



# SURVEY OF HEALTHCARE MANAGEMENT USING WIRELESS SENSOR NETWORKS (WSNS)

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**Abstract:** Using Wireless sensor Networks (WSNs) in health care system has yielded an amazing effort in recent years. However, in most of those researches, tasks like detector processing, health state choices creating and emergency messages causing are completed by a foreign server. Transmission and handing with an oversized scale of knowledge from body sensors consume plenty of communication resource, bring a burden to the remote server and delay the choice time and notification time. During this paper, we tend to gift a paradigm of a sensible entranceway that we've enforced. This entranceway is associate degree interconnection and services management platform particularly for WSN health care systems reception setting. By building a bridge between a WSN and public communication networks, associate degree being compatible with an aboard knowledge call system and a light-weight info, our sensible entranceway system is enabled to form patients' health state choices in low-power and affordable embedded system and find quicker time interval o the emergencies. We've conjointly designed the communication protocols between WSN, entranceway and remote servers. To boot LAN, Wi-Fi and GSM/GPRS communication module are integrated into the sensible entranceway so as to report and send word info to caregivers.

**Keywords:** Wireless sensor Networks, In-home patient monitoring, biosensors, wearable medical devices, smart textiles, outdoor monitoring.

## I. INTRODUCTION

Current health care systems area unit structured and optimized for reacting to crisis and managing unhealthiness face new challenges: a speedily growing population of aged and rising health care payment. Restructuring aid systems toward proactive managing of upbeat instead of unhealthiness, and specializing in bar and early detection of malady emerge because the answers to those issues.

Wearable systems for continuous health watching area unit a key technology in serving to the transition to additional proactive and cheap aid. Recent technology advances in integration and miniaturization of physical sensors, embedded microcontrollers and radio interfaces on one chip; wireless networking; and micro-fabrication have enabled a replacement generation of wireless device networks appropriate for several applications as shown in Fig. 1. Clever environments represent the next evolutionary improvement step in building, utilities, industrial, home, shipboard, and transportation structures automation. Like every sentient organism, the smart environment relies first and principal on sensory statistics from the real world. Sensory information comes from a couple of sensors of different modalities in dispensed locations. Due to the numerous benefits of wireless Sensor Networks (WSNs), which consist of wide insurance, low price, low energy, self-configuration and actual-time information get admission to; WSNs have been utilized in diverse regions along with military, herbal catastrophe prevention, natural world tracking device and health care tracking. So that it will meet the first-rate of carrier (QoS) in special packages, styles of communiqué protocols are needed to bridge WSNs with required networks. In this paper, we have designed an efficient conversation protocols to bridge WSNs with public network (Ethernet, WI-Fi and GSM/GPRS) to set up conversation among WSNs and faraway server.

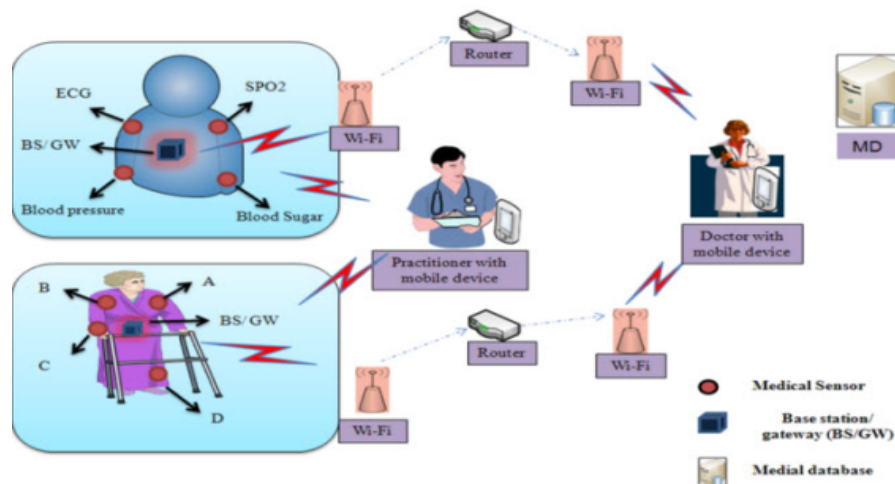


Fig.1. WSN HealthCare Monitoring System

WSNs in fitness care machine which integrates Wi-Fi communications, health care and sensor community, have attracted a number of studies efforts in current years [1][2][3]. A WSN health care gadget normally includes three elements: body and home environment sensors network, get entry to gadgets along with a gateway and public verbal exchange networks, and care-givers which include remote principal server, docs and loved ones. A situation is shown in Fig. 1. Fundamental position of the gateway is to bridge the WSN with public conversation network. Usually, sensor networks which can be well matched with IEEE 802.15.4 and run at the 868/916MHz or 2.4GHz ISM frequency bands cannot talk immediately with public verbal exchange networks which perform on Ethernet, IEEE 802.11 or GSM/GPRS networks. So gateway is needed to paintings as protocol translators, impedance matching devices and fee converters among them.

Maximum of the beyond health care system research efforts had been focused on sensor networks design like routing, MAC layout, and sensor nodes deployment. In the ones designs, sensor information are transmitted to far flung server thru get right of entry to gadgets. Tasks like sensor facts garage, patients' fitness states willpower, and notifications are performed by means of a relevant server even as gateway handiest acts as an intermediate device. The response put off includes community put off and significant server postpone. In health care machine, WSNs offer a large quantity of real-time signals which should be processed in time. With the growth quantity of sufferers, principal server's processing time will boom unexpectedly. The long distance statistics transmission may also purpose issues, which include congestions and packet losses. With the advances in electronics technique, cutting-edge embedded systems have an awful lot quicker processor and larger memory. This permits the gateway to have the ability to finish a few greater complex works and to interconnect to exceptional varieties of public networks. To resolve the troubles above, we've got designed a gateway-centered WSN health care system. In this gateway, a few obligations are moved to the gateway to lessen the load of far off server and public network traffic. Frame sensor community systems can help human beings through imparting healthcare offerings including scientific tracking, reminiscence enhancement, scientific facts get right of entry to and communiqué with the healthcare provider in emergency conditions through the SMS or GPRS [1, 2].

Non-stop fitness tracking with wearable [3] or apparel-embedded transducers [4] and implantable body sensor networks [5] will growth detection of emergency conditions in at hazard sufferers.

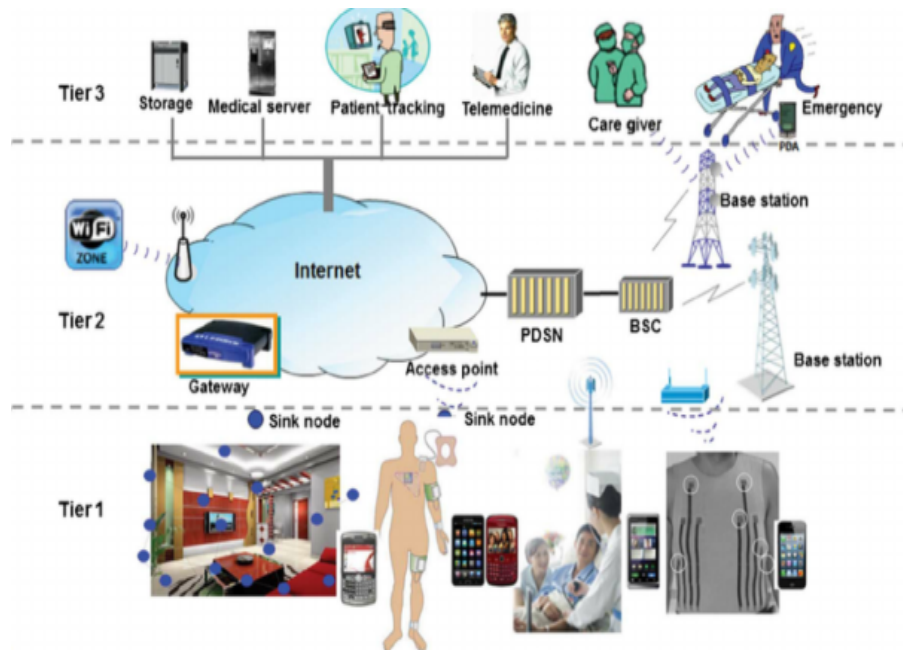


Fig 2. Health Care Monitoring System

No longer most effective the patient, but additionally their families will benefit from those. also, those systems offer beneficial strategies to remotely gather and reveal the physiological signals without the need of interruption of the patient's everyday existence, as a consequence improving existence excellent [6,7].

## II. LITERATURE SURVEY

### Patient tracking structures to ensure security:

These days many authors proposed distinctive schemes for making sure safety in affected person monitoring systems. Confidentiality is one of the troubles while storing affected person related statistics. In [9], Cipher textual content coverage characteristic primarily based Encryption (CP-ABE) changed into proposed. The patient information is encrypted and decrypted based totally on get right of entry to coverage. After encrypting facts, it can be stored in a server. So every where we could download the copy of the records, however they get entry to policy which became glad through the user can decrypt it. Right here unique algorithms have been used to generate keys, encrypt the information and decrypt the facts. Dynamic integrity checking can be observed in [14] and more than one mystery sharing was used to make sure confidentiality and dependability. Orthonormal vectors were used for dynamic integrity checking. The main dreams are confidentiality, dynamic integrity assurance and dependability. Protection troubles were taken into consideration in [10]. Secure and dependable disbursed information garage and satisfactory-grained information get admission to control. Confidentiality, integrity and dependability are the fundamental necessities of records storage. Confidentiality is accomplished by means of public key encryption, integrity is completed through MAC (Message Authentication Code) schemes and dependability is performed by mistakes correcting codes. To acquire get admission to control, SKC (Symmetric Key Cryptography) and % (Public Key Cryptography) had been used. In SKC, every affected person has to know all of the legal users and encrypt his very own facts with each person via pair smart key and it has several drawbacks. In p.c, characteristic primarily based encryption is used. CP-ABE is the variant of ABE. The authors concluded that ABE primarily based schemes had been suitable to make certain security. In [11], statistics storage scheme with dynamic integrity assurance was proposed primarily based on secret sharing and erasure coding. The information integrity schemes had been based totally at the precept of algebraic signatures. Right here the verification of records can be achieved without the need for authentic facts. Those schemes had been secure and green against one of kind kinds of attacks.

### Patient monitoring the usage of WSN

Wi-Fi Sensor network (WSN) is likewise used for in-domestic affected person monitoring. A allotted telemonitoring device was proposed in [8]. It uses offerings layers over light physical devices (SYLPH) model. Its miles a carrier oriented structure version. The objective of this version became those sources to be allotted amongst more than one WSN and to execute over specific wireless devices independently.

Numerous networks from unique wireless technology can also be related the usage of this version. In [6], Infrared (IR) sensor based totally system changed into used. IR primarily based tracking machine changed into installed in residence to collect movement values of the affected person and special function values like hobby degree, mobility degree and non response level. To differentiate regular and unusual behaviors, aids Vector statistics Description (SVDD) method become used. To categories the behavior styles, conduct sample classification set of rules changed into used here. The want for a laptop changed into eliminated in [13].The WSN become installed domestic. Those nodes are then connected to the hospital sever thru internet. Right here wide variety of sensors changed into used to acquire simplest ECG alerts. The ECG signals had been first sampled and transmitted to the get admission to factor placed in patients domestic. Then these alerts had been transmitted to the medical institution thru internet and analyzed to locate heart related illnesses.

### Patient person monitoring with the help of cell phones

Cell phone takes essential position in affected person monitoring to obtain system and transmit affected person information. Health internet cell tracking became proposed in [7]. BSN (body Sensor community) embedded in garments, acquire body parameters and communicates with affected person's mobile phone. Sensors and crucial hub had been embedded in patient's shirt. The essential indicators had been collected by way of the sensors and transmit them to the primary hub. Imperative node then communicates with cell phone thru Bluetooth hyperlink. Here confidentiality changed into done by using AES128 and authentication changed into achieved via SHA. A unique Wearable Mobility tracking device (WMMS) changed into added in [2]. This model changed into mounted primarily based on clever cell phone method. This machine is easily wearable on patient's belt and it video display units patient's mobility and takes picture for the duration of any change of state. For evaluation, these photographs had been used.

### Patient person monitoring using Bluetooth enabled tool

Bluetooth enabled tool also used for in-domestic affected person tracking. A Bluetooth enabled in-home patient monitoring system turned into proposed in [4] to stumble on Alzheimer ailment. Inside the affected person's home, patient contains the Bluetooth enabled monitoring tool and a get right of entry to point is placed in each room then all are linked to the nearby database. When a patient movements from one room to some other, the tracking device selects any individual of the get entry to point with strongest sign strength. Once the relationship is hooked up the contemporary region and movement of the affected person are traced and saved in a nearby database with the help of Bluetooth conversation. The accrued location information and the corresponding timestamps are forwarded to the selection engine that's placed within the health facility. This selection engine has motion reputation software, so that the scientific practitioner can carry out far flung diagnosis to determine whether the affected person has Alzheimer's disease or not. A survey on information confidentiality in early detection of Alzheimer's ailment becomes proposed in [12].

## III. WIRELESS SENSOR NETWORK

A Wi-Fi sensor network (WSN) is a Wi-Fi network consisting of spatially disbursed self sufficient devices that use sensors to reveal bodily or environmental situations.

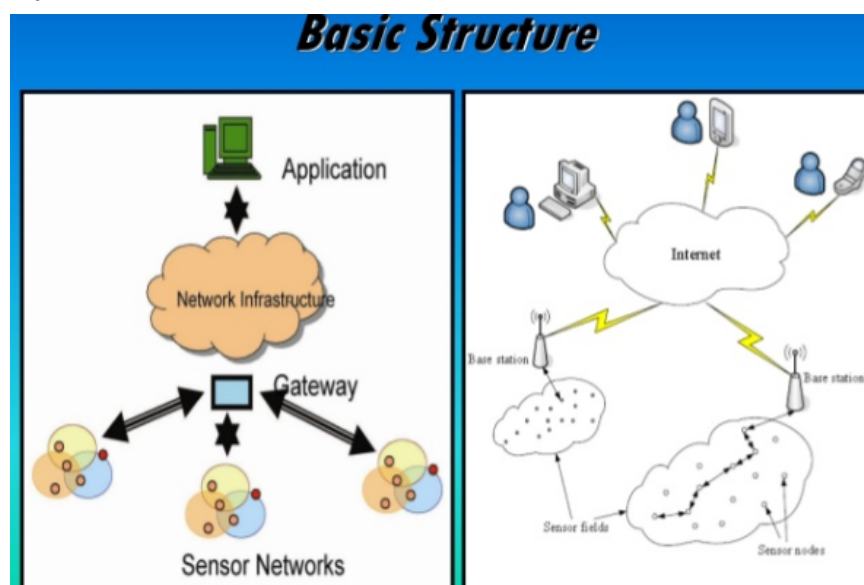


Fig. 3 Structure of Gateway

Those independent gadgets, or nodes, integrate with routers and a gateway to create a typical WSN system. Sensor networks are the important thing to accumulating the records wanted via clever environments, whether or not in homes, utilities, business, home, shipboard, transportation systems automation, or someplace else. Current terrorist and guerrilla battle countermeasures require allotted networks of sensors that can be deployed and feature self-organizing capabilities. In such packages, jogging wires or cabling is generally impractical. A sensor community is needed this is rapid and clean to put in and maintain. The clever gateway is designed to permit WSN and public conversation networks to get entry to every other with seamless internetworking. In this layout, the gateway consists of important manage unit, database (DB), WSN module, WLAN AP, and GSM module, as shown in Fig. 3. The distributed size nodes speak wirelessly to a crucial gateway, which provides a connection to the wired international where the statistics can be gathering, process, analyze and gift your size facts. To extend distance and reliability in a wireless sensor community, you could use routers to gain an additional communiqué hyperlink among quit nodes and the gateway. The gateway consists of 3 external conversation modules (ECM): WSN Module, WLAN AP, and GSM Module. WSN module, on one hand, is mainly used for receiving data applications from the sink of the WSN; alternatively, it's far used to send commands to the WSN or unique sensor nodes. It implements the protocol translation and affords the physical mechanism between gateway and WSN. On this design, a MIB520 USB Interface Board attaching with the sink node in WSN is used as the WSN module. A GSM module is needed while sending SMS to the care-givers using GSM networks, or sending facts to far flung server via GPRS if necessary. In this design, the GT64 terminal of small length is chosen and it has low power intake [9]. GT64 is an intelligent GSM/GPRS manage terminal which joints GSM networks with the 1800/1900 MHz RF bands. The conversation may be realized via SMS over GSM or SMS over GPRS the use of well-known AT commands. With its intrinsic TCP/IP stack, GT64 enables the gateway to get right of entry to to IP connections via GSM network. WLAN AP has two duties. First, which will hook up with the internet, it acts as a consumer pc and accepts the IP cope with assigned by way of the internet server. 2d, it sets up an advert-hoc network for care-givers and gadget maintainers a good way to connect to the clever gateway with computer or PDA effortlessly.

#### IV. CONCLUSION

In this paper, a far flung fitness care system primarily based on Wi-Fi sensor community is delivered. This new generation has ability to offer a wide range of blessings to sufferers, clinical employees, and society via continuous monitoring inside the ambulatory setting, early detection of ordinary situations, supervised rehabilitation, and capacity knowledge discovery via records mining of all collected information. This device may be placed in a hospital or a affected person's residence, thru this wireless sensor community the sensor nodes acquire some physiological indexes of the patients or screen the strolling state of the clinical devices and transmit the information to the sink node or the local laptop.

The wireless sensor network can connect to the far flung crucial server via numerous manners. This far off health care gadget has right scalability and excessive flexibility and may have an extensively software within the community scientific carrier machine, care unit and so forth. An even larger, more broadly used remote scientific carrier gadget may be built by connecting the wireless sensor networks to the net. This thinks its miles very essential to serve the patients higher. Surely, a few types of special wireless sensor networks can be developed for special clinical use to ideal the far off care system based on wireless sensor networks. The supplied gateway-primary health care gadget is a prototype. Duties like sensor facts database, DDS and actual-time record are carried out in a low strength embedded machine. Hardware and software design of the gateway are supplied and transmit protocols are designed for this gateway-primary device. A sequence of test outcomes display this prototype machine is possible and dependable. Inside the destiny, optimizing the interconnection via using GPRS verbal exchange between gateway and far flung server to extend to be had insurance of the fitness care machine and upgrade the DDS. Then, it could don't forget for integrating net-base website and voice name feature in the gateway. Protection troubles will also be taken into consideration within the destiny paintings.

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