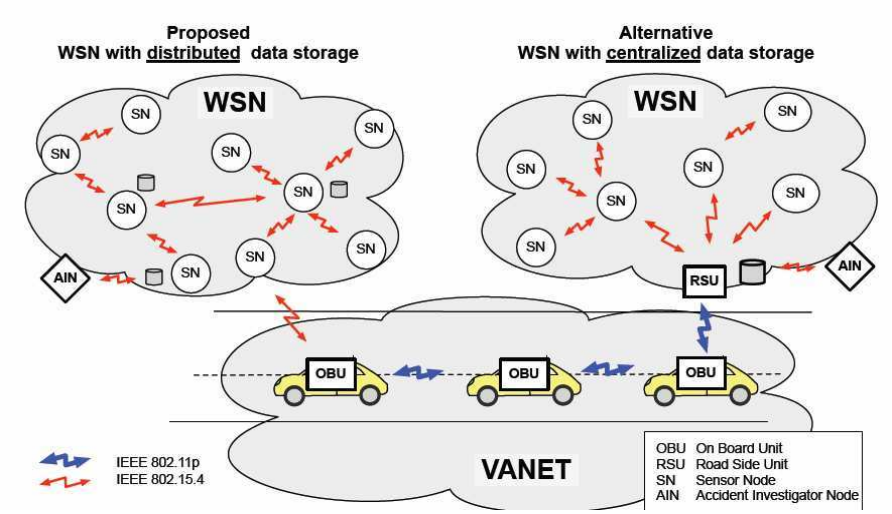

Fig. 1.3: Systems architecture with distributed and centralized Data Storage[9][11]

The proposed Main technology components of the architecture are:

(i) radio interfacesIEEE 802.11p and IEEE 802.15.4,
(ii) routing protocols Geocast and tinyLUNAR,
(iii) middleware for VANETs and tiny PEDS for WSNs, and
(iv) Applications.

The components are well adapted to the specific requirements of VANETs and WSN, respectively.

VANET = Vehicular Ad hoc Networks
WSN = Wireless Sensor Networks

Table 1.1: Prototype Platforms For VANET And WSN Nodes [11]

	VANET node (NEC LinkBird-MX)	**WSN node** (Crossbow TelosB)
Physical size	153 mm x 118 x 43 mm	65 x 31 x 6 mm
Processor	64 bits MIPS@266 MHz	16 bits MCU@8 MHz
Memory	512 MB + 16 MB program flash and 128 MB RAM	10 kB RAM, 48 kB program flash, 1 MB for data logging
Power suppy	5.4–22 VDC@400 mA max.	3 VDC@25 mA (active, sending) 6 μA (sleep)
Network interfaces	Fast Ethernet, IEEE 802.11p draft 3.0, IEEE 802.15.4 (only RSU)	IEEE 802.15.4
Connectors	UART (GPS, CAN), USB, MOST, VICS	UART, I2C, SPI
Antenna	External, omni-directional, diversity	Nearly omnidirectional (on-board) or directional (external)
Operating system	Linux 2.6	TinyOS
On-board sensors	None	Temperature, humidity, light

Technology Integration Components.

These are technological equipment needed or to be used in carrying out the tracking of metal arms in vehicles which will work with RVIS.

(i)**Transponder**

This is a wireless communication, monitoring and control device that picks up and automatically responds to an incoming signal. It is a contraction of the words **trans**mitter and res**ponder**. Simply put, transponder is an electric device used to wirelessly receive and transmit electrical signals [9]. It is an electronic device that can be used to send and receive signals wirelessly.

Transponders were developed to be attached to objects which needed to be located. A transponder functions by receiving a signal, called an "interrogator" because it is effectively "asking" for information, then automatically conveying a radio wave at predetermined frequency. In order to broadcast a signal on a different frequency than the one received, a frequency converter is built in. By receiving and transmitting on different frequencies, the interrogator and transponder signals can be detected simultaneously. In a real situation, transponder will be attached to vehicles for easy location and searching. This can be mounted on the windshield or dashboard.

Transponders can be classified as active and passive transponders. **Active transponder** is a type of transponder employed in location, identification, and navigation systems for commercial and private vehicles. It transmits a coded signal when it receives a request from a monitoring or control point. The transponder output signal is tracked, so the position of the transponder (on the vehicle) can be constantly monitored. It will operate over a kilometre distance and an example of this is Radio Frequency Identification (RFID). **Passive transponder** is a type of transponder that allows a computer or robot to identify an object. It must be used with an active sensor that decodes and transcribes the data the transponder contains. Magnetic labels, such as those on credit cards, and store items are common examples. This is the one to be employed in this work

Figure 1.4: Transponder over a truck [Source: 9]

(ii) **RFID**

This acronym stands for Radio Frequency Identification. It is the use of a wireless non-contact system that uses radio frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. It is a technology that incorporates the use of electromagnetic or electrostatic compiling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person. It does not require direct contact or line-of-signal scanning.

A RFID system uses tags, or labels attached to the objects to be identified. Two way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response. The readers generally transmit their observations to a computer system running RFID software or RFID middle ware. The tag's information is stored electronically in a non-volatile memory. An RFID reader transmits an encoded radio signal to interrogate the tag. The tag receives the message and responds with its identification information. This may be only a unique tag serial number, or may be product related information such as stock number, lot or batch number, production date, or other specific information. Note that RFID tags can be either passive, active, or

battery assisted passive. However, RFID system consists of these three components, antenna, transceiver (often combined into one reader) and a transponder [9].

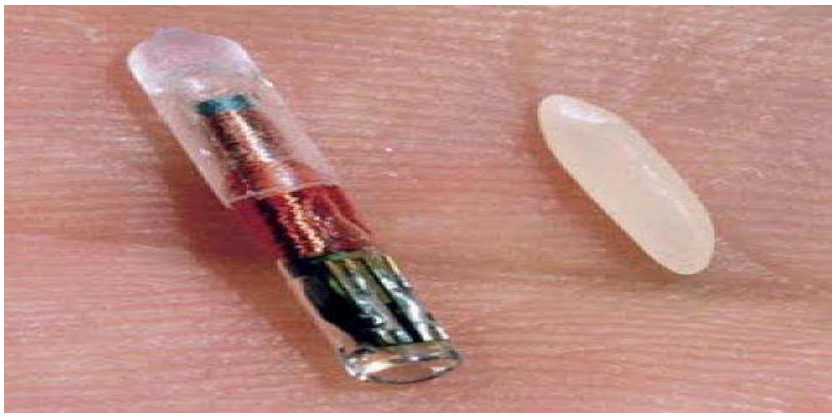

Figure 1.5: RFID [source: 2]

(iii) **Optical Character Recognition**

This is often abbreviated as OCR, it refers to the branch of computer science that involves reading text from paper and translating the images into a form that the computer can manipulate. It is the recognition of printed or written text and characters by a computer system or OCR reader/OCR machine. It involves photo scanning of the text character-by-character, analysis of the scanned-in-image, to identify each alphabetic letter or numeric digit, and then the translation of the character image into character codes such as ASCII, commonly used in data processing. Special software is used to compare the pattern of the signal sent from the machine or OCR reader to patterns already stored in the memory. When the match has been made, a respond signal will be sent to the machine accepting or rejecting the pattern. OCR is used in reading vehicles number plates. However, OCR systems include an optical scanner for reading text, and sophisticated software for analyzing images, and software to recognize characters.

Figure 1.6: OCR[9]

(iv) Sensor

A sensor is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument which are mostly now electronic. Generally, sensor is a device that receives signal and converts it into electrical

form which can be further used for electronic devices. For accuracy, most sensors are calibrated against known standards.

In this work we are concerned with **image sensor** which is a device that converts an optical image into an electronic signal. It is used mostly in digital cameras and other imaging devices. Most currently used sensors are digital charge-coupled device (CCD) or complementary metal-oxide-semiconductor which is active pixel sensors (CMOS APS). Both types of sensors accomplish the same task of capturing light and converting it into electrical signals.

An active-pixel sensor (APS) is an image sensor consisting of an integrated circuit containing an array of pixel sensors, each pixel containing a photodetector and an active amplifier. There are many types of active pixel sensors including the CMOS APS used most commonly in cell phones cameras, web cameras. Such an image sensor is produced by a CMOS process (and is hence also known as a CMOS sensor) and has emerged as an alternative to charge couple device (CCD) image sensors.

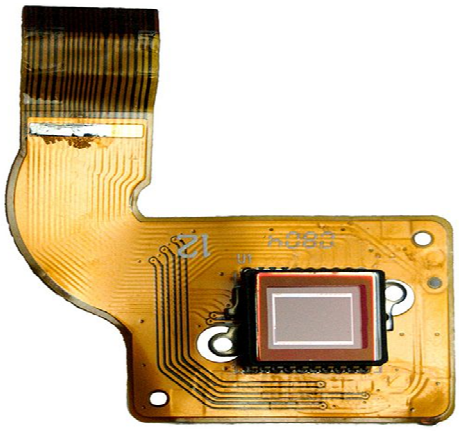

Figure 1.7: Image sensor [2]

(v) **GPS:** This is Global Positioning System which is a spaced based satellite navigation system that provides location and time information in all weather, anywhere or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is freely accessible to anyone with a GPS receiver. Modern vehicle tracking system commonly uses technology for locating vehicle. It can locate a vehicle anywhere on earth if it has vehicle tracking system. It also allows drivers of car and trucks to ascertain their location anywhere on earth. Mores, vehicle information can be viewed on electronic maps via the internet or specialized software.

(vi) **Simulation:** This is the imitation of the operation of a real word processor system over time. The act of simulating something first requires that a model be developed; this model represents the key characteristics or behaviours of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time.

Simulation is used in many contexts, such as simulation of technology for performance optimization and for scientific modeling of natural systems or human systems to gain insight into their functioning. It can also be used to show the eventual real effects of alternative conditions and courses of action. Simulation is also used when the real system cannot be engaged or it is being designed but not yet built like in this thesis. In this thesis we are concerned with computer simulation.

Computer simulation is a computer program that attempts to simulate an abstract model of a particular system. Simulation of a system is represented as the running of the system's model. It can be used to explore and gain new insights into new technology and to estimate the performance of systems too complex for analytical solutions. Computer simulations vary from computer programs that run for a few minutes, to network based groups of computers running for hours, to ongoing simulations that run for days.

(vii) **Computer System:** A complete, working computer is known as computer system. It includes the computer along with any software and peripheral devices that are necessary to make the computer function. Every computer system requires an

operating system. But a computer is programmable machine. The two principal characteristics of a computer are;

- It responds to a specific set of instructions in a well defined manner.
- It can execute a pre-recorded list of instructions that is program

(viii) **Image Scanner:** In computing, an image scanner often abbreviated to just scanner, is a device that optically scans images, print text, handwriting, or an object, and coverts it to a digital image. Hand held scanners have evolved from text to three dimensional (3D) scanners. A 3D scanner is a device that analyses a real world object or environment to collect data on its shape and possibly its appearance. It is being used in different areas of life including inspection. The purpose of 3D scanner is usually to create a point cloud of geometric samples on the surface of the subject. It is analogous to cameras. Like cameras, they have a cone-like field of view and can only collect information about surfaces that are not obscured. A 3D scanner collects distance information about surfaces within its field of view. The "picture" produced by 3D scanner describes the distance to a surface at each point in the picture. This allows the three dimensional position of each point in the picture to be identified.

However, for most situations, a single scan will not produce a complete mode to the subject. Multiple scans, even hundreds, from many different directions are usually required to obtain information about all sides of the object. These scans have to be brought in a common reference system, a process that is usually called alignment or registration and then merged to create a complete model. This whole process, going from the single range map to the whole model, is usually known as the 3D scanning pipeline.

There are varieties of technologies for digitally acquiring the shape of 3D object. A well establishment classification divides them into two types: contact and non-contact 3D scanners. Non contact 3D scanners can be further divided into two main categories, active and passive scanners. In this thesis, we are concerned with non contact 3D scanners.

Active scanners emit some kind of radiation or light and detect its reflection in order to probe an object or environment. The possible types of emissions used include light, ultrasound or x-ray. But passive scanners do not emit any kind of radiation themselves, instead rely on detecting reflected ambient radiation. Most scanners of this type detect visible light because it is a readily available ambient radiation. Other types of radiation, such as infrared could also be used. Passive methods can be very cheap, because in most cases they do not need particular hardware but simple digital cameras.

However, the anticipated roadside Vehicle Identification Technology for implementation is shown below but not drawn to to scale.

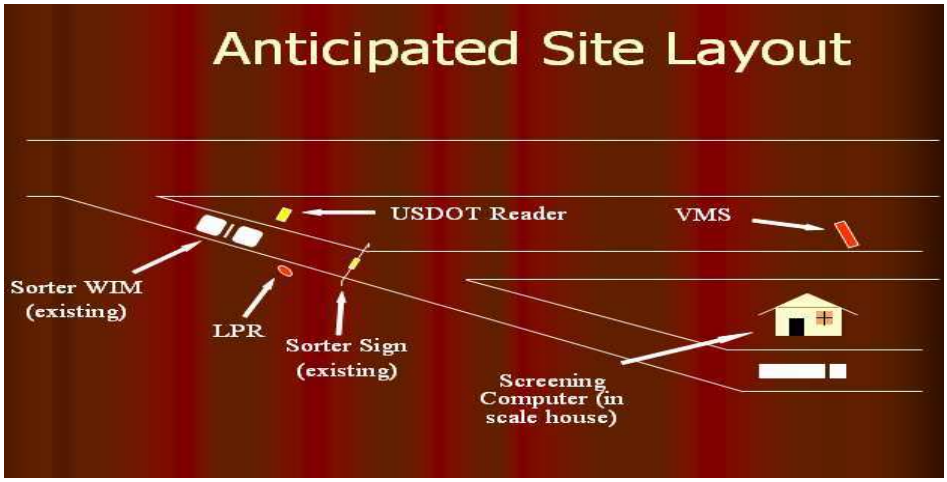

Figure 1.8: Proposed Roadside Vehicle identification layout [9].

How e-screen works

- As a participating vehicle approaches an enforcement station, the vehicle's transponder is read by a roadside reader.
- A computer in the enforcement station looks up the transponder in a database to make sure the vehicle is in good standing with regard to registration, safety record, and is not carrying any weapon.
- If everything checks out, the truck is given a green light on the transponder, indicating that the truck may proceed on down the road.

Enforcement personnel are then free to focus their attention on high-risk carriers.

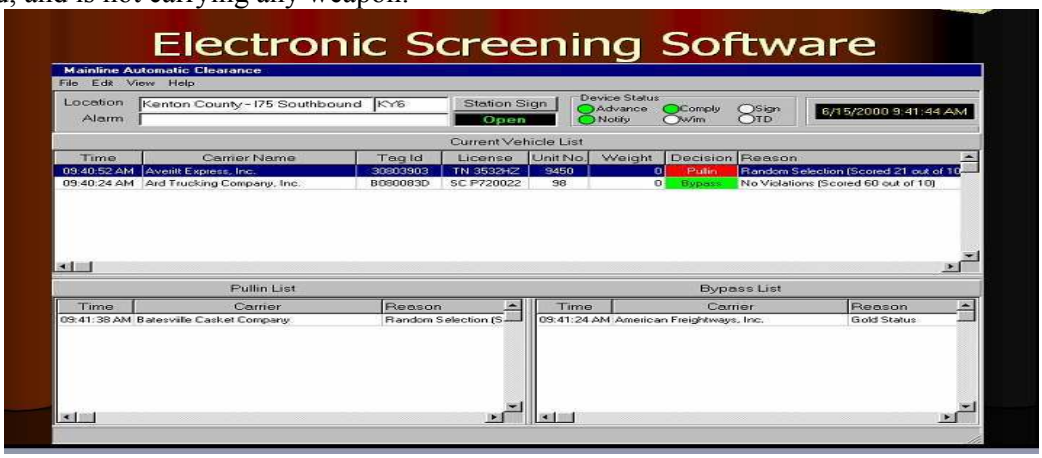

Figure 1.9: Proposed Electronic Screening Software[9]

Justification of the new system

The new system ensures equity, fairness, fastness, reliability, objectivity and accuracy up to eighty percent than the "stop and search" operation at Nigeria road checkpoints. It will completely take care of the weaknesses observed in the present manual system. The system will automatically generate report or information on vehicles with arms or ammunition and then draw the attention of security operatives on duty. Moreover, every vehicle must be screened automatically. There would no further incidence of allowing vehicles to pass without being searched due to human inadequacies such as tiredness. If the new technology is properly implemented, it will reduce the rate of violent crimes, riot, agitation, etc in Nigeria involving the use of arms and ammunition. This will improve the security situation of this great country.

Anticipated Benefits of the Proposed System

- For government:
  - More effective and efficient screening.
  - Make better use of security personnel.
  - Focus enforcement resources on the high-risk carriers.
  - More consistent and ubiquitous enforcement coverage
  - Monitor more routes at more times
  - More difficult for non-Compliant carriers to avoid enforcement.
  - Improved safety
  - Improved homeland security

- For industry:
  - Creates a more level playing field
  - More difficult for anyone to short-cut the requirements.
  - Everyone must play by the same rules.
  - Better revenue base – everyone paying their fair share
  - Streamlined operations at enforcement locations
  - Safe and legal trucks avoid stops and delays.
  - Fuel and time savings.
  - Improved safety
  - Unsafe operators taken off the road.
  - Less need to stop trucks on shoulder to perform checks.

Conclusion

This paper has identified the emerging complex security scenario in Nigeria as being capable of disintegrating the Nigerian state if not urgently addressed. We have proposed a technology solution via the deployment of Electronic Roadside Vehicle Monitoring Technology using Wireless Sensor Networks, Transponders, OCR and dynamic camera and automated vehicle checkpoints to track incidence of small arms movement in Nigeria. The objective is to arrest the unbridled proliferation of small arms used in perpetuating murder, robbery and bombings around Nigeria. The authors strongly believe that urgent implementation of this new tool by the Federal Government will go a long way in staving Nigeria away from the threat of sovereign collapse.

Recommendations

In line with the foregoing observations about the emerging complexity of the security scenario in Nigeria, we recommend thus:.

- That comprehensive automation of databases for vehicle registration throughout the country is initiated as a matter of urgency.
- That issuance of vehicle number plate should be comprehensively done with automated database system.
- Driving license issuance should be automated with a distributed or centralized database and security and access controlled from a central point.
- Vehicle registration database, vehicle number plate database and driving license issuance database must be linked and connected to the RSVIS when implemented for analysis.
- Database for offenders should be developed so, that reports can be generated at regular intervals when implemented.
- That there be established Emergency Security Response where all reports of identified arm movement on the road is reported for immediate security action.

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