

Recent advancements and challenges of Internet of Things in Healthcare

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Abstract

With the expanding progressions in computing devices, mechanical devices, and software to Liaoning and interchange information with diverse electronic gadgets and skeletons over cyberspace, there is a high chance of headway in another region. Well-being is a fundamental viewpoint for everybody in this world regardless of old enough. Everybody needs to prompt a better well-being life cycle by following cleanliness propensities. During this Corona virus pandemic circumstance, IoT has a significant effect on the medical care industry by refining gadget and human connections which drove numerous medical care applications and offers part of advantages to people who are under medical care, households, practitioners, critical care facility centers, and life insurance agencies. In this review, we did a complete review of the Internet of Things progressions, techniques, insights, and achievement cases applied to medical care.

Keywords: IoT, Healthcare, Sensors, Architecture, Medical, Gadgets.

1. INTRODUCTION

With the aging population increases and the sudden rise in chronic illness everyone in the world looking for healthcare solutions for longevity in life. Technology plays a vital role in health management. Technology allows hospitals, doctors, insurance companies and also inpatients and outpatients to trade data, screen and track adherence to care plan and pledge ideal promise all through the health services process. With the invention of IoT, everyone believes that more can be done in healthcare management.

IoT brings a profound influence on the common man and woman's livelihood particularly old aged senior citizens who are under medical care to have a continuous follow-up of health. With help of technology near and dear, families, doctors, and others can easily be notified by sending alerts. This IoT is not confined to physicians it can show real it's an advantage to hospitals, Health Insurance Companies.

2. ANATOMY OF IOT HEALTHCARE

The advent of IoT opens up the proliferation of healthcare products, research and created ample open doors and a colossal measure of information created by associated gadgets holds the possibility to change medical services. IoT redefined healthcare architecture [1]. Basically, IoT has four steps architecture.

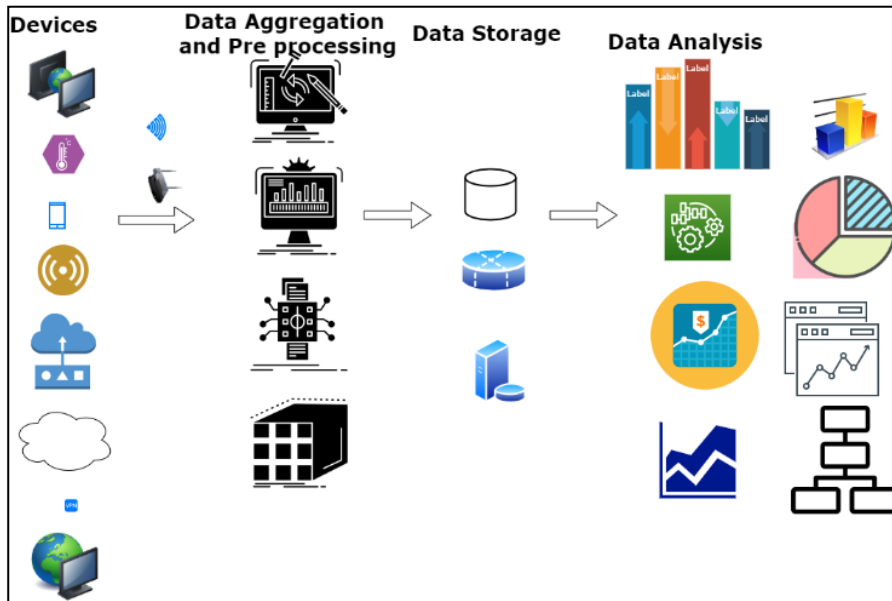


Figure 1 Four Stages of IoT Solutions











The early step includes sending associated devices or gadgets that consolidate sensors, actuators, screens, finders, camera structures, etc, and contraptions to assemble the data. In the second Step Frequently, data got from sensors/actuators and various other devices are in an upfront structure, which ought to be amassed and changed over to the automated design for extra data taking care. In the third step, once the data is encoded and totaled, this is taken care of, homogenous, and moved to the server homestead or Cloud. In the final advancement, information is coordinated and examined at the crucial level. High-level Analytics, applied to this information, brings basic business snippets of data for a solid course. IoT is changing clinical thought by ensuring further developed thought, further made treatment results and cost, use cutting for patients, and better cycles and work processes further made the execution and patient experience for clinical thought suppliers.

3. SENSORS USED IN IOT MEDICAL/HEALTHCARE FIELD

Sensors are used in various IoT-enabled medical or health fields to ensure patient care, comfort and increase doctor's performance and reduce costs. Various sensors are used in different medical devices or processes. The main sensors like pressure, humidity, temperature, force, airflow, co2, etc are used in a critical role in the operation of various equipments. With the advancement in technology and the availability of diverse hardware, various companies started investing in IoT-enabled health care products.

In the below table we have shown different sensors used in different medical applications launched by different companies

Table 1 Different sensors used in different medical applications

Ventilator solutions	Anesthesia Delivery Machines	Oxygen Concentrator Machine	Dialysis Solutions	Hospital Beds
				
Airflow sensors, Pressure sensors, Oxygen sensors, Temperature sensors, Humidity Sensors, magnetic Sensors	Airflow sensors, Pressure sensors, Oxygen sensors, Temperature sensors, Humidity Sensors, magnetic Sensors	Airflow sensors, Pressure sensors, Oxygen sensors, Temperature sensors, Humidity Sensors, magnetic Sensors	Pressure sensors, Force Sensors, Thermistors, barcode sensors	Humidity sensors, Magnetic sensors, basic sensors, position sensors, temperature sensors, barcode sensors
Infusion Pumps	Ventilators	Spirometer	Sleep apnea machine	Computer tomography
				
Basic sensors, force sensors, barcode sensors, magnetic sensors,	Airflow sensors, barcode sensors, humidity sensors, magnetic sensors, pressure sensors, thermostat sensors	Airflow sensors, Pressure Sensors	Airflow sensors, thermostat sensors, humidity sensor, magnetic sensors, pressure sensors	Pressure sensors, flow sensors, liquid level sensors, oxygen sensors, light sensors and radiation sensors

Here list of diverse sensors used in medical and health care field to ensure smooth functioning in IoT enabled smart healthcare environment

Table 2 Different types of Sensors

Type of Sensor	Description	Sample
Color Sensor	Capable detecting different colors. Color sensors often used to detect skin conditions. Measurements further used to evaluate skin disease and assess treatment results.	TCS3200 TCS230 Color Sensor
Current Sensor	Can measure AC current	5A Single Phase AC Current Sensor
Distance Sensor	Can measure distance. These sensors are often used to measure stomach size and in implementing drug delivery service	Sharp Distance Sensor Module - 2Y0A02

ECG, Pulse & Heart Beat Sensors	Mainly these type of sensors well fit in activity trackers which will daily monitor ECG, pulse and heart beat	MAX30102 Heart Rate and Pulse Oximeter Sensor Module
Humidity Sensor	These sensors frequently used in incubators, sterilizers, ventilators and micro environments	SKU: 618471
Magnetic sensors	Used to lock and unlock medication dispensing cabinets. These sensors are available stainless steel, aluminum and molded with plastic . magnetic field sensors are also play vital role in MRI machines, confirming needle presence in syringe and door alarm for clean rooms	GY-906 MLX90614ESF DCI Sensor
Position Sensors	Used to ensure patient bed kept in correct position and control the height	Generic BWL250 250 mm Linear Position Displacement Sensor
Pressure Sensors	Accurately measure blood pressure and used in BP machines where color indicators are used to indicate bp position of patient.	BMP180 Barometric Pressure Sensor
Force Sensor	Fore sensor provides quantitative data which will enhance tool capabilities. Used in drug delivery devices, consumer health devices, surgical tools and Therapeutic Devices	SLB700A/06VA
Thermistor Sensor	Thermistor sensor used measure patient temperature mainly used in digital thermometers	NTC Thermistor Temperature Sensor
Barcode sensor	Generally these are equipped with patient wrist or IV bag and Used in patient identification ,profiling ,movement, handover, medication management diagnosis, and pathology	SKU: 1219056
Airflow sensor	Used to measure air and oxygen flow in patient room and used in Anesthesia Delivery Machines	MG811 Air Carbon Dioxide (CO2) Sensor
Light Sensor	Measuring oxygen level in tissues and detecting tumors	GY-906 MLX90614ESF DCI Sensor
Radiation sensor	Measure the levels of radiation produced by a source	RayMon10 radiation detectors
Liquid level sensor	Ability to monitor fluids and used mainly in dialysis, dental, insulin and sanitizing equipments	SKU: 355146
EMG sensor	Measures muscle response in response to nerve signals	EMG Muscle Sensor Module V3.0 with Cable And Electrodes
Glucose/diabetic sensor	Measures glucose level in blood	Abbott Freestyle Libre Sensor
Metabolism sensor	monitoring cellular metabolic activity and used in wearable devices to detect analyses in skin ISF, tears, saliva	Omron HBF-375

4. IoT STANDARD MODEL

As IoT opens up lot of opportunities and scope for more research towards the betterment of technology and identifying key challenges. One of key challenge has discussed [2] is standardization. This System model opens up qualities, and shortcomings, by large for a wearable IoT clinical benefits structure. Challenges that clinical consideration IoT faces including security, insurance, wearability, and low-power movement are presented, and ideas are made for future assessment course.

5. IoT SMART HEALTH

At first IoT distinct by IERC and ITC as a unique overall organization system with redid capacities taking into account standard in like manner interoperable correspondence shows where physical and virtual things have characters, veritable attributes and virtual characters, utilize adroit affiliation centers and are perfectly coordinated into the data association. Not simply the processing of ICT thoughts and their bodies' electorate are vital yet what's more consolidating them in splendid circumstances and conditions across express application spaces.

The general test is to extend the ongoing Internet of Things into a capably organized catch of stages for related devices, objects, clever circumstances, organizations and individuals. Different enterprises have perceived the progression of the Internet of Things embedded in Smart Conditions and Smart Platforms outlining a splendid catch of everything as one of the accompanying huge plans to help social changes and monetary development, which will maintain the occupant in their master and local/public life. Before the ten years' finished, many related contraptions per human being on the planet are securely expected, interfacing with a business whose yearly improvement is surveyed at 20%. In this setting Europe needs to stay aware of its circumstance through organization in splendid and introduced systems headways with a strong potential in the creating industry area of computerized physical frameworks.[4]

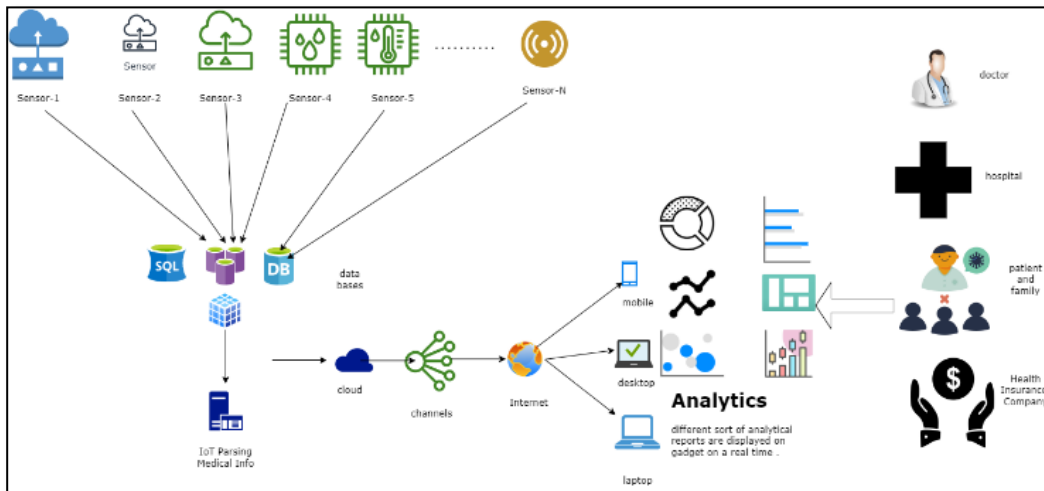


Figure 2 Process Chart of IoT in the medical field

Table 3 IoT Healthcare application areas

Research	Enables cross disciplinary research and focused four dimensions software, hardware, analytics and security. This cross research can ensure better results since it uses modern methods and instruments which will turn ensure reliable data sets which promotes further research
Care	IoT promotes better administration for hospitals, diagnosis centres, practitioners, patients and insurance companies by better making usage of better equipment
Devices	IoT fulfill the gap between device and methods transmitting healthcare. Generally internet is confined to desktop, laptop, smart mobiles, tablets .IoT revives this mode operation by enabling the non standard computing iot devices can communicate over internet.
Emergency situations	Through IoT acute deceases or illness situations now handled betterly by considering factors of time, availability and accuracy. In general acute situations many doctors don't have patient health records to start the medical treatment but with IoT doctor can handle emergency situation betterly as guarantee accurate health information of patient
Medical information distribution	IoT is purest form of distributed system where information can flow from device to device. To ensure secure data sharing, block chain technologies can be used[30]. This block chain technology enables secured data collaboration among healthcare providers ,insurance companies etc.
Remote patient monitoring	IoT devices are capable of collecting pulse rate, temperature, blood pressure, oxygen saturation level information of patient [31,32,33,34] where devices can be effectively used for real time monitoring and the same be disseminated to healthcare professional further prognosis.
Ingestible sensors/smart pills	Ingestible sensing[35,36] added a new dimension to IoT where patient can swallow this sensing capsule which turns outputs the invaluable information of health to patient and doctor

Robotic Sensors	IoT enables new way communication between digital world and physical world. often surgeons will operate complicate surgery by taking help of robots. This robotic mechanism assisted by IoT hardware[37] to increase accuracy.
Smart Inhalers	Asthma is chronic disease that effects the millions of people in world[38,39]. Smart inhaler can guarantee better life for asthma victims by understanding indications from smart inhaler and recognize need to adjust drugs.
Connected contact lenses	They collect data health data [40]. Google launches contact lenses project which aims to assist diabetes patients. As still it is under development the alternate for glucose monitoring is done through glucose meter for testing glucose and glycemia
Heart monitoring system	With help of pace maker device [41] IoT enables to observe heart rhythms and alerts healthcare professionals about gut health status of patient in real time
Depression and mood monitoring	IoT enables smart wearable devices which will monitor person mood and advise them for their better mental health[42,43].

6. IoT COVID

In the current situation, progressed data advances have opened another way to development in our regular routines. Among the data advancements, the IoT is an arising innovation that gives upgrade and healthier arrangements in the clinical domain, as appropriate clinical documentation, examining, coordination among gadgets, and reasons for infections. IoTs sensor based creation offers a wonderful aspect to decrease the bet of a clinical interaction all through jumbled models and strong for COVID-19 pandemic circumstance. In the clinical fields and regions, IoTs middle is to sponsorship with experience the treatment of a few COVID-19 examples conclusively. It changes the expert work humbler by prohibitive dangers and mounting the general presentation. Through this transformation, specialists can without a doubt perceive changes in clear impediments of the COVID-19 inpatients. This information based help opens up new remedial consideration open entryways as it sections towards the record preeminent method of an information layout to manage results as it approves overhauling of treatment settings in the crisis facility. Clinical substitutes can now be prepared for better impurity discovery and all everywhere focused for the forthcoming strategy. IoTs authentic use can help honestly resolve different clinical hardships like speed, charge, and intricacy. It can in actuality be redone to screen calorific affirmation and treatment like diabetes, asthma and joint bothering of the COVID-19 long term. This carefully meticulous wellbeing the executives framework can work on the general execution of medical care during COVID-19 pandemic days [5,6]. Below figure 2 shows generic flow diagram of IoT in medical field.

7. IoT HEALTHCARE PRODUCTS/ SOFTWARE'S/ DEVICES

Due to large availability of components healthcare field is one of the fastest growing sectors in IoT market. The key factors which are driving IoT enabled health care devices/products are active patient management , expecting cost control metrics or standards in healthcare sector, Govt initiation for digital health programs. Many companies such Medtronic, Ciso systems, IBM, GE healthcare are coming forward to comprise health care solutions

Table 4 IoT Enabled medical devices

Company	IoT enabled medical device	Usage
Alivecor	KardiaMobile(Heart rate Monitor)	<ul style="list-style-type: none"> • Smart connected ECG recorder • Display ECG patterns • Detects A-fib and sinus rhythm • Single device supports many users
Qardicore	Qardio Core Wearable Wireless ECG Monitor	<ul style="list-style-type: none"> • Record ecg signals • Monitor skin temperature • Respiratory rate

		<ul style="list-style-type: none"> •
Zanthion	OMVeritas	<ul style="list-style-type: none"> • Records heart rate • Detect live location • Deviation from actual behavior will alert the near and dear in the family
ScreeCloud	Samsung Galaxy Tab A8, Amazon Fire 7, Amazon Fire HD 8, Microsoft Surface Go 3, Hisense U8G Series TVs	<ul style="list-style-type: none"> • Communication framework in hospital • Announce on site emergencies • Sharing coded alerts to hospital staff to prevent stress and panic among patients
AZO	Selsius Ward & Clinic Monitor	<ul style="list-style-type: none"> • Temperature and door measurements • Wireless real time alerts • Control refrigerators
NHS	Test Beds	<ul style="list-style-type: none"> • People with dementia are benefitted • detect deterioration
Propeller	Propeller's Breezhaler device	<ul style="list-style-type: none"> • managing asthma and COPD
Apple	Takeda	<ul style="list-style-type: none"> • helps in handle the patient with MDD
Euronics	UroSense	<ul style="list-style-type: none"> • monitor urine output
Medipense	Medication dispense sensor	<ul style="list-style-type: none"> • Refill notification • Notification to patient that its time to take medicine • Medicine taking required dosage
AwarePoint	AwarePoint	<ul style="list-style-type: none"> • Location of medical equipment
Kinsa	smart thermometer	<ul style="list-style-type: none"> • Detect patient illness
Crunchbase	Chrono Therapeutics	<ul style="list-style-type: none"> • deliver drugs transdermally (through the skin)
Singapore based ABM Respiratory Care,	airway clearance and ventilation, BiWaze	<ul style="list-style-type: none"> • supports Invasive and Non-Invasive modes in ICU
Viatomtech	WellueSleepU Wrist Pulse Oximeter	<ul style="list-style-type: none"> • continuous monitor your SpO2, pulse rate and body motion up to 12-16 hours.
Respbuy	Automatic External Defibrillator (AED7000)	<ul style="list-style-type: none"> • event recording • self test
Medtronic	AZUREW1DR01, W1SR01, W3DR01, W3SR01,	<ul style="list-style-type: none"> • heart status • detect A-Fib
	Virtual patient monitoring system CDS Solution EWS Application SBT Monitoring Application	<ul style="list-style-type: none"> • view patient physiological information remotely • receive alerts • provide enhanced clinical care

These days, numerous IoT-based shrewd medical care gadgets and frameworks have opened up. These items have contributed a great deal to the undertakings like checking patients, keeping up with contacts with specialists, working on the exhibition of recovery, and so on [7]. Particularly many are looking for smart health monitoring systems for senior and physically challenged people which can guarantee assisted living. With assisted living patient can be monitored remotely by defining custom workflow with different heart beat, temperature, pressure, threshold values [8,9,10]. Refer figure 3 which depicts different sensors which vital role in indicating values from different part of human body through sensors. With this support medical and health care systems make IOT as one of most attractive field and which cover countless medical applications remote fitness programs/trackers, health monitoring tools or gadgets, long-lasting diseases and senior patient attention.

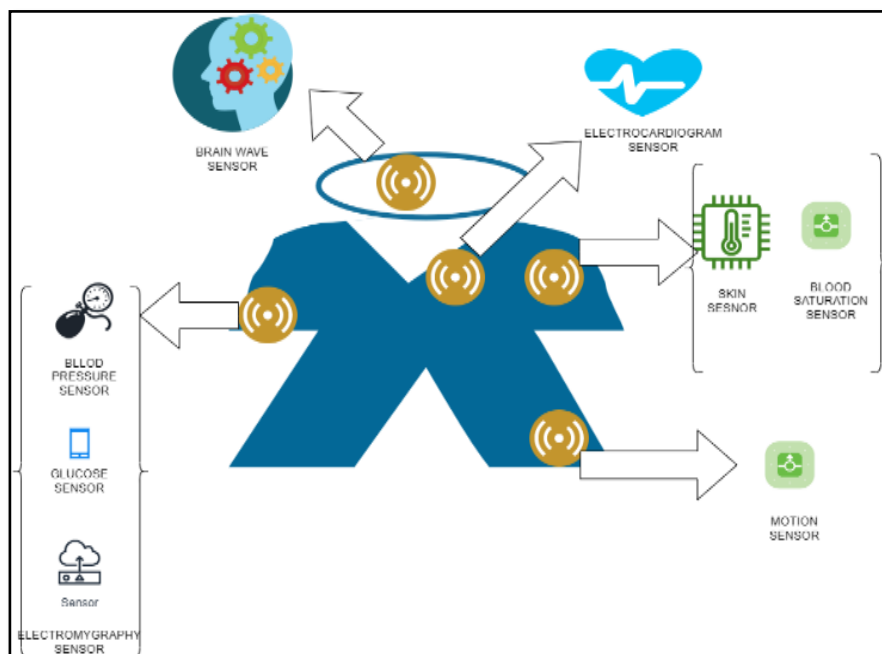


Figure 3. Layout of human common body sensors

Nowadays many are enforced to custom fitness tracker or tools or sensors that monitors our daily activity by measuring walking distance i.e., step count, consumption of calories, heart beat and sleep rate [11]. A lot of companies manufacturing fitness trackers and which are available in many online shopping malls and medical pharmacy malls. Many of brands are available in market like Waylon, Fronix, mi, handwin, coolmobiz, adlynlife, punnk with customized features.

Product	Features	Model No
Apple	<ul style="list-style-type: none"> • Fitness tracker • Blood monitor • Oxygen monitor • ECG monitor • Sleep monitor 	Series 7
Fitbit	<ul style="list-style-type: none"> • StressTracker and monitor • Sleep Tracker • Heart Rate 	Charge5
Garmin	<ul style="list-style-type: none"> • Body Energy Monitoring • Pulse OX monitor • Move counter 	010-02174-01
Polar Grit	<ul style="list-style-type: none"> • Heart Rate Monitor • Sleep monitor 	X
MI	<ul style="list-style-type: none"> • Stress monitoring Guided breathing exercise to lower the stress level • Yoga and rope skipping • menstrual cycle tracking and notification • Running and walking activity 	XMSH10HM, XMSH15HM
Fire-Boltt	<ul style="list-style-type: none"> • Blood Oxygen Monitoring 	BSW014, BSW005, BSW014

	<ul style="list-style-type: none"> • Heart rate monitoring • Sleep and Fitness Tracking • Calorie Tracker • Daily Workout Memory • Sleep Monitor 	
HONOR	<ul style="list-style-type: none"> • Sleep monitor • Heart rate monitor 	ARG-B39
Sonta	<ul style="list-style-type: none"> • Record daily movement steps • Estimate calorie based on number of foot steps covered 	Ews_2
VAAN	<ul style="list-style-type: none"> • Blood pressure • Heart rate monitor • Female period tracking 	V17
OnePlus	<ul style="list-style-type: none"> • Sleep monitor • Blood monitor 	W101IN
PunnkFunnk	<ul style="list-style-type: none"> • Sleep Monitor • Step Tracking • Heart Rate Sensor for Men, Women, Kids 	D116
boAt	<ul style="list-style-type: none"> • Stress Monitor • Heart & SpO2 Monitoring • Sleep Monitor 	8904130868054

Most of the common or unique features provided by these wearable technologies are depicted in below figure 4



Figure 4 Word Cloud Diagram for Activity Monitor Tracker

An incredible wellness/fitness tracker doesn't need to run many dollars. We've gathered together the best economical wellness trackers we could find that are accessible to buy on many online sites like Amazon, flipkart and pharmacy online malls 1mg,pharmezzy,truemeds,netmeds,dhani and many more. Viable long haul medicines are expected to address the heftiness pandemic. There are various wearable advancements intended for actual work and diet, however it is hazy assuming these are successful at further developing weight reduction.[11,12,13,14]. These wearable technology devices invent new dimension or era to people outdoor activities by monitoring and capturing vital data to showcase current health status and to assist us with further developing it further by suggesting custom fitted action plans.

Now this IOT makes hospitals as smart IOT based Hospitals as there is a ample medical solutions like smart watches, smartpills, smartbeds, biosensors, RTHS and many more. This IOT has shown profound influence not only on patients as For patients, IoT innovation appears as either an upgrade of customary clinical gadgets, or a totally new sort of innovation ,not only on physicians, not only on health insurance companies but also hospitals. Where IoT enabled devices or gadgets connected with sensors/actuators to monitor location in real time of medical equipment's automatic wheel chairs[15,16] which particularly

suitable for patients who are incapable of moving any part of their body except their head. In coming days, IoT-enabled wheelchairs can be controlled by head or voice [17], defibrillators [18] will be used as emergency response devices that track patient heart rhythm and use this data to provide instructions to rescuers to deliver chest compressions. Below diagram figure 6 shows a sample product from Lantronix's Pico Wi-Fi enabled Deployment program which shifts data from the defibrillator response device to the cloud databases so that medical professionals can remotely check patient health status.

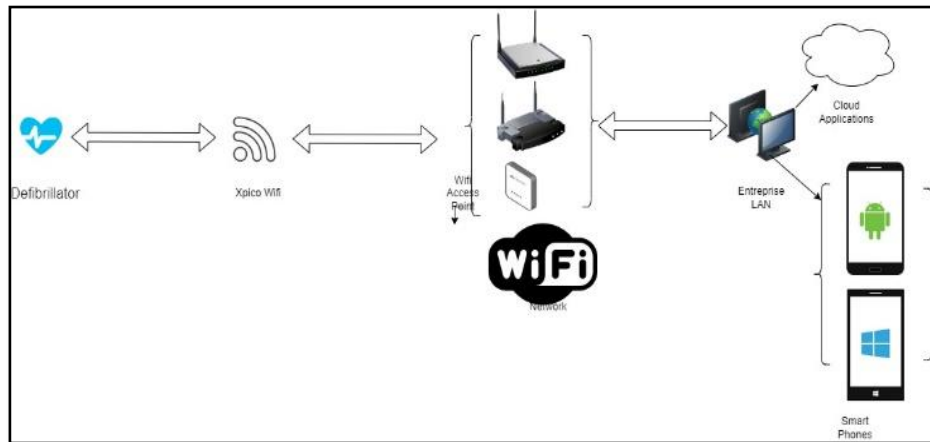


Figure 5 IoT-Enabled Heart Monitoring Device

nebulizers, oxygen pumps and many other vital medical equipment. The blowout of contaminations are central question for patients who are in clinics or diagnostic centers. IoT permitted cleanliness checking contraptions or gadgets help in holding patients back from getting debased. IoT devices besides aid asset the board with cherishing medication supply stock control, and regular seeing, for instance, truly investigating cooler temperature, and wetness and temperature resistor.

During the covid19, to reduce infection rates iot placed a crucial role to manufacture iot enabled device thereby reduce infection rates. If you take example of smart hand sanitizers dispensers are came into picture to ensure every one hand hygiene there by hospital can guarantee a safety by minimize contaminants from room to room or person to person.[19,20,21]

Day by day technologies and medical field devices are increasing and today lot more connected and wearable devices are available at cheaper cost which makes IomT as connected infrastructure By clubbing various fields/devices/domains like ambulance, diagnostic centers, hospitals, blood red cross societies, patient monitoring smart devices which are linked to cloud platform to deliver real-time services to patients, doctors and many more.[22]. Below figure 7 we have shown sample IomT network of objects which are communicated to enable more real time services. This IomT enables streamline workflow management, better patient care, and better medical device track policy.

With smart pills which microscopic sensors once swallowed then they transmit data to connected devices. These smart pills are used measure medication treatment effectiveness and monitor internal health status Challenges Faced in IoT Based Healthcare System.

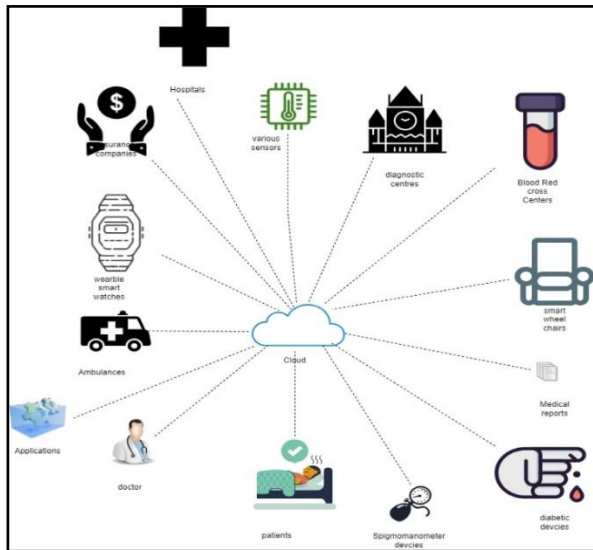


Figure 6 A sample IomT network

Though IoT shows lot benefits to medical and health care system but we cant discount challenges it is facing[23,24,25]. Major threat to Ioth health care is anonymity as huge data is transferred which hacked and modify against patient. IoT Need work numerous devices, standards and protocols to ensure entire process data transfer, analysis and retrieval becomes easy[48][49][50][51].

Below figure 8 shows number devices connected to IoT from 2015 to 2025(estimation) in billions. When more devices are connected to IoT network then amount data inflow into system is more and doctor will face situation where they cant manage this huge data.

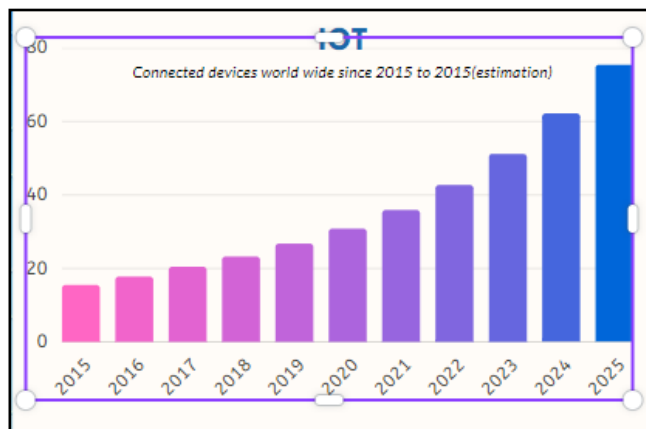


Figure 7 IoT Connected devices 2015-2025

IoT can lessen the treatment cost for an everyday person except hasn't had the option to make it happen yet. The Internet of things and medical services presently can't seem to make things financially savvy and it will require investment. It has made the clinical the travel industry circumstance where individuals travel to emerging nations to seek the treatment at a lot less expensive expense.

Table 6 List of Challenges

Reference No	Issue	Remarks	Solutions
[26]	Patient data security	Data flow across devices without encryption so high chances are there to alter data	Can work ciphers to ensure privacy of data
[26]	Interoperability among devices	Interoperability will play main role so that devices can communicate. As there no open standards for manufactures to follow	Can work on Standard operating procedures by formulating regulation bodies
[26]	Non uniformity in protocols	Many times devices from same vendor can communicate among themselves since all are from same umbrella. When devices from different vendors often communication establishment between devices is a big plight for developers.	Can work on protocols which can guarantee communication among diverse devices
[27]	uncomfortably	Since patients require constant monitoring which makes mandate for patients to keep sensors on body	
[27]	Noise presence in data	Data transmitted from device to device always there is possibility of delta noise in actual data	Can propose noise removal techniques to enhance data
[27]	ECG Monitoring	Most ECG monitoring involves supervised learning and this may lead to cost and false positives	Machine learning algorithms[44,45,46] can be utilized to ensure efficiency and reduce cost in all health care applications.
[27]	Increased number of sensors and devices	As number sensors and devices are increased in IoT network, this may lead to power consumption and leakage	Can propose optimization techniques to reduce energy usage
[27]	Number of users	As number of users are increased , storage must on par with number of users	Cloud storages can solve storage issue but which may increase complexity.
[28]	Service and maintenance cost	Every time device firmware need to update to comply with latest updated	Whatever continuous up-gradation is needed for devices which should be scheduled automatically so that manual intervention can be reduced
[28]	Scalability	Device must be scalable to meet and adopt changes in environment	Automated bootstrapping and controlled data pipeline, three axis scaling approach, adopt multiple data storage technologies can guarantee IoT device scalability
[28]	Patient Identification	When patient dealt with multiple health issues it is very difficult to exchange patient identity	Use barcode to resolve patient identification issue or Shibboleth-based systems can facilitate better authentication across multiple entities of digital health system
[28]	Self configuration	IoT devices must a have provision to change configuration settings so that device can acquaint the environment changes and application need	If user have an option of manual corrections of configurations then device can be accustomed with environment and application changes
[28]	Environmental impact	Manufacturing of IoT devices involves rich in chemical and semi conductors so there is need for regulation body which can impose guidelines to mitigate the effect on environment	If proper regulation body formulated then impact on environment can be controlled
[29]	DOS attacks	DOS attacks can affect healthcare network	Use the redundancy technique to counter against DOS attacks. Also should have better security mechanism to defend against

8. CONCLUSION

It is evident that IoT is now integral part of medical care field by providing services to patients, doctors, diagnostic centers, blood red cross centers, health insurance companies and many more. It can reach every patient from the entire world and it will be global connection between patients, doctors, hospitals and insurance companies. IoT can transform clinical consideration more affordable and useful coming. It can aid in the creation of more changed and patient prepared gear. Moreover, IoT will in like manner engage patients to get better permission to data, tweaked care; as such, provoking less visits to the center. New plans of action will be made, coordinated effort with patients will be significantly better.

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