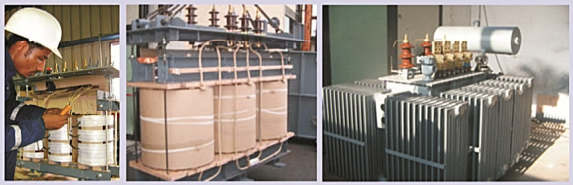
We manufacture efficient, high quality and cost effective transformers. This is an excellent opportunity for technology transfer to Nigerians

DANELEC FZE
CALABAR NEPZA/RCI/0151
Transformer Manufacturing Industry

NORMAL LOSSES IMMERSED OIL TRANSFORMERS -CLASS 12-17.5-24KV ELECTRICAL SPECIFICATION

33/0.415kV	11/0.415kV
50kVA	50kVA
100kVA	100kVA
200kVA	200kVA
300kVA	300kVA
500kVA	500kVA

IEC 60076 STANDARD



IMMERSED OIL TRANSFORMERS • THREE PHASE DISTRIBUTION TRANSFORMERS

DANELEC FZE PRODUCES TRANSFORMERS THAT MEET REGULATORY, STATUTORY AND CUSTOMER REQUIREMENTS BASED ON STANDARD PROCESSES THAT ARE OPEN TO REGULAR IMPROVEMENTS

Plot C6a Trade Free Zone, Murtala Mohamed Highway,
Calabar, Cross Rivers State, Nigeria.
Tel/Fax: 234-48-880982, Mobile: 234-803-3103782
E-mail: info@danelecfze.com
www.danelecfze.com

PROUDLY MANUFACTURED IN NIGERIA

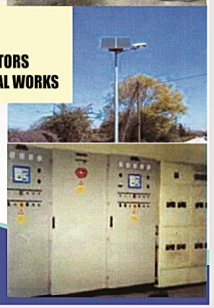
Established in 1992, the company has built up its activities with highly qualified and experienced staff comprising of expatriates and indigenous experts. The company is equipped adequately with standardized instrument to carry out work efficiently.

DANELEC LIMITED
RC 211,972

- Electrical/Electronics Engineering
- Construction / Installation
- Solar Power Lighting and Services

We design, procure, install and maintain in the following areas

INSTRUMENTATIONS • SECURITY SYSTEMS • TELECOMMUNICATIONS
NGV/LPG FILLING STATIONS • ANTI-CORROSION TECHNIQUES
SOLAR POWER/PHOTOVOLTAIC SYSTEMS • CATHODIC PROTECTION & GENERATORS
HT/MT/LT SUBSTATIONS & ELECTRIFICATION • ELECTRICAL, CIVIL AND INDUSTRIAL WORKS



Plot 278, Trans-Amadi Industrial Layout,
P. O. Box, 4308, Port Harcourt
Tel/Fax : 084-772299
Mobile : 0803-3103782
e-mail : info@danelec-ltd.com,
gm@danelec-ltd.com

Safety First and Quality

www.danelec-ltd.com

2ND INTERNATIONAL CONFERENCE

IEEE NIGERCON 2013

IEEE
Advancing Technology for Humanity

2ND INTERNATIONAL CONFERENCE ON

EMERGING AND SUSTAINABLE TECHNOLOGIES FOR POWER AND ICT IN A DEVELOPING SOCIETY

IEEE NIGERCON 2013

PROCEEDINGS

NOVEMBER 14 -16, 2013

LINKS HOTELS,
NEW OWERRI COMMERCIAL AREA, IMO STATE, NIGERIA.

EDITED BY
IFEYINWA E. ACHUMBA, Ph.D. MIEEE
UCHENNA H. DIALA, MIEEE
EHINOMEN E. ATIMATI, MIEEE

www.nigercon.info

2013 IEEE International Conference on Emerging & Sustainable Technologies for Power & ICT in a Developing Society (NIGERCON)

Copyright © 2013 by the Institute of Electrical and Electronics Engineers, Inc. All rights reserved.

Copyright and Reprint Permission:
Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.
For reprint or republication permission, email to IEEE Copyrights Manager at pubs-permissions@ieee.org.

IEEE Catalog Number: CFP13NIG-ART

ISBN: 978-1-4799-2017-4

TABLE OF CONTENT

1. Biometric-based Attendance System with Remote Real-time Monitoring for Tertiary Institutions in Developing Countries - *Eze Peter U., Joe-Uzuegbu C. K. A., Uzoechi Laz, Opara F. K.* 1

2. Low Complexity FPGA Implementation of Register Exchange Based Viterbi Decoder - *Abdulrazaq Muhammad B., Abdullahi Zanna M., Almustapha Mohammed D., Dajab Danjuma D.* 21

3. Low Cost Ground Test Equipment for Atmospheric Rocket Flights Using Embedded Systems – *Babayomi O. O., Osheku C. A., Adetoro M. A. L., Okon A. and Opasina A. O.* 26

4. Switch Mode-Based Constant Voltage Battery Charger for New Generation Motor Vehicles - *Osinowo O. E. and Raji A. G.* 30

5. An Improved Scheme for Minimizing Handoff Failure Due to Poor Signal Quality – *Uduak Idio, Kalu Constance, Obot Akaninyene, Ozuomba Simeon* 38

6. Analysis of Spectrum Maximization of Advanced Modulation and Coding Techniques – *Atimati E. E., Chukwudebe G. A., Iwuchukwu U. C.* 45

7. Analytical Assessment of Comparative Advantage of Deploying IT for Election Process in Nigeria – *Ekwonwune E., Nwabueze D. E. and Anyiam C.* 52

8. Cloud Computing for Optimal ICT in Nigeria - *Dahunsi Folasade Mojisola* 67

9. Crime Suspect Identification System Based on Footprints - *Adetunmbi A. O., Osisanwo F. Y.* 89

10. Dispersion Management in a Single-Mode Optical Fiber Communication System Using Dispersion Compensating Fiber - *Lawan S. H. and Ajiya M.* 93

11. DTV Coverage and Protection Contour Estimation for Spatial White Space – *Nasir Faruk, Adeseko A. Ayeni, Adediran Yinusa. A.* 96

12. E-MART: A Novel Smart Home Governance System for a Densely Populated Power Challenged Environment – *Mbonu Ekene S, Okafor Kennedy C., Uzedhe Godwin O., Ezekwe Chinwe* 100

13. Effect of Dielectric Constant on the Design of Rectangular Microstrip Antenna – *Atser A. Roy, Joseph M. Môm and Douglas T. Kureve* 111

14. Minimization of Call Congestion in Telecommunication System Using OFDM Optimization Model – *Dike D. O., Iroh C. U., Ezeh G. N., Dike B. C., Chukwuchekwa N. and Ndinechi M. C.* 123

15. Optimizing the Efficiency of Fiber-Optics Technology in Telecommunications Systems – *Dike J. N., Ogbe D. A.* 135

16. Reconfiguration Approaches in Wireless Sensor Network: Issues and Challenges – *Emmanuel Eronu, Sanjay Misra, Musa Aibinu* 143

17. SMS Controlled Digital Display System – *Ukpa O. S., Onwuamana C. C., Okpala N. K., Chukwudebe G. A. and Achumba I. E.* 153

18. Strategies for Improving Community Policing through Community Informatics Social Network - *Ezenkwu Chinedu Pascal, Ozuomba Simeon, Kalu Constance* 163

19. Switched Local Area Networks' Bit-Carrying Capacity Determination - *Eyinagho Monday* 169

20. The Use of Social Media for Business Promotion - *Isodje A. A.* 173

21. Towards an Iterative Maintainability Web Service Model for Effective Mobile Healthcare Delivery - *Adeoye Olamide Olayinka, Misra Sanjay, Olaniyi O. Mikail, Ahmed Aliyu* 177

22. Wireless Sensor Networks for Remote Healthcare Monitoring: Challenges and Way Forward – *Hassan N. M, Olaniyi O. M., Ahmed A, Dogo E. M* 182

23. Wireless Transmission of Biomedical Signals Using the Zigbee Technology –
Olonibua Abiodu, Akingbade Kayode Francis 187

24. A Novel Data-Acquisition System For Improving Electric Power Distribution Planning –
Adetona Z. A, Waheed M. A., Adejumobi I. A., Akinwale A. T. 191

25. Application of Neural Network to Electrostatic Fields Distribution Pattern: A Case Study –
Akinsanmi O. and Ekundayo K. R. 206

26. Bounds of Fuzzy Controller Output Scaling Gains for Stabilization of a Dissipative Chaotic System –
Umoh Edwin A. 212

27. Chaos Control of the Complex Rabinovich System via Takagi-Sugeno Fuzzy Controller –
Umoh Edwin A. 217

28. Comparative Analysis of Techniques for Economic Dispatch of Generated Power with
Modified Lambda-iteration Method - *Dike Damian O. and Izuchukwu Adifono Moses* 231

29. Conceptual Framework for Sustainable Energy Development in Africa - *Dahunsi F. M.* 238

30. Cost Parity Assessment of a Solar PV Generator for a Commercial Bank in Makurdi –
Goshwe Nentawe Y., Afiagh Timothy, Okafor Ephraim 242

31. Effect of Static VAR Compensator Positioning on a Grid-connected Wind Turbine-driven
Squirrel Cage Induction Generator –
Waheed A. Oyekanmi, GhadirRadman, Adeniyi A. Babalola, Lazarus O. Uzoechi 247

32. Electricity Access in Sub-Saharan Africa– Case for Renewable Energy Sources Microgrid –
Longe O. M., Oluwajobi F.I., Omowole F. 253

33. Evaluation of Transient Response of a Separately Excited DC Motor under No-Load Condition -
Oise I.M., Diala U. H., Ezeh G. N., Opara R. 258

34. Improving Security and Emergency Response Through the Use of Unmanned Vehicles –
Okereafor D. T., Diala U., Onuekwusi N., Uzoechi L. O., Chukwudebe G. A. 263

35. Matrix Converter Control for DFIG – *Okedu Kenneth E., Uhunmwagho Roland* 273

36. Power Distribution Problems on 11 kV Feeder Networks in Akure, Nigeria –
Melodi A.O. and Ogunboyo P.T. 292

37. Self Diagnostic System for Predictive Maintenance of Traffic Light Control System –
Mbonu Ekene S., Ndinechi Micheal C., Okafor Kennedy .C., Ezekwe Chinwe Genevra 308

38. Towards Achievement of Adequate Consumer Integration in the Nigerian Grid:
The Smart Grid Approach – *Onuekwusi Nnaemeka C., Chukwudebe G. A., Ononiwu G. C.* 314

39. Using Reliability Analysis for Sustained Wind Farm Operation in Remote
and Weak Transmission Areas - *Okoronkwo Jonathan O.* 319

40. Virtual Platforms for Teaching Harmonic Load Flow to Engineering Students –
Amoo A. L., Bappah A. S., and Aliyu U. O. 333

41. Single Switch Forward Converter - *Emelogu G. C. and Raji A. G.* 348

42. Game Theory-Based Analysis of Cooperative Wireless Networks with Error Control Coding –
Adeleke O. A and Akande D.O. 369

43. Virtual Power Plants: Stochastic Techniques for Effective Costing and Participation in
a Decentralized Electricity Network in Nigeria - *Monyei C.G., Fakolujo O. A. and Bolanle M. K.* 374

Eustace M. Dogo <eustace.dogo@futminna.edu.ng>

Upload of papers in Xplore- urgent

1 message

Gloria Chukwudebe <gloriachukwudebe@yahoo.com> 2 December 2013 at 01:55
Reply-To: Gloria Chukwudebe <gloriachukwudebe@yahoo.com>
To: "ndagi@futminna.edu.ng" <ndagi@futminna.edu.ng>, "mikail.olaniyi@futminna.edu.ng" <mikail.olaniyi@futminna.edu.ng>, "aliyu.ahmed@futminna.edu.ng" <aliyu.ahmed@futminna.edu.ng>
Cc: "eustace.dogo@futminna.edu.ng" <eustace.dogo@futminna.edu.ng>

Dear Professional Colleagues,
Crosscheck, IEEE Plagiarism software requires that you review and improve your references. Your paper*: **Wireless Sensor Networks for Remote Healthcare Monitoring in Nigeria: Challenges and Way Forward*** has Similarity Score of **31%**. It could be you have published on the topic before, you need to reference it properly. Please review and return paper to the undersigned before close of business on Wed Dec. 4, 2013. Any score 30% and below is allowed.
Please treat as very urgent! !

Warmest Regards

Prof Gloria Chukwudebe
Director, ICT Centre
Federal University of Technology Owerri
& Chair, IEEE Nigeria Section
Phone- 08033279081, 08099898491

Wireless Sensor Networks for Remote Healthcare Monitoring in Nigeria: Challenges and Way Forward

Hassan N. M, Olaniyi O. M., Ahmed A, Dogo E. M,
Department of Computer Engineering
Federal University of Technology Minna Nigeria
E-mail: ndagi@futminna.edu.ng, mikail.olaniyi@futminna.edu.ng, aliyu.ahmed@futminna.edu.ng;
eustace.dogo@futminna.edu.ng;

Abstract-Wireless sensor networks have gained a lot interest in the field of medicine with a wide range of capabilities. In most developed countries wireless sensor networks are being used in monitoring critical illnesses such as Cancer detection, cardiovascular diseases, monitoring asthmatic patient and in the treatment of Diabetes. Wireless sensor networks have enabled medical doctors to monitor patients remotely and give them timely feedback and support; potentially increasing the reach of health care by making it available anywhere at any time The application of Wireless Sensor Networks for remote medical monitoring is relatively new in Nigeria. Recently the Nigerian government embarked on the use of e-health to meet the health requirements of its remote and rural dwellers. In this paper, we discuss some of the core challenges facing the application of wireless sensor networks for remote medical care monitoring in Nigeria, and how these challenges can hinder the application of Wireless Sensor Networks for remote healthcare in Nigeria.

Keywords-- Wireless Sensor Networks; Healthcare systems; Biosensors; Remote medical Delivery

I. INTRODUCTION

Recent technological advances in integrated digital electronics and miniaturization of sensor devices, microprocessor, and radio frequency devices into a single micro-chip has led to the emergence of very lightweight, ultra-low power, monitoring sensors devices[1][2][3]. These sensor devices have the capability of sensing, processing and transmitting vital physiological signals using wireless technology [4]. Sensor nodes are integrated into wireless sensor networks (WSN) which can be used for industrial automation, environmental monitoring, military surveillance, emergency cases and health care monitoring [5]. Interest in wireless sensor networks for healthcare practice has been rapidly increasing. Traditionally, medical sensors such as the blood pressure monitors, pulse oximeters and electrocardiograms were physically attached to patients by wires. Nowadays, these high cost time consuming tasks can be avoided. In other words, patients can be liberated from all the instrumentation by the application of wireless sensor networks for remote medical monitoring [6]. Wireless Sensor Networks are being used in developed countries to monitor real time physiological parameters such as heart beat rates, blood pressure rate, pulse, body temperature and blood flow rate; sensors are also used for biochemical examination [7].

The World Health Organization stated that heart disease accounts for the high mortality in the developed world; 17 million deaths (about 30%) annually throughout the world are caused by heart failure and 80 percent of all deaths recorded in China were caused by chronic heart disease [8]. About half of those who die do so within one hour of the start of symptoms and before reaching the nearest hospital [8]. Wireless Sensor Networks is a key technology that is being used by developed countries to provide real-time monitoring of cardiovascular patients by continuously sensing, processing and transmitting physiological data from a remote station to a central server, where the physician makes use of captured data to diagnosis patients.

The Nigerian government is presently reforming its health sector with the vision of attaining a level of healthcare that will enable all Nigerians to live a healthy and economically productive life [9] [10]. There are three tiers of healthcare delivery levels in Nigeria, namely: primary, secondary, and tertiary healthcare systems. The health sector is faced with several challenges in delivering healthcare services to the people, especially in the primary healthcare system where the beneficiaries are mostly remote and rural dwellers. These rural dwellers make up 70% of Nigerian population and have no adequate access to

978-1-4799-2017-4/13/$31.00 ©2013 IEEE

emergency treatment. They have no adequate infrastructure, no access to information dissemination and lack qualified medical personnel. With these many inadequacies coupled with a growing demand for improved healthcare system, the government in its health sector reforms adopted the use of e-health in form of telemedicine to tackle the numerous challenges of medical healthcare delivery in Nigeria [9] [10]. Telemedicine is the use of electronic sensor devices and wireless communication to deliver healthcare support when participants are separated by distance [11]. The use of biosensors in monitoring patient with critical diseases is also being considered by the government.

In this paper, we have reviewed the generic system architecture of Wireless Sensor Networks for remote medical application, the application of Wireless Sensor Networks in remote health monitoring in Nigeria; the main challenges facing the application of Wireless Sensor Networks for remote medical monitoring in Nigeria and proffer plausible solutions.

II. GENERIC SYSTEM ARCHITECTURE FOR WIRELESS SENSOR NETWORKS

The generic system architecture of a wireless sensor network is a multi tier system, the first tier comprises of intelligent sensor devices; the second tier is a personal server (personal digital assistant (PDA), Smartphone, or personal home computer); and the last tier encompasses series of remote medical care servers and related health services (Physician, caregivers and the Clinic) [12]. Each tier constitutes a fairly complex subsystem portably organized to ensure efficient, secured and cost effective system.

The generic architecture of a wireless sensor network for remote healthcare monitoring is made of three main sections [12].

A. Wireless Body Area Network (WBAN)
B. Personal Server using intelligent personal digital assistant (PPS).
C. Medical Server for remote healthcare monitoring.

A. Wireless body area network

The core of this section is the user called the patient. Sensors nodes attached to the body of the patient acquire and transmit data to the sink nodes. Sensor nodes are very tiny in size, inexpensive and have batteries that can last for longer duration; sensor nodes have limited computing and communication capability. Sensors consist of microprocessors, memory, radio transceivers and power supply unit [12][13].

B. Personal Server (PPS) using intelligent personal digital assistant

The personal server is the interface between the WBAN nodes and the remote medical server at the hospital; it communicates using wireless protocols such as Zigbee or Bluetooth technology.

C. Medical Server for remote healthcare monitoring

The third tier is called Medical Server for Remote Healthcare Monitoring (MSRHM). It receives data from the personal server; it is the backbone of the entire architecture. It is situated at medical centers or hospitals where health services are provided. It is the database of all remotely monitored patients. Medical server keeps electronic records of registered patients, which can be accessed by different medical staff, including general practitioners, specialists, nurses and doctors from their offices in the hospital over the internet as depicted in the figure 1[13].

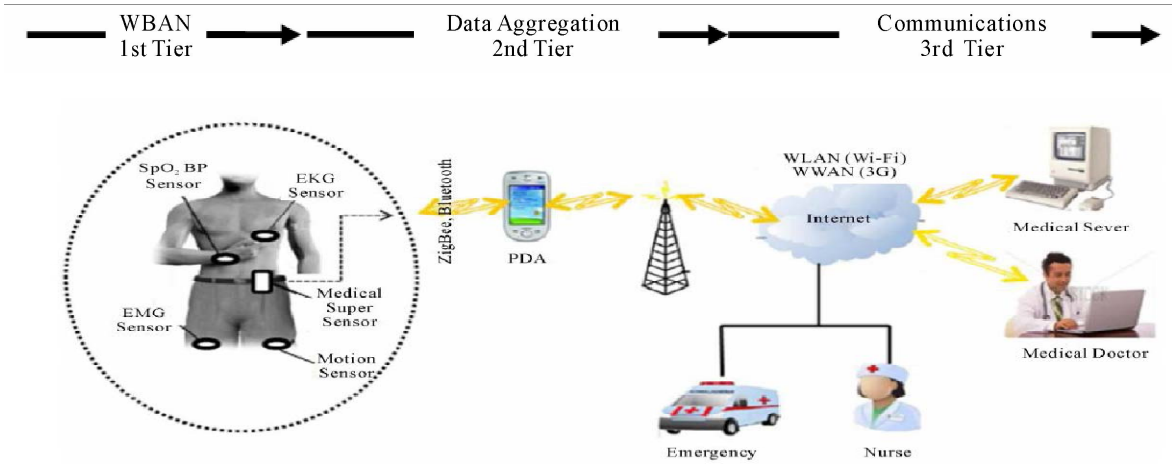


Figure 1: Generic Architecture of wireless sensor networks for remote healthcare monitoring system [13]

III. WIRELESS SENSOR NETWORKS FOR REMOTE HEALTHCARE PRACTICE IN NIGERIA

Remote healthcare practice using wireless sensor networks is relatively new in Nigerian. The government is presently implementing reforms in the health sector, with the aim of improving the health status of all Nigerians. To achieve this, it has adopted the use of e-health as one way of attaining the primary health care needs of the rural population. The Federal Ministry of Health has already launched a Telemedicine project and research is being conducted in some teaching hospitals and universities on the use of biosensors to diagnose patient remotely [14]. Telemedicine can be defined as the use of telecommunication technologies to provide remote medical information and diagnoses [14]. It may be as simple as a patient discussing his case with a doctor over the telephone, or as sophisticated as using satellite communication to relay consultation between healthcare centres in two countries using videoconferencing equipment. Nigerian telemedicine is a pilot projects of the Nigerian Communication Satellite (NigComsat-1), which promises to improve remote medical delivery to rural Communities[15].Telemedicine application is new in Nigeria is expected to provide remote and rural communities easy access to healthcare at real time relying on the backbone of NigComSat-1 thereby saving lives, time, cost and scarce resources while achieving the objective of the Nigerian Health Sector reform. Biomedical sensors combined with telemedicine can be used to remotely monitor patient with chronic diseases like diabetes, hypertension, rheumatism and heart defects. These biosensors measuring vital data sends signals via wireless communication provided the GSM companies to the remote medical server. The doctor or specialist response quickly and the patient receives directive on his PDA or mobile phone [16]. Figure 2 shows a simple architecture for a mobile- phone based patient compliance system, patients are motivated to perform optimal self-management while the doctor monitors compliance from a distance [17].

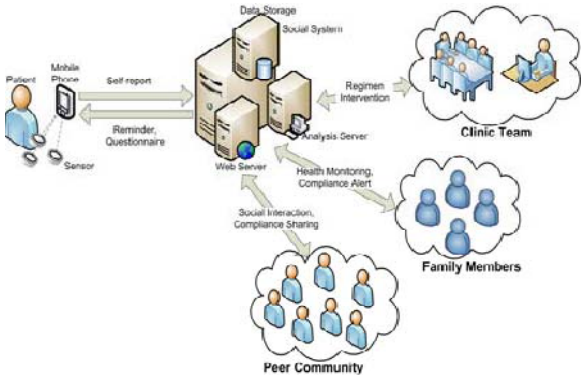


Figure 2. Mobile-Phone based Patient Compliance System [17].

IV. CHALLENGES FACING THE APPLICATION OF WIRELESS SENSOR NETWORKS FOR REMOTE HEALTHCARE MONITORING IN NIGERIA.

The application of wireless sensor networks in remote healthcare monitoring has brought major advantages to the existing healthcare services in Nigeria. However, this emerging technology has several key challenges. These challenges vary from the lack of technical infrastructures that hinders access to information and emergency treatment to the inadequate qualified medical personal [18]. Other challenges include the reliability of the technology, the digital divide among the participants and ethical implication of this system on the culture of Nigerians. While Biosensors and Telemedicine for remote healthcare is certainly promising in Nigeria, the above mentioned challenges must be addressed for the project to be successful.

A. Security and Reliability of the system

There are competing security threats to sensor networks for remote medical application or telemedicine application. An outsider or insider attacker can be launched on the health information that is been transmitted via wireless from one point to the other. In an outsider attack, the adversary is not an authorize user, he eavesdrops and records encrypted messages which he later decodes to discover secret keys [19]. The insider attack is more dangerous because the attacker physically captures node, read their memory; he then obtains key materials and forges nodes messages [19]. These security threats brings to question the reliability of this technology and data received from the system. Healthcare system application demands strict

requirements on system reliability. This is because the data being considered has to do with the live of an individual. End users require measurements that are reliable and precise. Environmental factors can also affect the reliability of the system; the location where these sensor devices are deployed may not favor radio frequency transmission. This could be as a result of high interference or barrier such as metal doors [20]. It has also be been discovered in recent research that packet losses for radio frequency devices operating the IEEE 802.15.4 standard is higher in hospital than other indoor places [21].

B. Ethical and Cultural Issues

Ethical and cultural issues can be major impediments that may hinder the application wireless Sensor Networks for remote healthcare in Nigeria. The diversity in culture and different religious beliefs amongst Nigerians can restrict the application of e-health. The system may be associated with a lot of ethical issues, of major concern are the security and confidentially of patient information because decisions are usually taken on patient without personal contact [22]. The issue of vulnerability of patient's privacy and confidentiality in e-health has been deliberated upon by many researchers; most have expressed concerns at security and potential abuse of confidential medical data via IT. They have pointed out that IT medicine, specifically telemedicine and biomedical sensors used for remote healthcare can result in ambiguous doctor -patient relationships [23].

C. Legal and Policy Issues

This challenge ranges from restriction on medical practices across the nation to issues of litigation due to misdiagnosis or malpractice. With the use of wireless sensors networks for remote healthcare application in its infant stage in Nigeria, legal and policy issues are major challenges; this is because it lacks legal framework and a strategic policy [24].

D. Inadequate IT infrastructure

Inadequate IT facilities are major impediment to the application of e-health in Nigeria; IT facilities include computer systems, software and bandwidth. More than 50% of Nigerians are in the rural areas and have no access to the internet due to absence of IT infrastructure [25].

E. Epileptic Power Supply

The epileptic power supply can hinder the success of the remote medical delivery project in Nigeria [25].

F. Digital Divides/Literacy

Digital divide refers to gap that exist in computer literacy between one group of individuals and another. It is obvious that the level of computer awareness among Nigerians is very low. For the remote medical programme of the Federal government of Nigeria to succeed, the challenge of computer literacy has to be surmounted

V. THE WAY FORWARD ON THE APPLICATION OF WIRELESS SENSOR NETWORKS FOR REMOTE MEDICAL DIAGNOSES IN NIGERIA

The use of wireless sensors networks for remote healthcare delivery Nigeria is very promising; it can reduce mortality and poverty rates if well the following steps are taken.

- Information and Communication Technology should be included in all schools curriculum; this will enable Nigerians to have knowledge of information technology. Also enlightenment and awareness programmes on the basics of Sensor networks, telemedicine and other forms of e-health should be carried out for adults in the rural and urban centres of Nigeria.
- Adequate ICT Infrastructure and professionals should be made available to support the system at all tiers government.
- The government should improve electricity power supply to the country; only a stable power supply will support the implementation of the programme.
- A strategic plan and policy on the application of Wireless Sensor Networks for remote medical practice should be established by the federal government and legislation on the use of e-health in Nigeria should be enacted by the parliament.
- Finally, IT should be given high attention in the yearly budget to sustain all the e-health projects.

VI. CONCLUSION

Although wireless sensor networks for remote healthcare have been implemented in different forms, the principle and objective of the system remain the same. That is achieving remote medical treatment by using miniature electronic devices to communicate through wireless medium over a distance. Nigerian e-health projects have a lot of potentials, which cannot be exploited completely when all the above challenges are not solved. In this paper, the architecture of Wireless Sensor Networks for remote

medical application has been discussed. We also present key challenges facing the application of Sensor Networks in Nigerian and recommend steps to be taken for a better implementation of the remote e-health projects in Nigeria. In future work, a survey should be carried out across Nigeria measuring some indices among health workers and the general public on the feasibility of using Wireless Sensor Networks for remote medical application in Nigeria.

REFERENCES

[1] J. N. Al-karaki and A. E. Kamal "Routing Techniques in Wireless Sensor Networks", IEEE Wireless Communication, vol. 11, pp. 6-28, 2004.

[2] K. Akkaya and M. Younis "A Survey on routing for wireless sensor networks", Elsevier Network journal, 2005.

[3] K. Akkaya, M. Younis and M. Youssef, "Efficient Aggregation of Delay Constrained Data in Wireless Sensor Networks", The Proceedings of IEEE/ACS International Conference on Computer and Applications, 2005.

[4] O.K. Boyinde and K.G. Akintola, "Transforming Nigerian Health care System through Wireless Sensor Networks", Pacific Journal of Science and Technology, vol. 1, 2009.

[5] P. A. Ademola, A. Z. Nureni, O. A. Ademola, K. A. Kehinde and O. N. Henry, "Using Wearable sensors for Remote Healthcare monitoring systems", Journal of Sensor Technology. Vol. 1 pp. 22- 28, 2011.

[6] C. H. Vallejos de Schatz, H. P. Medeiros, F. K. Schneider and P. J. Abatti, "Wireless Medical Sensor Networks: Design Requirements and Enabling Technologies", vol. 18, 2012.

[7] C. Anyu " Medical Sensors Purpose, Types and Development", School of Biomedical Engineering, Capital Medical University 2009.

[8] K. Narendra, A. Alok and G. Nidhi "Wearable sensor for Remote Health Monitoring System" International Journal of Engineering Trends and Technology, Vol. 3, 2012.

[9] A. Alale , "Telemedicine Pilot project, the Nigerian communication satellite", 2010

[10] K. J. Godstime, O. P. Kayode and S. A. Halilu "Telemedicine Development in Nigeria", National Space Reseach and Development Agency, Abuja Nigeria, 2010.

[11] F. A. Imouokhome and V. I. Osubor " Mobile Device Based Telemedicine for improved Health ", African Journal of Computing & ICT, vol. 5, 2012.

[12] P. S. Pandian, K. P. Safeer, G. T. S Pragati, and V. C. Padaki, " Wireless Sensor Networks for wearable physiological monitoring", Journal of networks, vol. 3, 2008.

[13] A. Darwish and A. E. Hassanien, "Wearable and Implantable Wireless Sensor Network Solutions for Healthcare Monitoring", Open Access Sensor, No. 11, pp. 5561-5595, 2011.

[14] D. Perednia and A. Allen, "TMVC technology and clinical applications", Journal of American Medical Association, pp. 483-488, 1995.

[15] S. O. Mohammed, "An Over view of the Nigerian Space Research Programme and future Direction" A Presentation at the National Space Dialogue and Annual media Conference in Nigeria, 2011

[16] O. R. Oyeleke, O. J. Emuoyibofarhe and F.O. Alamu, "Healthcare Personnel Preference for Age Ranges to Wear Intelligent Mobile Biomedical Sensor for Blood pressure Monitoring" International Journal of Applied Information Systems (IJAIS),Vol. 2, 2012.

[17] B.M.G. Amosa, O. L Longe and O. P. Akinbode, "Mobile Phone Based Patient Compliance System for Chronic Illness care in Nigeria", JCS&T Vol. 12 No. 1, 2012

[18] R. O. Akinyede, O. A. Daramola, and O. S. Adewale, " Towards Delivering High Quality Healthcare through Integrated

National Health Information System And Telemedicine Development, Problems And Recommended Solutions ", Canadian Journal of Computing in Mathematics, Natural Sciences, Engineering and Medicine Vol. 3 No. 6, 2012.

[19] D. Tassos and I. Krontiris, "Security Issues in Biomedical Wireless networks", Athens Information Technology centre, 2008.

[20] G. Jeong and L. Chenyang, B. Mani, A. S. John and T. Andreas " Wireless sensor Networks for Healthcare" The Proceedings of IEEE Vol. 98, No. 11, 2010.

[21] J. Ko, T. Gao, R. Rothman and A. Terzis " Wireless sensing systems in clinical environments; improving the efficiency of the patient monitoring process", IEEE Eng. Med. Biol. Mag., vol. 29, no. 2, pp. 103–109, 2010.

[22] O. L. Abodunrin and T. M. Akande "Knowledge and Perception of E-Health and Telemedicine among Health Professionals in Ladoke Akintola University Teaching Hospital, Osogbo, Nigeria", International Journal of Health Research, pp. 123-130, 2009.

[23] O. A. Olorode1 and O. E. Oladunni " E-health in Biomedical, Its role and challenges in Bayelsa state, Nigeria", The Proceedings of the International Technology, Education and Environment Conference of African Society for Scientific Research, 2011.

[24] E. Lambo, " Embracing Telemedicine " http://www.nigeriannewsworld.com/content/embracing-telemedicine 2012.

[25] Communiqué and Statement of the 17th ISfTeH International Conference on Telemedicine and e-Health, held at Thisday Dome, Abuja, Nigeria 2012.