

Survey about the combinational outcome of Internet of things over and Wireless Sensor Networks for enhanced technology implementation

Pravina H. Bhatt¹

¹Vadodara Institute of Engineering

ABSTRACT- The motto of this paper is to demonstrate distinguished properties of Wireless sensor networks and Internet of things. In border sense both WSN and IOT are like two sides of a coin. IOT inherits the functionalities of WSN. Moreover the eminent study is necessary to select the path for a good future in the field of transition of technologies. Nowadays the world is moving towards smartness by selecting smarter technologies, that led to enhance and implement the detailed study of enhanced embedded system and its branches like wireless sensor networks and Internet of things. This paper will elaborate the clear visualization of mere functionalities of WSN and IOT to route the area of research based in the sector of smart home.

Key words—WSN-Wireless sensor networks, IOT-Internet of things.

I. INTRODUCTION

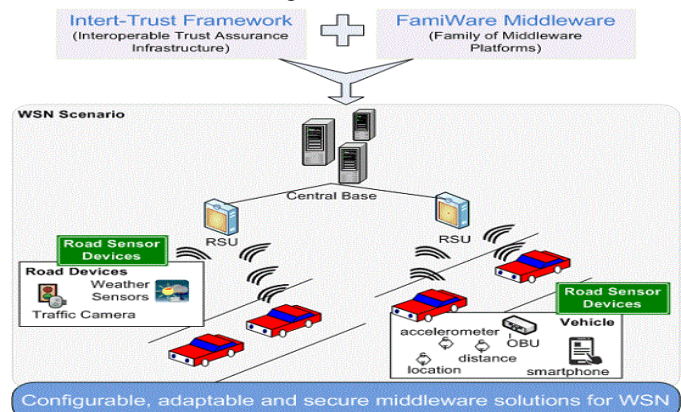
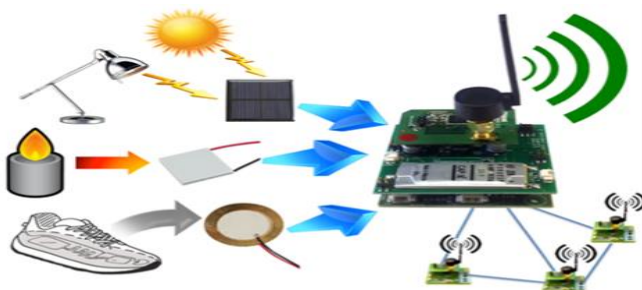
Wireless Sensor Networks (WSN) is like the eyes and ears of the Internet of Things. It is the bridge that connects the real world to the digital world. And it is also accountable for transitory on the sensed real world principles to the Internet. The Internet of Things in a broad sense is like a brain, it can both store the real world data (in cloud services or databases) and can also be used to monitor the real world parameters, make significant understanding and even make decisions on the bases of sensed data. IoT is conscientious for the data processing, manipulation and decision making.

II. WIRELESS SENSOR NETWORKS

A. A Wireless Sensor Network is one kind of wireless network includes a large number of circulating, self-directed, minute, low powered devices named sensor nodes called motes. These networks certainly cover a huge number of spatially distributed, little, battery-operated, embedded devices that are networked to caringly collect, process, and transfer data to the operators, and it has controlled the capabilities of computing & processing. Nodes are the tiny computers, which work jointly to form the networks. The sensor node is a multi-functional, energy efficient wireless device. The applications of motes in materialistic profession are extensive. A collection of sensor nodes accumulates the information from the background to achieve particular

application goal. The communication between motes can be done with each other using transceivers. In a wireless sensor network, the number of motes can be in the order of hundreds/ even thousands. In contrast with sensor networks, Ad Hoc networks will have fewer nodes without any structure.

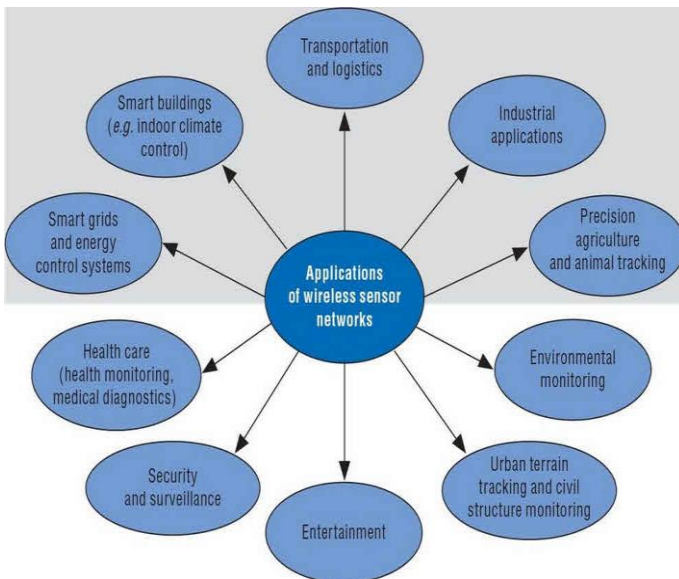
B. As wireless sensor technology improves; an increasing number of organizations are using it for a wide range of purposes. Followed by Bluetooth the latest standardised wireless personal area is ZigBee technology. An invention of introduction to such latest technology has given birth to a new wireless meter-reading system based on ZigBee protocol. This system, which is comprised of ZigBee network and database management system, has many important advantages such as low cost, low power consumption, and low data rate. The combined outlet of Wireless Sensor Network on the basis of ZigBee technology is nothing but a cordless network as a combination of various lump of ZigBee RF chip, sensor and multipoint control unit that is suitable for objective of the remote monitoring system in flammable and explosive environment. Fusion of RFID and ZigBee is also possible which turn out to be boon for wireless sensor network technology. A complete overview of wireless sensor network technology is given in this paper. Wireless sensor network technology has become one of technological basic needs of us.



C. Currently, WSN (Wireless Sensor Network) is the most standard services employed in commercial and industrial applications, because of its technical development in a processor, communication, and low-power usage of embedded computing devices. The WSN is constructed with lumps that are used to study the environment like temperature, moisture, vibration, position, pressure, noise etc. These nodes can be used in various real-time applications to perform various tasks like smart detecting, a discovery of neighbor node, data processing and storage, data collection, target tracking, monitor and controlling, synchronization, node localization, and effective routing between the base station and nodes.

D. Presently, WSNs are beginning to be organized in an enhanced step. It is not awkward to expect that in 10 to 15 years that the world will be protected with WSNs with entree to them via the Internet. This can be measured as the Internet becoming a physical n/w. This technology is thrilling with infinite potential for many application areas like medical, environmental, transportation, military, entertainment, homeland defense, crisis management and also smart spaces.

E. Wireless sensor networks provides wide range of sensors which are sharp to monitor and may withsatnd the wear and tear situations those are low seismic, sampling rate, radar, infrared, acoustic , thermal, visual, and magnetic. Sensor nodes are used for constant sensing, event ID, event detection & local control of actuators. The utilization of WSN is encountered in the field of home, health, military, environmental, commercial areas & many more.



- Military Applications
- Health Applications
- Environmental Applications
- Home Applications

- Commercial Applications
- Area monitoring
- Health care monitoring
- Environmental/Earth sensing
- Air pollution monitoring
- Forest fire detection
- Landslide detection
- Water quality monitoring
- Industrial monitoring
- Machine health monitoring
- Data center monitoring
- Data logging
- Water/waste water monitoring
- Structural health monitoring

III. INTERNET OF THINGS

The IoT refers to the link of plans (like smartphones and computers) to the Internet. Cars, kitchen appliances, and even heart monitors can all be connected through the IoT. And as the stream of IoT grows in the next few decades, mere hardwares will join this list. Smart, Connected Products within The Internet of Things (IoT) will create a broad spectrum of opportunities for businesses to transform the way they create products and deliver services.

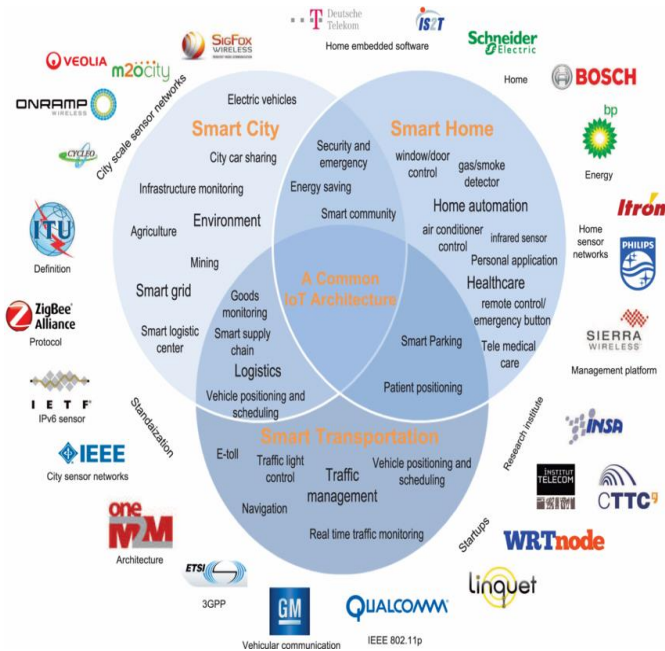
IoT precisely tends to the connection of sensors to the Internet and behave as if in a way of it by making open, adhoc connections, distributing data liberally and allowing unexpected applications, so computers can understand the world around them and become humanity's nervous system.

How global organizations are using IoT today?

A. Using 'smart workplaces' to boost productivity and efficiency

Seven in ten (72 %) enterprise organizations have introduced IoT devices and sensors into the workplace from air conditioning and lighting systems (56%) to personal mobile devices (51%).

The study outcomes on survey also shows that advanced workplaces is feasible for implementation. Over three-quarters (78%) of enterprises say the introduction of IoT into the workplace has improved the effectiveness of their IT team, while 75% find it has increased profitability.



B. Industrial sector looking to IoT to reduce risk and downtime

With a 62 percent adoption rate, leaders of industrial organizations reported using IoT devices such as chemical sensors (62 percent) and picking systems (46 percent) to reduce operational risk and address downtime.

The drastic raise in margin of innovation as 83%, business efficiency as 83%, and visibility across the organization of 80 percent is encountered those who have adopted IoT. These points are important for achieving a long-term vision for IoT in this sector; 40 percent believe IoT will help them expand into new markets and another 34 percent are hoping to see overall industry growth because of their IoT practices.

C. Healthcare increases innovation and reduces costs through IoT

Six in ten healthcare organizations are already using IoT, with patient monitors (64 percent) and X-ray/imaging devices (41 percent) among the main devices connected to the network. Huge numbers of healthcare companies are benefited by using sensors to record and uphold medical devices. But with growing pressure on healthcare infrastructures and resources, efficiency is paramount. Possibly this is why 22% of respondents gave their number one IoT use case as 'remotely tracking assets by location'.

D. Retailers are building IoT services to enhance the customer experience

Just about 49% of global retailers have choose IoT technology, and 56% of them are allowing personal mobile devices to access the network in order to organize new and growing retail experience.

A leading application of IoT is to create store location services that deliver personalized offers and product information to shoppers (30 percent). Moreover 18% are using IoT for

mobility in controlling environmental factors, such as heating and lighting. All of this is making its mark on consumers, at a time when customer experience is increasingly a winning differentiator. The review of 81% of retail organizations declared that IoT has improved the overall customer satisfaction, and for rest it has enhanced business overdue.

E. Governments are saving costs with IoT, creating smart cities

At 42%, governments are further behind in their adoption of IoT. In fact 35% of IT authorizers within government bodies claimed their leaders had little or no understanding of IoT. However, there remain signs of progress being made in IoT. Governments are already connecting 57% of building security systems, 32% of street lights and 20% of vehicles to create a smart city. The most popular application of IoT is the remote monitoring and control of devices within the city boundaries (27% name this their number one application).

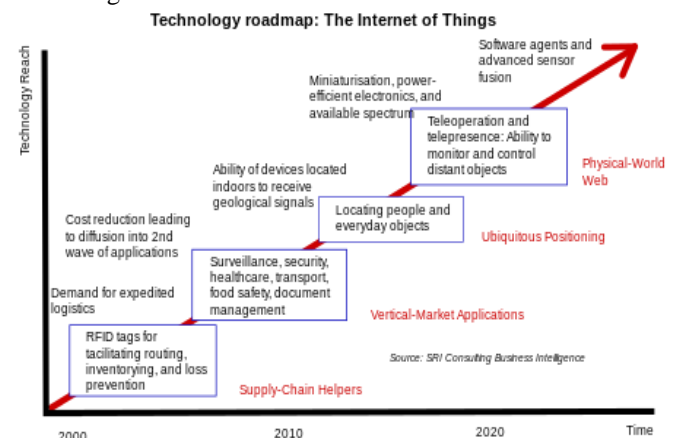
Within cities, the limitations of legacy technology is proving a key challenge, with nearly half (49%) of government IT departments struggling to integrate older technology into their systems. However, those with a working IoT strategy show why it is worth pursuing: seven in ten (71%) public sector IoT adopters reported cost savings, and a further 70% said IoT had improved visibility across their organization—a crucial step if the unified infrastructure of the smart city is to be realized.

F. The IoT business opportunity

The real-world applications of IoT show significant promise, and this finding is echoed across the global research. The survey demanded businesses that have adopted IoT to elaborate the results they have watched yet deployment. The survey consistently found positive responses.

Just some of the areas IoT is helping transform:

- 82% said they had seen an increase in business efficiency since adopting IoT technology
- 81% have seen their organization's IT become more efficient.
- 73% have achieved cost savings.
- 78% saw an improvement in customer experience.
- 72% declared a profitability increase.
- 77% have seen improved visibility of processes across the whole organization.



IV. TECHNICAL ANALOGY- WSN Vs IOT

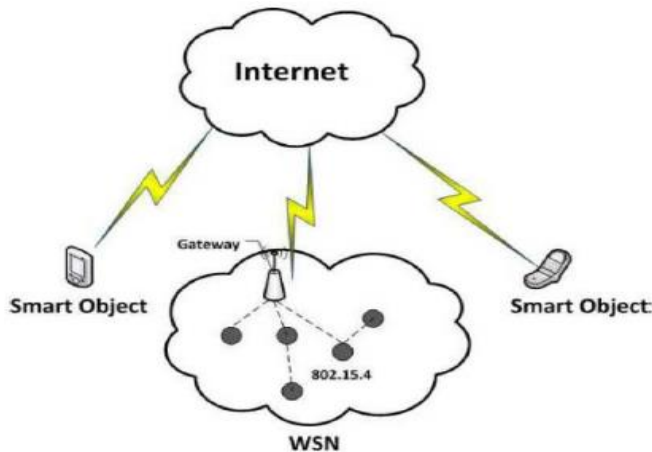
A. *WSN: Things (sensor nodes) connected without a wire to gather some data.*

As name suggested its Wireless (have no wires) Sensors (have sensor(s)) Network (a network with specific topology). WSN is a network of electronic nodes connected through unguided media which consists of various sensors. The purpose of a wireless sensor network is to collect data from these sensors from subject environment. One most popular topology of this network consists of three type of nodes which are as follow:

Router: A node which simply take the data from small subnetworks and send it to coordinator. such a node may also have their own sensors.

Coordinator: It is a crucial part of network, it is a node in a WSN which accumulate all data from entire network and pass it to other gateway from where data goes to data centre of a IoT ecosystem to get analyzed

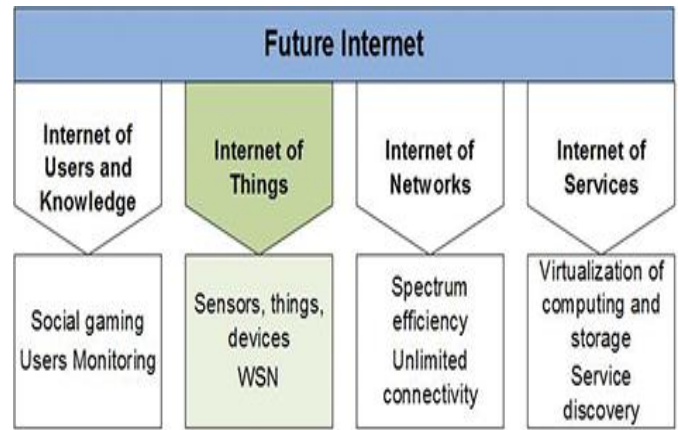
End devices: These nodes perform a data acquisition from one or more then one sensors and send it to coordinator directly or via a router.



B. *IOT: WSN+ Internet + App + Cloud computing+ etc...*

Internet of Things is an background in which smart small hosting nodes which are Always, Anywhere and Anytime (3As of IoT) are connected with each other and sending some data or information which can further be processed over cloud to generate meaningful analytic result that can help a lot or to trigger an automatic action according to the analysis. Any device of IoT surrounding gets attached with any device and makes them smart device.

These small devices are called the "THING" of Internet of Things and this environment comprises of 3 ingredients called Device, Network and Application also known as DNA of Internet of Thing.



What we need to do to convert anything into "THE THING" of Internet of thing?

1. Now some devices are already smart like your smart phone and sensors are already resides inside them but for others we need to put some sensors.
2. IPV6 or 6LoWPAN is already providing unique identification to these devices.
3. For communication we need to add some IoT gateway like most popular one out of many CC3200 by Texas Instrumentation.
4. Next front end like a mobile app or website where all the data with analytic result or controlling device user interface front end is available.

V. CONCLUSION

As the study moves forward we enlighten the soul of this paper that is the main application of IOT over WSN. We got answers to various questions like how features of IOT is inherited from WSN, why WSN is father that to for the son named IOT, why IOT is more advanced and having vast area to enlarge its capacity and so on. As technological advances are daily being developed, so do wireless sensor networks and so does the Internet. Internet started as a way to provide communication between computers established in distinct locations, when every other sort of communication system is non-operable. In the upcoming Internet of Things (IoT), the everyday objects that surround us will become proactive actors of the Internet, generating and consuming information. The elements of the IoT comprise not only those devices that are already deeply rooted in the technological world, but also objects foreign to this environment, or even living beings. In fact, one of the most important elements in the IoT paradigm is wireless sensor networks (WSN). The benefits of connecting both WSN and other IoT elements go beyond remote access, as heterogeneous information systems can be able to collaborate and provide common services. This integration is not mere speculation, but a fact supported by several international companies. Noteworthy examples are 'A Smarter Planet', a strategy developed by IBM which considers sensors as fundamental pillars in intelligent water management systems and intelligent cities; and the CeNSE project by HP Labs, focused on the deployment of a worldwide sensor

network in order to create a “central nervous system for the Earth” It is clear that the potential of the wireless sensor networks (WSN) paradigm will be fully unleashed once it is connected to the Internet, becoming part of the Internet of Things (IoT). However, it is necessary to discuss whether a full integration at the network level (i.e. using direct TCP/IP connections) should be advisable for every application.

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