Practical Applications Of Wireless Sensor Network Based On Military, Environmental, Health And Home Applications: A Survey

Ananya chatterjee, Manjusha Pandey

Abstract— The past few years have witnessed accumulated interest within the potential use of wireless sensor networks (WSNs) in a very big selection of applications and it's become a hot analysis space. This has been enabled by the provision, notably in recent years, of sensors that are smaller, cheaper, and intelligent. These sensors are equipped with wireless interfaces with that they will communicate with each other to create a network. This survey paper aims at reportage an summary of WSNs technologies, main applications and standards, options in WSNs style, and evolution.

Index Terms— **Environmental applications,Health Applications,Home applications,Military applications,Surveillance,Monitoring,Wireless sensor network**

— — — — — — — — ◆ — — — — — — — —

1 INTRODUCTION

A wireless sensor network is style of wireless ad-hoc networks. It's little and infrastructure less .Basically wireless device network consist variety of sensor node, known as little sensor and these are operating along to sight a district to require information regarding the setting. Wireless device network aim is to produce economical association among the physical condition and web worlds. The nodes of the wireless sensor network is permits random preparation in inaccessible terrains, this implies protocol of the wireless device is self organized, another vital feature of the wireless sensor network is cooperative effort of the sensor nodes. sensor nodes are grouping information regarding setting, once grouping it they method it then transmit to the bottom station.Base station provide interface between user and web. In wireless sensor nodes includes each a hardware platform Associate in Nursing an OS designed. Tiny OS could be a part primarily based OS designed to run in resource affected wireless devices. Basic characteristic of the wireless sensor network are restricted energy, dynamic configuration, lower power, node failure and quality of nodes. Sensor nodes are often used for continuous sensing, event detection, event ID, location sensing, and native management of actuators. The construct of micro-sensing and wireless association of those nodes promise several new application areas. Wireless sensor networks (WSN) is a very important and exciting new technology with nice potential for rising several current applications in medication, transportation, agriculture, process management, and therefore the military furthermore as making new revolutionary systems in areas like global-scale setting all observation, precision agriculture, home and assisted living medical aid, smart

buildings and cities, and various future military applications.we tend to categorizes the applications into space wise like military, environment, health and home.

2 MILITARY APPLICATIONS

Wireless sensor network might be a necessary part of military charge, control, interchanges, registering, discernment, reconnaissance, observation and focusing on (C4ISRT) frameworks. A percentage of the paramount and adequate provisions of sensor arranges in military requisitions are as accompanies

2.1 Monitoring friendly forces, equipment and ammunition

By the assistance of WSN Leaders and commandants can always screen the status of inviting troops, the condition and the accessibility of the gear and the fire power in a front line. The little sensors are appended with each troop, vehicle, gear and basic ordnance and report the status to the troop pioneers[1].

2.2 Battlefield surveillance
As the operations advance and new operational arrangements are ready, new sensor systems could be conveyed whenever for front observation. Basic landscapes, approach tracks, ways and straits could be quickly secured with sensor systems and nearly looked for the exercises of the restricting drives[1].

2.3 Targeting
Pinptr is a test counter-marksman framework improved to distinguish and spot shooters. The framework uses a thick arrangement of sensors to recognize and measure the time of landing of gag impacts and stun waves from a shot. Sensors track their estimations to a base station to figure the shooter's area[1].

_____

- *Ananya Chatterjee is currently pursuing masters degree program in Computer science engineering in KIIT University, India, PH-91 9040649680. E-mail: ananyachatterjee2212@gmail.com*
- *Manjusha Pandey is currently professor in computer science engineering in KIITUniversity, India, PH-91 8763999448. E-mail: manjushapandey82@gmail.com*

2.4 Nuclear, biological and chemical attack detection and reconnaissance

In synthetic and organic warfare, being near ground zero is critical for auspicious and precise recognition of the executors. Sensor systems conveyed in the well disposed district and utilized as a synthetic or biotic cautioning framework can furnish the amicable constrains with basic response time, which drops losses definitely. We can additionally utilize sensor organizes for itemized surveillance after a NBC strike is recognized. Case in point, we can make an atomic surveillance without uncovering a recce group to atomic radiation[1].

2.5 Aerostat acoustic payload for transient and helicopter detection

Using acoustic sensor shows suspended underneath fastened aerostats The Army Research Laboratory (ARL) has led tests to locate and restrict transient motions from mortars, big guns and little arms discharge. Unattended ground sensor (UGS) frameworks are utilized to perform a 3d triangulation on a source area. The same aerostat and UGS joint effort can track adjacent helicopters in 3d for tie evasion[2].

2.6A novel shoe scanner using an open-access quadruple resonance sensor

Novel shoe scanner advanced at the GE Security San Diego Centre of Excellence utilization Quadruple Resonance (QR) to distinguish explosives stowed away in shoes. The shoe scanner was created with an open-access frame and filtering chamber that permits travelers to stand in the framework in a regular position throughout the checking process[2].

2.7 Advances in group filter applications to sea mine detection

It is extremely challenging to separate questions in the underwater environment which change in size, shape, and introduction from regularly happening and man-made disorder. For that unmanned underwater vehicle (UUV) sensor frameworks described by high sensor information rates and constrained preparing capabilities is utilized by Naval Surface Warfare Centre Panama City (NSWC PC) to output the sonar picture and characterize the picture characteristics, geometrically characterized structures with introductions, and confined ghastly data into different orthogonal parts or emphasize subspaces of the picture[2].

2.8 Omni Bird a miniature PTZ NIR sensor system for UCAV day/night autonomous operations

Supported via Navair and working with Boeing and Northrup Grumman, Technest is in its finishing Phase of improving a novel airborne motion picture sensor called Omni bird for day and night UCAV (Unmanned Combat Air Vehicles) deck taking care of (e.g. maneuvering) operations and ready for. The Omni bird sensor joins a remarkably designed optical structure, a greatly delicate close infrared (NIR) sensor, and a particular locally available picture preparing hardware unit into a payload bundle that is little in size, minimal effort, lightweight, and has pan/tilt/zoom capacity. When it is finished, the sensor framework will be completely coordinated with a motion distinguishment framework to immediately discover and track the flight deck activity executive, to distinguish his/her motions, and to guide the UCAV for its movement[2].

2.9 Low-cost acoustic sensors for littoral anti-submarine warfare (ASW)

Detecting cutting edge diesel-electric submarines working on electric cells in littoral waters is exceptionally challenging utilizing universal sonar engineering due as a part of substantial part to the uproarious and reverberant nature's turf. To address this issue, Si2 Technologies Inc. (Si2) has advanced a little, minimal effort, short range, double mode acoustic sensors. This idea uses little sensors with inactive and dynamic sonar to discover advanced diesel submarines working on electric cells. The sensors could be sent in vast numbers (hundreds or thousands) to furnish a high thickness sensor field hinging on the requisition of investment[2].

2.10 Early attack reaction sensing element (EARS)

a man-wearable gunshot: the first Attack Reaction sensing element (EARS) may be a passive acoustic sensing system that detects gunshots (muzzle blast and/or shockwave) to produce relative AZ and vary data of the shot origin to the user via audio alert and visual show. The EARS system consists of a tiny low mike array and Digital Signal process board packaged for numerous platform-independent applications as well as man-wearable. the target was to develop a cheap, transportable / man-wearable, micro-acoustic array that instantly alerts a soldier to the origin of hostile enemy fireplace[2].

2.11 Time difference of arrival blast localization using a network of disposable sensors

MCQ has developed such a system, employing a mesh network of cheap acoustic sensors. The system performs a three-dimensional, Time-difference-of-arrival (TDOA) localization of blasts of assorted yields in many totally different environments. Localization data of the blast is provided to the tip user by ex filtration over satellite communications. The system is in a position to perform accurately within the presence of assorted sources of error as well as GPS position, propagation effects, temperature, and error in determinative the time of arrival (TOA)[2].

2.12Novel optical sensor system for missile canisters continuous monitoring

Missile environmental monitoring dramatically will increase missile active service life, saving ample bucks and reducing the quantity of missiles required. this needs a high-speed continuous observation sensing element system that collects and stores information on environmental shock and vibration (up to one hundred gm) in missile canisters while not electrical hazards. This work instigated a shot to develop a Fabry-Perot MEMS-based optical sensing element system capable to watch shock and vibration in missile canisters in 3 dimensions at high speed (5 kHz) mistreatment a wholly optical interrogation approach. The system is planned to be utilized in All-Up-Round (AUR) environmental exposure observation system on AEGIS destroyers or cruisers to gather and store vibration,

shock, temperature, or damaging events information over the whole life of a missile canister[2].

2.13 Acoustic threatening sound recognition system

Threatening sound detection, classification associate degreed localization is an example technology which will be effectively utilized in uneven warfare and against terrorist threats.. The functions of threat detection, classification and supply localization square measure organized in WSN in multiple levels, namely, base level, entrance node level and sensing node level. At every level, the knowledge process task is performed during a distributed manner. On the opposite hand, the projected system design permits cooperation among sensing nodes to collaboratively notice target signatures, scale back false alarms, classify target sorts, and estimate the acoustic supply location. The system combines recent advances in rippling Analysis, intelligent learning and sensing element fusion. above all, the projected separate rippling Packet rework (DWPT)- based mostly power-law detection algorithmic rule is powerful to environmental noise, nevertheless computationally economical[2].

3 ENVIRONMENTAL APPLICATIONS

3.1 Habitat Surveillance

ZebraNet system could be a mobile wireless device network accustomed track animal migrations. ZebraNet consists of device nodes engineered into the zebra's collar with GPS unit. point readings are taking victimization the GPS and sent multi-hop across zebras to the bottom station. The goal is to accurately log every zebra's position and use them for analysis. when readying, the biologists discovered that the collared zebras were stricken by the collars. They discovered extra head shakes from those equine within the initial week. when the primary week, the collared equine show no distinction than the uncollared equine[3].

MAX could be a system for human-centric search of the physical world. MAX permits folks to look and find physical objects once they are required. . MAX was designed with the objectives of privacy, economical search of a labeled object, and human-centric operation. MAX uses a hierarchic design that needs objects to be labeled, sub-stations as landmarks, and base-station computers to find the item. Tags on objects will be marked as personal or public that is searchable by the general public or owner solely. MAX is intended for low energy and minimal-delay queries[3].

Matching Mother and Calf Reindeer The matter of matching newborn Greenland caribou calves to their mothers, and thus to their homeowners, so they're given correct identification tags, when the reindeers are gathered from the wild in Gregorian calendar month annually, could be a conscientious task that is being undertaken victimization personnel that is extremely expensive and time intense, at constant time the manual techniques used are terribly nerve-wracking for the ani-

mals and farmers alike. Here a way is projected victimization wireless device networks supported wireless local area network enabled active RFID tags. it's projected to hold wireless local area network enabled RFID tags to the necks of the calf and mother reindeers on a short lived basis, a procedure that mustn't consume a lot of time nor cause stress on the animals, and to trace the placement of these tags victimization the wireless local area network. Localization algorithms developed to watch the placement of the tags and to work out the correlation between any pairs of tags that indicate mother and her calf. A full description of the technology is conferred beside description of well-known localization techniques. it's hoped that this can pave the means for the utilization of wireless device networks for the aim of identification of semi-wild animals[4].

3.2 Volcanic monitoring

Volcanic observance with WSN will facilitate accelerate the readying, installation, and maintenance method. WSN equipments ar smaller, lighter, and consume less power. The challenges of a WSN application for volcanic knowledge assortment embody reliable event detection, economical knowledge assortment, high knowledge rates, and distributed readying of nodes[1].

3.3 Forest fire detection

Since device nodes could also be strategically, randomly, and densely deployed in a very forest, device nodes will relay the precise origin of the hearth to the top users before the hearth is unfold Uncontrollable. Macroscope of redwood could be a case study of a WSN that monitors and records the redwood trees in Sonoma, California. every device node measures air temperature, ratio, and photo-synthetically-active radiation. device nodes ar placed at totally different heights of the tree. Plant biologists track changes of spatial gradients within the microclimate around a redwood tree and validate their biological theories[2].

3.4 Greenhouse Monitoring

To make sure that the automation system in a very greenhouse works properly, it's necessary to live the native climate parameters at varied points of observation in numerous elements of the massive greenhouse. This work if done employing a wired network can build the whole system clumsy and expensive. However, a WSN primarily based application for constant purpose victimization many little size device nodes equipped with radio would be a price effective resolution. Such associate degree application has been developed in. knowledge analysis, DSP primarily based management solutions and a lot of complicated network setups ar the areas nevertheless to be explored[2].

3.5 Flood detection

Associate degree example of a flood detection is that the ALERT system deployed within the US. many sorts of sensors deployed within the ALERT system ar downfall, water level and weather sensors. These sensors offer data to the centralized info system in a very pre-defined means[2].

3.6 Underwater monitoring study

In developed a platform for underwater device networks to be used for future observance of coral reefs and fisheries. The device network consists of static and mobile underwater device nodes. The nodes communicate via point-to-point links victimization high speed optical communications. Nodes broadcast victimization associate degree acoustic protocol integrated within the TinyOS protocol stack. they need a range of sensing devices, as well as temperature and pressure sensing devices and cameras. Mobile nodes will find and move on top of the static nodes to gather knowledge and perform network maintenance functions for readying, re-location, and recovery. The challenges of deploying sensors in associate degree underwater atmosphere were some key lessons from this study[2].

3.7 Water Quality and Air pollution Monitoring

Here device nodes collects the environmental knowledge like water temperature, pH levels, dissolved chemical element levels, and wind speed and live the standard of water level[5]. In pollution observance, GIS is employed to manage knowledge of observance field and web site, like attribute (monitoring parameter) knowledge and geographical knowledge (monitoring web site location); to investigate and simulate spatial-temporal distribution of pollution condition as well as pollution model; to see the results of analysis and observance. as a result of ZigBee primarily based wireless device network will find the placement of the nodes, GIS is additionally accustomed manipulate these nodes that have geographical data[6].

3.8 CAESRS(Chemical Accident Emergency Search and Rescue System)

It is orientated to observance the leak of unsafe chemicals and to guaranteeing the protection of individuals in unsafe areas. Technologies like WSN (Wireless device Network) and mobile mechanism got to be integrated to make up CAESRS. Humanitarian search and rescue operations will be found in most large-scale emergency operations. The set of capabilities provided by robot-sensor networks match up well with those required to make an efficient search and rescue system. so as for a research and rescue system to fulfills its mission, the system should be able to each quickly and faithfully find victims among the search area[7].

3.9 Slope Stability Monitoring

The standard observance instrumentality cannot satisfy the request of immediate response for slope instability. This study is aim to supply an easy, effective and immediate device to scale back the injury the maximum amount as potential by real time before disasters happens, and take reaction promptly. The advanced, engineering of Wireless device Network (WSN) is first of all introduced for this application in Taiwan. MEMS tilt meter, sensitivity with zero.5 degree in X Y direction is employed for observance the changes from options of slope stability IEEE commonplace of ZigBee is applied for wireless communication network. Since this intelligent WSN system contains sensors, wireless transmission, and low power offer,

every single node becomes a knowledge assortment and transmission base. It shows that for any movement from the slope surface, the device knowledge will labor under all the nodes. And to succeed in the server station, then the reaction from management workplace will be taken promptly[8].

3.10 Post Disaster Road monitoring System

The post disaster road observance system provides a motivating application space for wireless device networks. when the earthquake the roads are subjected to be blocked by landslide. The folks need a scalable and low value technology for obtaining real tie dynamic knowledge concerning road accessibility as a result of aftershocks occur unendingly. Wireless device networks are promising candidate to fulfills these necessities. The earthquake and landslide can disturb the atmosphere through seismic motion, sound image and etc. during this system there's a detection module composed by the seismic motion device sound device and image device that is embedded within the node to watch the changes of the road condition. The system determines whether or not the road is blocked through the data collected by the seismic motion device and sound device, If there's a happening system can send the request to transfer the image to the relevant node and send a warning message[9].

3.11 Victim Sensor Node (VSN) for rescue operations

It's conferred that every person living in disaster danger space carry a specially designed device with distinctive number. The device is termed Victim device Node (VSN). relying upon style and quality, the VSN might be fitted in a very watch, mobile, billfold etc or one by one worn. There are already well placed wave warning centers round the world which may provide warning cushion time of a minimum of 3-5 minutes. it's projected that once a warning is issued folks manually activate their sensors. Since folks got to manually start their sensors, thus this technique is best suited to disasters with previous warnings like wave. when the wave disaster the WSN shaped by the VSNs worn by victims can facilitate relay the data to nearest Network Aggregation Hub (NAH). The NAHs are sturdy and resilient aggregation devices situated in sturdy compartments throughout the danger zones. These NAHs gather the info and so transmit it to central server (CS). The metallic element processes the all incoming knowledge and divides it into extractable data like location and proximity of survivors, body temperatures and heart pulses etc. what is more since every VSN encompasses a distinctive ID, relatives and friends may use the general public portal to examine on them. just in case the nodes get dead or destroyed, the central server goes to save lots of the last understand location of that specific node in its info. during this means they'll be having all the viable data of the victims. Thus, groups are able to save and rescue them a lot of effectively[10].

3.12 Smart Phones for Disaster

In these years, disasters usually occurred in abroad. once the disaster happen, general communication strategies, e.g., cell phone, might not work well thanks to the injury of communication infrastructure or restriction of usage of communication

resources. a way to let users quickly make sure safety could be a critically vital drawback when a disaster. Therefore, it proposes a style of safety confirmation system desegregation WSN and good phones. Users will input messages victimization good phones and therefore the messages ar sent through WSN engineered supported device nodes mounted on good phones. A preliminary simulation has been performed to judge the effectiveness of the strategy for transferring messages[11].

4 HEALTH APPLICATIONS

4.1 Sleep Safe

Several child die from unexpected sudden infant death syndrome (SIDS) annually, it's designed for observance associate child whereas they sleep. It detects the sleeping position of associate child and alerts the parent once the child is lying on its abdomen. Sleep Safe consists of 2 device motes. One SHIMMER molecule is hooked up to associate infant's vesture whereas a T-mote is connected to base station laptop. The SHIMMER node encompasses a three-axis measuring instrument for sensing the infant's position relative to gravity. The SHIMMER node sporadically sends packets to the bottom station for process. supported the dimensions of the sensing window and therefore the threshold set by the user, the info is processed to work out if the child is on their back[2].

4.2 Baby Glove

model is intended to observe organ. Baby Glove could be a swaddling baby wrap with sensors which will monitor associate infant's temperature, hydration, and heart rate. A SHIMMER molecule is connected to the swaddling wrap to transmit the info to the T-mote connected to the bottom station. Like Sleep Safe, associate alert is shipped to the parent if the analyzed information exceeds the health settings[2].

4.3 FireLine

It could be a wireless vital sign sensing system. it's wont to monitor a hearth fighter's vital sign in period of time to notice any abnormality and stress. FireLine encompass a Tmote, a custom created vital sign device board, and 3 re-usable electrodes. of these parts square measure embedded into a shirt that a hearth fighter can wear beneath all his protecting gears. The readings square measure taken from the T-mote is then transfer to a different T-mote connected to the bottom station. If the fireplace fighter's vital sign is increasing too high, associate alert is shipped[2].

4.4 Efficient Patient monitoring For Multiple Patients

It is a economical system which will monitor multiple patients' health parameters at the same time and may effectively deliver the info to a patient observance system wherever its hold on for good. Current ancient health observance is accomplished by individual PCs hooked up to every patient's bed. The multiple parameters that square measure monitored square measure force per unit area, temperature, ECG, and EEG. Our analysis investigates the potential of WSN to faithfully, wirelessly collect, send and method these multiple pa-

rameters of multiple patients at the same time, in period of time. This is achieved by distinguishing every patient's monitored parameter employing a distinctive ID and using a time programming theme throughout information transmission. The system conjointly alerts the doctor/nurse of some measured price cross threshold limits[12].

4.5 Glove based deaf-mute communication interpreter system

Communications between deaf-mute and a traditional person have perpetually been a difficult task. This aims to facilitate folks by means that of a glove based mostly deaf-mute communication interpreter system. The glove is internally equipped with 5 flex sensors, tactile sensors and measuring instrument. for every specific gesture, the flex device produces a proportional amendment in resistance and measuring instrument measures the orientation of hand. The process of those hand gestures is in Arduino. The glove includes 2 modes of operation – coaching mode to profit each user associate an operational mode. The concatenation of letters to make words is additionally wiped out Arduino. additionally, the system conjointly includes a text to speech conversion (TTS) block that interprets the matched gestures i.e. text to voice output[13].

4.6 Remote monitoring of oxygen Saturation and Heart Rate

This describes the belief of a wireless element saturation and vital sign system for patient observance in a very restricted space. The projected system can permit the automated remote observance in hospitals, at home, at work, in real time, of persons with chronic sickness, of older folks, and of these having high medical risk. The system is used for long-time continuous patient observance, as medical help of a chronic condition, as a part of a process, or recovery from associate acute event. The blood element saturation level (SpO2) and vital sign (HR) square measure endlessly measured mistreatment commercially obtainable pulse oximeters and so transferred to a central observance station via a wireless device network (WSN). The central observance station runs a patient monitor application that receives the SpO2 and hour from WSN, processes these values and activates the alarms once the results exceed the predetermined limits. A easy Graphical interface was developed for the patient monitor application to show the received measurements from all monitored patients. A model of the system has been developed, enforced and tested[14].

4.7 Tracking and monitoring doctors and patients and drags inside a hospital

Every patient has tiny and lightweight weight device nodes hooked up to them. every device node has its specific task. for instance, one device node is also sleuthing the center rate whereas another is sleuthing the force per unit area. Doctors can also carry a device node, that permits different doctors to find them at intervals the hospital. If device nodes is hooked up to medications, the prospect of obtaining and prescribing the incorrect medication to patients is decreased[1].

4.8 iCalm: measurement Electro dermal Activity

Electro dermal activity (EDA) is associate indicator of sympa-

thetic system arousal, approximating one amongst the 2 main dimensions of feeling – the arousal dimension. The EDA signal will describe the degree of a person's excitement or anxiousness, yet as obtain on arousal changes associated with anticipation, pain, and plenty of different feelings which will be of interest. several factors will play into a person's arousal: location, time of day, task, familiarity with setting, etc. in a very typical research lab setting, several of those factors aren't natural, creating the person's arousal keen about the altered setting. iCalm measures electro dermal activity in a very tiny, comfy, and mobile form-factor wirelessly, allowing measurements to be created outside of a research lab setting. This capability is important for learning regarding feeling in natural human action[15].

4.9 Glaucoma Intraocular Pressure Monitor

It could be a harmful disease that causes sightlessness in uncountable folks worldwide. There could open up new avenues for treatment. This work focuses on the look and fabrication of a lively eye disease force per unit area (IOP) monitor that's absolutely wireless and implantable. Major edges of a lively IOP monitor embrace the potential to work severally from associate external device for extended periods of your time and therefore the risk of developing a closed-loop observance and treatment system. The absolutely wireless operation relies off mistreatment gigahertz-frequency non particulate radiation propagation, that permits for associate orientation freelance transfer of power and information over cheap distances. this technique is comprised of a small mechanical device systems (MEMS) pressure device, a electrical phenomenon power storage array, associate application-specific computer circuit designed on the Texas Instruments (TI) a hundred thirty nm method, and a monopole antenna all assembled into a biocompatible liquid-crystal polymer-based tadpole- formed package[16].

4.10 Bus Identification System for Visually Impaired Person

Several technologies have recently created noticeable changes in many domains. This can shed the sunshine on the sector of transportation to boost the life quality of visually impaired persons (VIPs) mistreatment a number of these technologies like radio frequency identification (RFID) and wireless sensors network. moreover, a mechatronic system design associated an acceptable style for its parts are going to be projected. this technique can permit VIPs to soundly catch buses with the assistance of associate audio device and a tactile interface through a wireless communication system (Wi-Fi) between the transmitter and therefore the receiver. VIPs can have the chance to induce info regarding bus/transit stop locations and departure times or different transit schedule info[17].

4.11Wireless Technology for Occupational Dosimetry

This presents associate innovative networked answer for never-ending measure of human exposure to ultraviolet rays and dirt. The platform is formed from mobile wireless sensors nodes, designed to be hooked up on garments, so as to be merely wore by anybody. Power provide isn't required, due to the utilization of energy gather techniques. The physical de-

vice itself is chosen among business parts obtainable off the shelf, however the antenna and therefore the radio square measure designed designedly and integrated on the dress. the full device is completed by means that of a producing technique that enables its wash ability. Flexibility, light-weight weight and tiny dimensions guarantee a non-intrusive presence of the part, that doesn't have an effect on the conventional activity of the topic. Among some, we've selected a specific application, dedicated to employees used within the construction sites, with specific relevancy folks operating in geographic region Countries, wherever summer temperatures could become over fifty two degrees and winter robust dust/sand storms could happen on a weekly basis. the overall realization theme is bestowed, in conjunction with associate analysis of the performance of a primary model[18].

4.12 Visual Neuroprosthesis

This describes a whole visual neuroprosthesis wireless system designed to revive helpful sight to deeply blind folks. This visual neuroprosthesis performs intra plant tissue small stimulation through one or additional arrays of microelectrodes established into the first cortical area. the full system consists by a primary unit set outside the body and a secondary unit, established within the body. the first unit contains a neuromorphic encoder, a forward transmitter, and a backward receiver. The developed neuromorphic encoder generates the spikes to stimulate the cortex by approximating the spatio-temporal receptive fields' characteristic response of neural structure cells. Power and stimuli info square measure carried to within the braincase by means that of a low-coupling electrical device, that establishes a wireless inductive link between the 2 units. The secondary unit contains a forward receiver, microelectrode stimulation electronic equipment and a backward transmitter that's wont to monitor the implant. Address event illustration is employed for communication spike events. information is modulated with binary frequency-shift keying and differential binary phase-shift keying within the forward and within the backward directions, severally[19].

5 HOME APPLICATIONS

5.1 Smart Home Vacuum Systems

a foreign computer hardware robotic vacuum system is exchange the recent household appliance, however this robotic vacuum system isn't able to clean ace of baseboards, stairs, and beneath the piece of furniture. a contemporary vacuum cleansing system ought to conquer the weak points related to the robotic vacuum system within the sensible home setting. SHV consists of 2 major parts, Vacuum sensing element Node (VSN) and Intelligent cleansing Management Station (ICMS). every VSN is in a position to sweep, sense "cleanness" in its accountable space and report its standing (such as energy residues, location and perceived cleanness) back to ICMS. to scale back the energy consumption, all VSNs square measure sorted in clusters, wherever every cluster is managed by a cluster head (CH). Upon receiving the knowledge from supervised VSNs, cluster head (CH) transmits the collective information to the ICMS. The election of cluster-head will proceed victimi-

zation no matter policy is appropriate. during this the planned goal driven task coming up with (GDTP) engine can select the most effective clump formula to optimize the performance matrices[20].

5.2 Net in Net

Internet in web model related to Zigbee and GPRS technology. it's hardware device related to code programming. furthermore B/S and C/S mixed mode square measure used for remote interaction. Even cyber protocol is additionally accustomed build home system additional secured reliable, stable and timeliness. It uses Wireless sensing element network embedded with net server and alert management system[21].

5.3 WSN Application Service Platform (WASP)

It's planned associate innovated sensing element observation service with web-based and GIS based mostly design, that is known as WSN Application Service Platform (WASP). WASP may be a information management center, that designed with the conception of Services minded Application (SOA) as a Cloud Service. The raw information may be transferred into add-on valued data and shown on the net pages through WASP. Users will question and procure the dear data and understand the meanings of those information through web-based interfaces, that is outlined in sensing element net Enablement (SWE) by Open Geospatial association (OGC). supported WASP, the information may be shown right away on social networks (i.e. Face book) via the framework. All sensors and devices offer their location data to information center and kind a community. The planned framework provides remote functions for WSN to extend the information retrieval potency supported OGC SWE sensing element Observation Service (SOS), sensing element coming up with Service (SPS), and sensing element Alert Service (SAS).The planned system is useful and economical for user to get pleasure from the sensible home applications[22].

5.4 Smart Power monitoring System

System has been designed which will be accustomed monitor electrical parameters like voltage, current and power of family appliances. The system consists of a wise sensing unit that detects and controls the house electrical appliances used for daily activities by following completely different tariff rates. It will scale back prices for the customers and thereby improve grid stability. A developed example has been extensively tested and experimental results have compared with standard mensuration devices[23].

5.5Remote Control System of sensible Appliances

Standing of the house appliances may be queried and controlled through either the remote laptop interface or mobile phones and the report will be send through GSM. The system has the benefits of convenient up to the mark, versatile in adding new devices[24].

5.6 Using a Kinect WSN for home monitoring

trailing folks associated gesture recognition become an application more and more exploited for management and oversight particularly with the invasion of networks and commu-

nication systems. during this it propose a wireless sensing element network victimisation Kinect video sensing element to regulate and supervise the state of sick or golden ager into a wise home. Here the utilization of a wireless fidelity network with network topology and therefore the application of a routing protocol like OLSR or 802.11s normal square measure mentioned. for every node, we tend to investigate the latent period and therefore the link quality. It attempt to transport Kinect information within the network victimisation USB over science encapsulation. Results show that it's troublesome to circularize information from the sensing element within the mesh wireless fidelity network as a result of the high rate needed that is regarding 180Mbits/s and open prospects for victimization another wireless normal[25].

6 CONCLUSION

The application area of WSN is very vast and diversified, as is presented by this survey. The survey has been done as elaborately as possible and during our survey we concluded with the following vital information that could be of prime importance for the research community.

- There are much more applications related to the military field but still keeping in mind about security and safety there may be lots more possible military applications for future research are required in this field.
- In case of environmental applications also research is being going on and implemented applications still need applicability of wireless sensor to provide attention and alert about harsh environment and natural calamities.
- Most of the applications of WSN done in health area are very much helpful for the special care patients and elderly people. These applications have helped them to come out from critical condition and always they can be monitored under treatments. So more and more attention should be paid in this area
- In case of home application more advancement can be done to make them applicable and compatible to expert systems.

.

REFERENCES

[1] I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci,A survey on sensor networks, IEEE Communications Magazine, 2002

[2] Md.Asdaque Hussain, Pervez khan, Kwak kyung Sup, WSN Research Activities for Military Application,ICACT,2009

[3] Jennifer Yick, Biswanath Mukherjee, Dipak Ghosal, Wireless sensor network survey, ELSEVIER ,2008

[4]   Mohamad Y. Mustafa, Svein M. Eilertsen, Amund Kronen, Matching Mother and Calf Reindeer Using WirelessSensor Networks, CSIT ,2013

[5]   Ning Jin, Renzhi Ma, Yunfeng Lv, Xizhong Lou,Qingjian Wei, A Novel Design of Water Environment Monitoring System Based on WSN,IEEE,2010

[6]   Han Zhi-gang, Cui Cai-hui, The Application of Zigbee Based Wireless Sensor Network and GIS in the Air Pollution Monitoring, IEEE,2009

[7]   Huiyong Wang, Minglu Zhang, Jingyang Wang, An Emergency Search and Rescue System Based on WSN and Mobile Robot, IEEE 2009

[8]   Dave Ta Teh Chang, Li Lun Guo, Kai Chun Yang, Yuh-Show Tsai, Study of Wireless Sensor Network(WSN) using for Slope Stability Monitoring, IEEE 2011

[9]   Usman Mehmood, Usman Mansoor, Dong Yeop Hwang, Ki-Hyung Kim,Taekkyeun Lee, Seung Wha Yoo ,Wireless Sensor Networks for Integrated Search and Rescue Efforts for Disaster Hit Areas, IEEE,2012

[10] Xu-guang Sun, Xiao-ling Sun, Qiu-ge Yang, Shu-nan Ma, Applications of Wireless Sensor Networks in Post Disaster Road Monitoring System, IEEE,2011.

[11] Junbo Wang, Zixue Cheng, Isao Nishiyama, Yinghui Zhou .Design of a Safety Confirmation System Integrating Wireless Sensor Network and Smart Phones for Disaster, IEEE2012

[12] Rajesh Kannan, Megalingam, Divya M. Kaimal, and Maneesha V.Ramesh, Efficient Patient Monitoring For Multiple Patients ,IEEE, 2012

[13] Sonal Kumari, Suman.K.Patra, Human Action Recognition using DFT , IEEE, 2011

[14] Cristian Rotariu, Vasile Manta, Wireless System for Remote Monitoring of Oxygen Saturation and Heart Rate, IEEE, 2012

[15] Elliott Hedman, Ming-Zher Poh, Oliver Wilder-Smith, Rich Fletcher, Matthew S. Goodwin, Rosalind Picard , iCalm: Measuring Electrodermal Activity in Almost Any Setting, IEEE , 2009

[16] Eric Y. Chow, Arthur L. Chlebowski, Pedro P. Irazoqui, A Miniature-Implantable RF-Wireless Active Glaucoma Intraocular Pressure Monitor, IEEE, 2010

[17] Lamya El alamy, Sara Lhaddad, Soukaina Maalal, Yasmine Taybi,Yassine Salih-Alj " Bus Identification System for Visually Impaired Person" IEEE 2012

[18] Elisa Pievanelli, Riccardo Stefanelli, Daniele Trinchero, Wireless Technology for Occupational Dosimetry Implementing Medium Range Sensor Networks, IEEE ,2013

[19] Moisés Piedade, José Gerald, Member, Leonel Augusto Sousa, Gonçalo Tavares, and Pedro Tomás, Visual Neuroprosthesis: A Non Invasive System for Stimulating the Cortex ,IEEE, 2005

[20] Huan Chen, Bo-Chao Cheng,Chih-Chuan Cheng and Li-Kuang Tsai, Smart Home Sensor Networks Pose Goal-Driven Solutions to Wireless Vacuum Systems, IEEE,2006

[21] Longhua Ma, Jun Yao, Ming Zu,Tengkai Yuan, Meng Shao, Net-in-Net: Interaction modeling for community cyber-physical system, IEEE, 2010

[22] Jen-Chu Liu, Kuo-Yu Chuang, and Cai-Fang Ye, A Highly Flexible System for Smart Home Sensor Networks, IEEE, 2010

[23] S.P.S. Gill, N. K. Suryadevara and S. C. Mukhopadhyay , Smart Power Monitoring System Using Wireless Sensor Networks, IEEE, 2012

[24] Tengfei Zhang, Qinxiao Li, Fumin Ma , Remote Control System of Smart Appliances Based on Wireless Sensor Network, IEEE, 2013

[25] Asma BEN HADJ MOHAMED, Thierry VAL,Laurent ANDRIEUX, Abdennaceur KACHOURI, Using a Kinect WSN for home monitoring: principle, network and application evaluation, IEEE ,2012

.