INTERNET OF THINGS- Global Technological And Societal Trends.

Vikas Johal[1], Jasleen Kour[2]
[1,2] *Model Institute of Engineering and Technology, Kot Bhalwal, Jammu, J&K, India*
(johalvikas111@gmail.com)

Abstract—As we know presently, Internet of Things (IoT) acquired a gigantic attentiveness from researchers, since it becomes a cardinal technology that assures a smart human being life, by permitting a imparting between bodies, machines and every things affixtly with peoples. IoT renders a system which subsists a thing in the real world, and sensors anchored to or coalesced to these things, connected to the Internet via wired and wireless network anatomy. The IoT sensors can use sundry kinds of analogy such as RFID, Wi-Fi, Bluetooth, and ZigBee, in addition to permitting wide area connectivity using many technologies such as GSM, GPRS, 3G, and LTE. IoT-enabled things will share information about the condition of things and the nearby environment with people, software systems and other machines. by the technology of the IoT, the world will becomes smart in every strands, since the IoT will provides a means of smart cities, smart healthcare, smart homes and building, in addition to many cardinal requisitions such as smart energy, grid, transportation, waste management and monitoring . In this paper we analysis a notation of many IoT requisitions and future possibilities for new allied technologies.

Keywords—*IOT; Smart Home; Smart Health; RFID ; WI-FI; Internet.*

I. INTRODUCTION

The Internet of Things (IoT), also known as the Internet of Objects. The sundry sectors like education, industries, business, science, government, and many others [1][3] widely uses this technology. As we all know Internet is one of the most cardinal and powerful creations in all of human history and now with todays world of the internet of things, internet play vital role in for making the world smart .

Internet of Things is a technology which accesses the Internet. With the help of this technology of Internet of Things, things can examine themselves and obtain intelligence behavior by making or enabling allied decisions thinks to the fact that they can communicate information about themselves [4]. These objects can get the information that has been coalesced by other, or they can added to other services [1][3]. Figure 1 tells us that Internet of thing is anything that can communicate to internet at any time, from any place to provide any service through network to anyone. This new technology will provide us many new requisitions like Smart home Automation, Smart Agriculture Irrigation, Smart Cities or World, and many more to make the things more smarter [1][2][3][4].

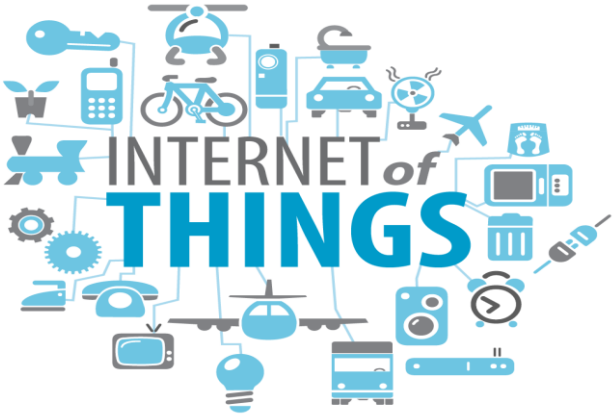


Fig.1 Internet of Things

By the development of this IoT technology, their proper tests and deployment will make this environment more smart by 2020 [1][3]. In the near future, IoT will become widely used technology in the world which encompasses :people, machines, smart objects, nearby space and platforms connected with wireless/wired sensors, GSM , GPRS,WIFI Module, Microcontrollers which will create a highly demedialized resources interconnected by a dynamic network of networks [1][2][3][9].

IoT is the common term and all everything linked to it play an agile role to make this world and environment smarter, where the role of the Internet has changed [3].

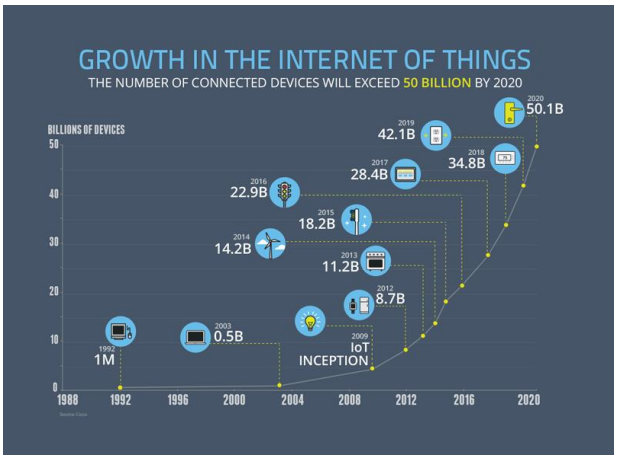


Fig.2 IoT Growth

II. TIME SERIES

Accessed from the URL dated on 24/3/2013: http://postscapes.com/internet-of-things-history.

1999: The term Internet of Things is coined by Kevin Ashton, Executive Director of the Auto-ID Center in Massachute Institute of Technology (MIT).

1999: Neil Gershenfeld first time spoken about IoT principles in his book titled "When Things Start to Think"

1999: MIT Auto-ID Lab, originally founded by Kevin Ashton, David Brock and Sanjay Sarma in this year.

They helped to develop the Electronic Product Code

2000: LG announced its first Internet of refrigerator plans

2002: The Ambient Orb created by David Rose and others in a spin-off from the MIT Media Lab is emanicipated into wild with NY Times Magazine naming it as one of the Ideas of Year

(2003-2004): RFID is deployed on a massive scale by the US Department of Defense in their Savi program and Wal-Mart in the commercial world

2005: The UN's International Telecommunications Union (ITU) published its first report on the Internet of Things topic.

2008: Recognition by the EU and the First European IoT conference is held

2008: A group of companies launched the IPSO Alliance to promote the use of IP in networks of "Smart Objects" and to enable the Internet of Things

2008: The FCC voted 5-0 to approve opening the use of the 'white space' spectrum

(2008-2009): The IoT was born according to Cisco's Business Solutions Group

2008: US National Intelligence Council listed the IoT as one of the 6 "Disruptive Civil Technologies" with potential impacts on US interests out to 2025

2010: Chinese Premier Wen Jiabao calls the IoT a key industry for China and has plans to make major investments in Internet of Things

2011: IPv6 public launch-The new protocol allows for 340, 282, 366, 920, 938, 463, 463, 374, 607, 431,768,211, 456 (2128) addresses.

III. INTERNET OF THINGS REQUISITION

A. Smart Home

Smart Home evidently come out, ranking as lofty Internet of Things requisition on all dignified channels. More than 50,000 people searching for the term "Smart Home" every other month. This is not a surprise. The IoT inquiring organisations database for Smart Home encompasses 256 companies and startups [5]. More companies are agile in smart home than any other requisition in the field of IoT. The total amount of pooling for Smart Home startups currently exceeds $2.5bn [1][5]. The Smart Home entails the controlling and automation of lighting, heating, ventilation, air conditioning and security as well as home contraption such as washer/dryers, ovens or refrigerators/freezers. WIFI module is mostly used monitoring and controlling. When these Home devices are monitored and controlled using Internet then it is IOT. Present day systems generally embrace of switches and sensors connected to a medial fulcrum sometimes called a "gateway" from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal, Cell phones, software, tablets ,computers or a web interface, often but not always via Internet cloud services.

Fig.3 Smart Home

B. Wearables

Smart Wearables is one of the most techoonolgy in todays world. As consumers anticipate the emanicipate of Apple's new smart watch in April 2015, there are assload of other wearable metamorphosis to be enthusiastic about: like the Sony Smart B Trainer, the Myo gesture control, or LookSee circlet. Taking into account all IOT startups, wearables forger Jawbone is presumably the one with the stupendous pooling to date. Wearable technology is a hallmark of the Internet of Things and the most prevalent of its enactments to date. The proficiency of data undertaking procured by sundry smart wrist wear, hearables , and smart glasses is gingerly disseminate inert skepticism among the public and is getting closer to where wearables will bring atypical value to our lives[1][2].

Fig.4 Wearables

C. SMART CITIES

Many major cities had implemented the smart projects and controlled smartly, like New York, Tokyo, Shanghai, Singapore, Amsterdam, and Dubai. Smart cities can be viewed as cities which will come in existence in future and can bring smart environment, and according to the rate of innovation of smart cities in todays , the IOT technology will enter into the development of smart cities very soon[1][2]. Smart cities entails planning in each step with help from governments, citizens and every other in order to introduce the internet of things technology in every strands. With the help IoT in smart cities, cities can be improved to gigantic levels, by ameliorating city planning, city public transportation by reducing traffic load, and keeping the population of the respective city safe, healthy and raising the living standard[2]. By interlinking all departments in the cities like transportation department, healthcare department, weather monitoring department and etc. Moreover helping the people by providing them up to date information of airports, railways, transportation tracking operating under specified protocols via internet. Thus ,Internet of thing make the city more smarter [1][3][4].

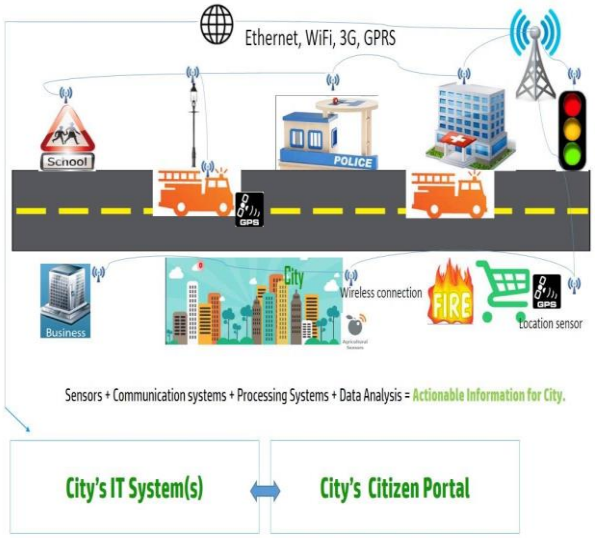


Fig.5 Smart Cities

D. Health Care

Among the requisitions of the Internet of Things (IoT), smart and connected health care is a noteworthyly one of the most cardinal requisition [1][7] In the HealthCare many sensors are connected to our body or worn on our body or can be placed in the living environment which in return provides us a lot of information of person or patience which indicates both physical and mental health. These information are collected on a continuous basis, analysized and examined which can bring a positive transformative change in the health sector. In noteworthy, the availability of data at beforehand ineffabled scales and worldy longitudes duoed with a new cohort of intelligent undertaking algorithms can: (a) facilitate an evolution in the practice of medicine, from the current post facto diagnose-andtreat reagile architype, to a proagile framework for prognosis of infirmitys at an incipient stage, duoed with prevention, cure, and overall management of health alternately of infirmity, (b) permit individualization of remedy and management options targeted noteworthyly to the specific circs and needs of the individual, and help lessen the cost of health care while simultaneously ameliorating outcomes. [1][3][7]

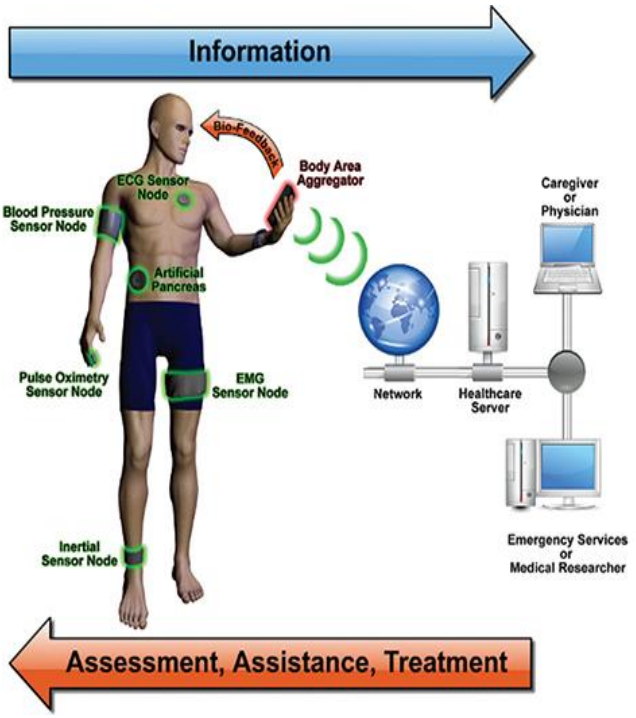
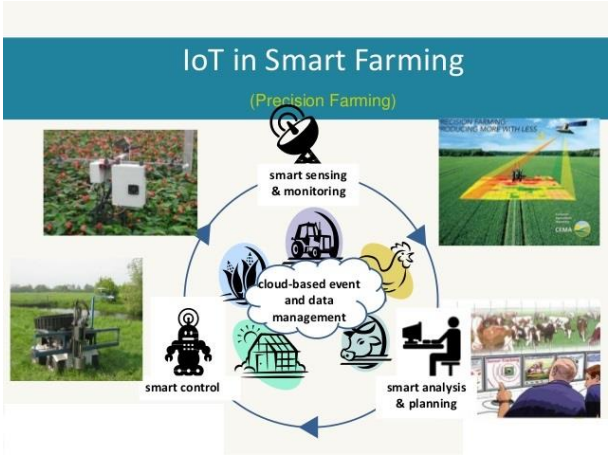


Fig.6 Health Care

E. Smart Farming

Agriculture cardinal role in the development of agricultural country. In countries like India about 70% of population depends upon farming and one third of the nation's capital comes from farming. So agriculture development results to the development of the country. In order to eliminate the problems of agriculture and to bring development in agriculture at large scale, there is need to use smart agriculture technique and methods of agriculture. Hence the objective is to make agriculture smart using automation and Internet of things like technologies. This entails smart GPS based remote controlled robot to perform activities like weeding, spraying, sensing soil, monitoring bird and animal scaring, keeping vigilance, using Quadcopter to get visual details, etc[1][2][3][6]. Secondly it also entails smart irrigation to make smart control and intelligent decision making based on data collected from the field with the help of sundry agro used sensors. Thirdly, smart warehouse should be there which will maintain power supply, temperature, humidity, moisture and theft detection. Thus controlling all these devices to get information of and from the field on a continuous basis with the help of smart device or computer having Internet and the operations will be performed by interfacing sensors, Wi-Fi or ZigBee modules, camera and actuators with micro-controller and raspberry pi[6].



. Fig.7 Smart Farming

IV. CHALLENGES IN IOT

A. *Security*

As in Wireless communication networks security threats are very common. The major wireless communication networks requisitions are in military, business, healthcare, education, online systems and transportations. The wired, cellular, or adhoc networks are commonly used in these systems. In society and industry, actuator networks, wireless sensor network and vehicular networks have received a gigantic attentiveness. In recent years, the Internet of Things (IoT) has received considerable research attentiveness.[1][3] The IoT is considered as future of the internet. In future, IoT technology uses will increases rapidly and will change our environment to smart , our living styles, , as well as business miniatures. The use of IoT in different requisitions will increase rapidly in the coming years. In IoT, billions of devices, peoples, and services are connected receive and barter information. Thus, due to this increased use of IoT devices, the IoT networks are highly prone to security attacks. Thus there is need of deployment of efficient security and privacy protocols in IoT networks to ensure confidentiality, authentication, access control, and integrity, among others[8].

B. *Value of data*

Transforming data into valuable information is no easy or small task. The variables and the risks are real and often uncharted; flexibility and time to market can mean the difference between failure and success. But, with the considerable potential of this developing market, there are some businesses those are aggressively undertaking the challenges. These businesses—the ones planning now for this new technology—will be the ones to succeed and thrive [1][3].

C. *Connectivity*

As number of devices on IOT will go on increasing with time and connecting them is going to be one of the stupendous problem of the future of IoT, and it will defy the very anatomy of current communication miniatures and the underlying technologies[4][8]. At present we rely on the medialized, server/client architype to certify, endorse and connect distinct nodes in a mesh. This model is ample for present IoT ecosystems, where tens, hundreds or even thousands of devices are included. But when networks grow to affix billions and hundreds of billions of devices, medialized systems will turn into a conjestion. Such systems will entail huge investments and spending in perpetuating cloud servers that can control such large amounts of information barter, and entire systems can go down if the server becomes unavailable. The future of IoT will very much have to depend on demedializing IoT networks[8]. Part of it can become possible by moving some of the errands to the edge, such as using fog computing miniatures where smart devices such as IoT fulcrums take charge of mission-censorious operations and cloud servers take on data converging and analytical responsibilities [5].Other solutions involve the use of peer-to-peer communications, where devices identify and authenticate each other directly and barter data without the intervene of a broker. Networks will be created in meshes with no single point of failure. This model will have its own set of challenges, especially from a security perspective, but these challenges can be met with some of the emerging IoT technologies such as Blockchain. [4][8]

D. *Power Supply*

Many objects typically move around and they have no power supply , so for smartness there is need of proper power supply for or self-ample energy source. Although there are few devices passive RFID transponders, they do not need their own energy sources as their range for functionality and communication is very limited. But there are many system or devices which collect or barter data on continual basis and loss of power to such systems may lead to gigantic loss. So in such cases there is need of regular and proper power supply [1][3][8]

E. *Scalability*

Internet of Things is very large and complex notation than as compare to Internet of computers, because in IOT things are cooperated within an open environment. Communication and service discovery are basic functionality and therefore need to function properly with gigantic proficiency in both small scale and large scale environments. Moreover, IoT entails a new techniques and ways in order to gain an efficient operation for scalability.[8]

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F. *Maintenance of device*

Maintenance is a censorious issue to understand as billions of new devices flood the Internet. We all know that unmaintained computers eject all approach of stuff onto the Internet, and most of those have an operating system that *is* maintained by someone. In variance, many IoT merchants have already gone out of business, and their devices may well be full of midges that none will ever be able to affix. What does that do to the Internet's potential to allot with malevolent actors? And how will recital and

optimization cases across the Internet be discern and rectified in such a sinwy and quick-changing environment? The numberal of devices lashed to the Internet will only enlarge faster as more and more objects become Internet-enabled. Let's be sure we expect about some of these rudimentary concern now before a billion refrigerators start telling us to buy milk on the way home.[1][3][8]

G. Software Complexity

As large and costly software infraanatomy are entaild on the network and on background servers so that smart objects can be managed properly and provide services to support them.Thus this increase of infraanatomy increases the complexity of the system.[3]

V. FUTURE SCOPE

Many new technologies are allied to IoT to prove the integration of wired as well as wireless control, communication and IT technologies affixtly which are responsible for connecting several subsystems and things which operate under a unified platform controlled and managed smartly.

A. Big Data

As the result of increasing network nowdays, the number of devices and sensors in the system are goes on increasing in the physical environments which will change the information communication networks, services and requisitions in sundry domains [1][9]. It is estimated that within the upcoming years near about 60billon devices will provide us large amount of data from many requisitions and service from different sectors like Home Automation, Smart Agriculture, transport healthcare and bussniess These technologies and networks that enable integration of data from different areas and services into the current information networking technologies are often described under the term of the Internet of Things (IoT) [10].

The amount and volume of data goes on increasing at large rate on the Internet and the Web, near about 2.5 quintillion bytes of data is created and it is estimated that 90% of the data was generated in the last two years. Data collected from different sensors allied to different fields and occurrences can be examined and transform into real information in order to provide better understanding of the physical world and to generate more valuabe products and services. The data from sensors used in sectors like smart grids, analyzed data of pollution, weather and congestion , help to manage and provide better traffic control, and monitoring and undertaking health signals data that collected by sensory devices to provide better healthcare services [10]. Apart from this, data and information collected from social media like tweeter, Facebook and WhatsApp etc. Thus with this large amount of data from IOT ,issues allied to automation, and data examining will entail common description and data representation frameworks in addition to machine readable and interpretable data descriptions [1][10].

B. Monitoring and Reporting

Thousands and millions of devices, equipments would be connected with each other with IOT notation. Inputting data at present is not fully automated in the internet, but this also will be procured with Self Monitoring Analysis and Reporting Technology (SMART). Using IOT each and every manoeuvre in our home can be scanned and affixed to the internet. By reporting and affixing we mean to say that if there is a gas exude, the sensors can find out and liaise it to us. Smart cities would confirms subsistence in clean and safe environs, intelligent smart traffic systems confirms less number of mischance.[1][9]

C. Plants and Animals

IoT will steer massive alteriation in the way our food is fatten, actioned, distributed, stored, and gobbled. We would be able to know the entailment of plants and animals, based on data that can tell people, computers, and machines when, for example, they entail water, treatment, healthcare support, need more sun or individual attentiveness.[9]

D. Cloud Computing

The two terms Cloud and IoT, both are the rapid and independent evolution. These two terms are very different from each other, but if we talk about their features they are somewhat similar and complementary in general, in which IoT can benefit from available resource of cloud to compensate its technological problems for example storage, undertaking, and communication [11]. .On the different hand, cloud can benefit from IoT by expanding its scope to link and deal with real world objects in a more proper and dynamic manner, and thus can deliver new services on large scale for real life scenarios. Also in many cases, Cloud can provide the intermediate layer between the objects and the requisitions, hiding all the complexity and functionalities necessary to implement the latter. This will impact future scope and requisition development, where data accumulation , undertaking, and transmission will generate new problem, especially in a multi cloud environment or in fog cloud [11]. Cloud play cardinal role in IoT requisitions in order to collect data and undertaking of that data , in addition to rapid setup and integration of new things, while perpetuating low costs for deployment and for complex data undertaking [1][11]. Once into Cloud, data can be treated as homogeneous through well-defined APIs, can be protected by applying top level security, and can be directly accessed and visualized from any place .

Apart from this there are many more requisitions where Internet of things will enter like agriculture sector , security and privacy of data and so on. Internet of thing is the fastest growing technology which will enter in every sector of life to make smart environment ,and smart world.

CONCLUSION

IoT has been gingerly bringing a sea of technological changes in our daily lives, which in turn helps to makingour life simpler and more comfortable, though sundry technologies and requisitions. Internet of things is a new way to the market which have many requisitions to connect the things to things and human to things through the internet. The IoT uses different number of networks and technologies such as sensors, microcontroller , clouds , mobile ,computers which will further help to store data , process data and barter data i.e controlling and management .This new technology have proper architecture , protocols and frequencies . The Iot have smart requisitions like smart home automation , smart cities, smart agriculture , smart healthcare and many more to make human life more comfortable and make the world more smarter.

The Internet of Things facing many problems like security and privacy , value of data , scalability etc and allied researches are going on to eliminate these problems and challenges . The internet of things promises future new technologies when allied to cloud, fog and distributed computing, big data, and security issues. Thus by concluding and integrating all the above we reach to a point that Internet of Things have smart requisitions which will come in market very soon and make this world more smarter. This paper also takes into consideration some most cardinal requisitions and their challenges in order to implementation of IOT notation and the other future technologies make the notation of IoT feasible.

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Vikas Johal has completed his Bachelors in Engineering in Electronics and Communication from Model Institute of Engineering and Technology, Kot Bhalwal, Jammu, J&K, INDIA. Areas of Interest are Internet of Things, Embedded systems,Artificial Intelligence and HTML.

Jasleen Kour has completed her Bachelors in Engineering in Electronics and Communication from Model Institute of Engineering and Technology, Kot Bhalwal , Jammu , J&K, INDIA. Areas Of Interest are Internet of Things, Microcontroller and HTML.