

Surveillance of the Internet of Things (Iot) Technology in Digital India

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Abstract

Due to recent development and innovation in both hardware and software, the global network of networks, or Internet of Things (IoT), is finally becoming a reality. The IoT's diverse billions of communicating devices, or smart objects (SOs), enables a new paradigm of interactivity among all manner of things and people. One of the IoT's biggest hurdles is the monolithic nature and fragmentation of existing vertical closed systems, architectures, and application areas. In this paper discussed briefly about the initiatives like Policy on Internet of Things (IoT), Smart Cities, Centre of Excellence for IoT in Bangalore by GOI and NASSCOM, Andhra Pradesh to become an IoT hub with first-of-its-kind policy, Tech Giants back Digital India Vision taken up by Government of India as well as the applications of IoT. Methodology of IoT in India.

Keywords: *Smart Objects (SOs), Policy on Internet of Things (IoT), Centre of Excellence for IoT, IoT hub with first-of-its-kind policy, Tech Giants back Digital India Vision.*

INTRODUCTION

The digital space in India is undergoing a major transformation and with Prime Minister Narendra Modi leading the Digital India campaign, Magazine chalks

down five major Internet of Things (IoT) initiatives taken by the Indian government. But before we dive into the top 5 IoT initiatives, here's a bit of lowdown on the emergent IoT market share of India.

According to reports, India is expected to capture 20 % share in the global Internet of Things (IoT) market in the next five years and the overall global market is estimated to touch US\$ 300 billion by 2020. Another reports point out the IoT market in India is projected to grow at a CAGR more than 28.2 per cent during 2016-2022. Now, India already has a strong base in technology and the public-industry partnership is bound to bring about a monumental change. One of the most notable IoT initiatives for India will be delivering health, education and financial services to remote areas. Thereby, building a bridge between rural and urban India with IoT will be a landmark step in empowering millions in rural India and tackling. Here are the top 5 IoT initiatives by Government of India

Policy on Internet of Things (IOT)

In a first for the Indian government, 2015 saw the roll-out of a draft policy on IoT that laid down the framework. Reports indicate India would share 5-6% of global IoT industry. Building on the vision of a secure, smart and connected IoT based system for the country, the Government has undertaken several research and development projects for assisting technologies. Foremost being the setting up of 100 smart cities in the country,

second automating several industries such as energy, health, disaster management via remotely connected devices. The draft policy lists down the industry collaboration also — **“IT industry also has an opportunity to provide solutions, services and analytics related to IoT.”** The policy would be implemented through a multi pillar approach, such as capacity building and incubation, R&D, and incentives and engagements.

Smart cities

One of the most talked about initiatives by the Indian government, IoT will play a pivotal role in the Smart City project. The government has dedicated an investment of INR 7,060 corers on smart cities. The idea of a smart city is an urban centre where information technology is the key driving factor with many technological platforms such as automated sensor networks, data centers and many other. A smart city is one which is advanced in terms of its infrastructure, has sustainable real estate and the right communication among other features. Some of the key aspects shared by Indian Government’s draft policy on IoT pertaining to smart city are:

- Smart parking
- Intelligent Transport System

- Smart urban lighting.
- Waste management.
- Smart city maintenance
- Tele-care
- Citizen safety
- Smart Grid
- Smart Energy
- Water Management

Centre of excellence for iot in bangalore by goi and nasscom

Earlier this year, the Indian government in partnership with NASSCOM, DEITY along with TCS, Intel, Amazon Web Services and FORGE Accelerator launched a Centre for Excellence for IoT in Bangalore. “The COE facility will function as a platform for skill development and also an innovation accelerator to explore establish high end technologies to support government initiatives using IoT in areas like water, energy, agriculture, crime, safety and health,” R. Chandrashekhar, President, NASSCOM said in a statement. The COE will also act as a springboard for budding entrepreneurs to leverage new age technologies and address issues such as waste management, women’s safety, parking, electricity, water management.

Andhra pradesh to become an iot hub with first-of-its-kind policy

In a proposed project, Andhra Pradesh plans to turn into a IoT hub by 2020 and creating 50,000 jobs in IoT sector. Reportedly, as per the landmark policy, Andhra Pradesh government proposes to set up 10 IoT hubs and wants to attract 100 IoT companies to set up operations thereby creating a first of its kind IoT ecosystem in India.

The program is aimed at positioning Andhra Pradesh as the IoT Hub in the country and grab a market share of USD 1.5 billion by 2020, as per the reports. So far, the IC2 Institute of the University of Texas and the Federation of Andhra Pradesh Chambers of Commerce and Industry have proposes a one of its kind IT incubation centre in Tirupati.

Tech Giants back Digital India Vision

One of the highlights of the Digital India campaign is the high level of interest evinced by tech giants to partner with Indian Government in the campaign. And the latest company to jump on the bandwagon is Juniper Networks with an astounding INR 6,700 crore investment for digital India drive. According to reports, the company is looking at schemes such as

digitization and digital infrastructure for every citizen.

Legacy tech giant Intel announced a slew of projects to back Digital India vision. One of its projects is aimed at accelerating digital literacy ‘Ek Kadam Unnati Ki Aur’ initiative.

Another prominent voice lending support is that of John Chambers, Cisco Chairman. With major investments in Andhra Pradesh, Cisco is setting up Internet of Everything (IoE) Innovation Centre in Visakhapatnam to promote regional innovation and to enable partners and startups to build solutions around IoE.

As a slew of storied technology companies tie up with Indian corporate for developing new IoT and M2M solutions, the Digital India initiative is expected to enhance the focus on IoT in tackling the rural and urban challenges.

LEATARAURE SURVEY

Internet of Things (IoT) as defined by the ICT (Information and Communication Technology) as a dynamic global network infrastructure with self configuring capabilities based on standard and interoperable communication protocols where physical and virtual things have identities,

physical attributes and virtual personalities use intelligent interface and seamlessly integrated into the information network. IoT is the inter networking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoTGSI) defined the IoT as the infrastructure of the information society. The traditional fields of embedded system, wireless sensor networks, control system, automation systems are together interconnected to form the IoT. That means the internet of things builds over the revolutionary success of mobile and internet network. Even a few decades back, nobody could have imagined having a video chat with their families. Nowadays, it is merely a child’s play. All of this is due to the wide availability of internet and creation of devices with Wi-Fi abilities. Technology costs are going down, and smart-phones are capable of doing almost anything with their inbuilt features and apps. What we have till now is “Internet of Computers (IoC)” and it is gradually growing in size. According to Gartner’s study, “the world will be a more deeply and intimately connected place, with an estimated 7.3 billion tablets, PCs

and Smartphone's, by the end of this decade. By the year 2020, this massively connected system is likely to expand at even more rapid rate to 26 billion connected devices around the globe." Thus, emerging the huge scope of Internet of Things (IoT). This so called IoT is sitting on a perfect storm. And the storm revolves around five basic areas Sensor technologies, Local processing, Networking models, Data Science and Predictive Technologies, Machine Learning and Security. Basically, this is the idea of fundamentally interfacing any gadget to the Internet (and/or to each other). This incorporates everything from cell phones, coffee machines, dish-washers, earphones, lights, wearable gadgets and just about whatever else anybody can consider. This likewise applies to parts of machines, for instance an engine of a plane or the drill of an oil rig. One of the biggest paradigms behind this trend is the Internet of Things (IoT) which foresees a world permeated with embedded smart devices, often called "smart objects", inter-connected through the Internet. The IoT will turn into a mammoth system of associated "things" (which additionally incorporates individuals). Communication will be between human-human, human-things, and things-things. Today this has given a

vision of bigger things like IoT enabled interconnected Cyber Physical Systems (CPS).

Companies and organizations are therefore very interested towards these concepts. Announced at the Hanover Messe Trade Show 2016, Microsoft and Rolls-Royce will collaborate to support Rolls-Royce intelligent engines and offer 'advanced operational intelligence to airlines'. Rolls-Royce will integrate Microsoft Azure IoT Suite and its Cortana Intelligence Suite to gather information on flight operations, fuel usage and maintenance planning. More to say, the Virgin Atlantic are also investing in the IoT by making a fleet of Boeing 787 aircrafts and cargo devices connected with IoT devices and sensors. Each connected plane can expect to produce over half a terabyte of data per flight. Thus, decision making algorithms can be applied to report mechanical problems before they happen. While sounding laughable at first, the 'internet of cows' is a great example of a useful IoT application. Working with the National Trust, British Telecommunications (BT) monitored the cows' location in order to prevent theft. Currently, various companies are also keen to use IoT protocols in the development process of cyber physical manufacturing systems. A

recent study published by the World Bank estimates that over the next 10 years there will be two million unfilled Information and Communication Technology-related jobs globally. In addition, over 95% of companies say they will be using the IoT in some form within the next three years. This requires educational institutions to better prepare students for employment by these companies.

The Secure Internet of Things Project is a cross-disciplinary research effort between computer science and electrical engineering faculty at Stanford University, University of California - Berkeley, and the University of Michigan. The research effort focuses on three key domains:

- **Hardware and software systems:** Construction of hardware and software systems that will make the IoT enabled systems intelligent and secure.
- **Analytics:** Integration and analysis of the enormous streams of physical world instrumentation with all of the existing data.
- **Security:** Developing pervasive sensing and analytic systems to preserve and protect user security.

Tyfone, with the support of MIT Sandbox Innovation Fund Program, is creating a unique opportunity to help secure the Internet of Things. Harvard University has established a six-year, \$8.4 million research alliance with a group of Tata companies including Tata Sons, Tata Communications, Tata Steel, and Jaguar Land Rover. The initial focus of the research alliance will be on robotics, wearable technologies, and the “internet of things” (IoT), tapping into recent strides in the field of advanced materials. Over time, the scope could broaden to encompass new research areas of mutual interest. The University of California - Berkeley have built a specialized laboratory to go beyond smart-phones. They are aiming towards a human-centered design research to explore disruptive opportunities with flexible/stretchable wearable in the Internet of Things.

Characteristics

Some of the characteristics of IoT are Inter connectivity, Things related Services, Heterogeneity, Dynamic Changes, Enormous Scale etc. Today rapidly development of electronic gadgets with computing capabilities, storage along with embedding short range transceivers enabling new form of communications between people and things and things

themselves. This new phenomena has added a new dimension to the world of information and communication technologies (ICTs). That is why IoT makes it possible from anytime, anyplace connectivity for anyone, we will now have connectivity for anything.

So Internet of Things is a technological revolution which is totally a dynamic in nature. It has been converging multiple technologies creating new dimension of services that improves the quality of life of consumers and productivity of enterprises. From the consumer point of view, the IoT has the potential applications such as deliver solutions that dramatically improve energy efficiency, security, health, education, connected cars, smart homes, smart retails and many other aspects of daily life. For enterprises, IoT can underpin solutions that improve decision-making and productivity in manufacturing, retail, agriculture and other sectors.

Technologies to support IoT

Some of the technologies converging to support and enable IoT applications are architecture, Identification, Communications, Network Technology, Network Discovery, Software and algorithm, Hardware Technology, Data and signal processing, Discovery and

Search Engine, Net-work Management, Power and Energy Storage, Cyber Security, Information security etc.

Challenges and research areas of IoT:

- Robustness
- Privacy
- Cloud computing
- Cyber physical system
- Autonomic Computing
- Social Networks
- Security

IoT represents a vision in which the Internet extends into the real world embracing everyday objects. Physical items are no longer disconnected from the virtual world, but can be controlled remotely and can act as physical access points to Internet services. The IoT vision is grounded in the belief that the steady advances in microelectronics, communications and information technology witnessed in recent years will continue into the foreseeable future. "Smart" objects play a key role in the IoT vision, since embedded communication and information technology have the potential to revolutionize the utility of these objects.

Using sensors, they are able to perceive their context and via built-in networking

capabilities they would be able to communicate with each other, access Internet services and interact with people. The research in this emerging area is one of the main thrust areas under CPS.

IOT METHODOLOGY

The internet of things is now growing exponentially and is reaching different verticals and industries. India is one of the countries where a lot of innovation is happening around IoT across different verticals and technologies. The IoT ecosystem in India is mainly driven by 3 players: Government, Industry and Startups.

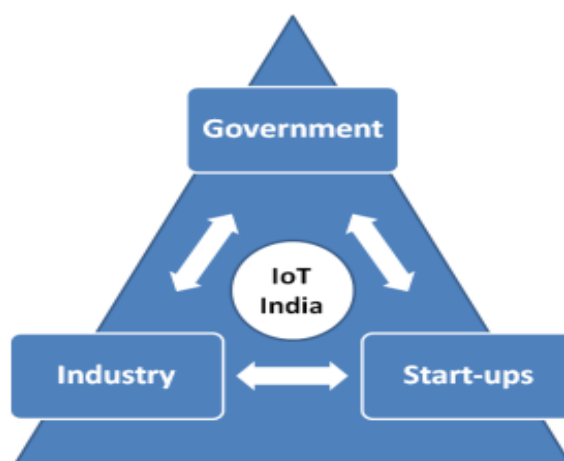


Figure: 1

GOVERNMENT:

There is a lot of scope for IoT in India and Government has rightly recognized it and working towards it. The government has taken initiative and framed a draft policy

to fulfill a vision of developing a connected, secure and a smart system based on our country's needs. Government's objective is to create an IoT industry in India of USD 15 billion by 2020.

Other domain specific applications include smart water, smart environment and smart health. There is a plan to incorporate an incubator for to IoT to promote innovation. Government plans to nurture and grow the IoT ecosystem.

With growth come challenges:

- The biggest implementation challenge will be the complete integration of technology and language. We have to keep in mind India's diversity.
- Cyber security is another obstacle. We are all well aware that internet and cyber crime are inseparable.
- Issue of last mile connectivity.

INDUSTRIES

Another key player in this ecosystem is the Industry. IoT will transform how companies do business when they grab onto its innovations. Statistics shows about one-fifth of manufacturing companies are

using IoT to increase production and reduce costs.

Why use IoT? What are the benefits? IoT offers better control of companies' logistics. The use of the data can also enable them to offer their customers near real-time tracking of shipments. The future of the manufacturing sector in India is envisioned to be capital efficient and flexible. Design updates will be introduced more quickly, and customizations will easily be installed.

Automobile industries are another major adopters aiming to feature-rich, safer and cost effective products and services. They contribute 17% share as adopters. Transforming strategies are being worked upon currently are:

- **Usage Based Insurance (UBI)** – this enables the device incorporated in vehicles to capture data and transmit it to the IoT platform which is then managed by UBI platform. This will enable insurance companies to build propositions and take it to market.
- **Intelligent Emergency Calling (eCall)** – It enables cars to automatically call emergency services in case of a serious crash.

- **Stolen Vehicle Tracking (SVT)** –This is currently implemented

IT INDUSTRY

The world around has evolved with many innovations appearing on a day-to-day basis. These connect machine-to-machine and human-to-machine. Other notable industries that are adopters of IoT are mining, healthcare, banking and education. Some of the companies who are active in IoT space in India are

- 1) **Intel**– It is at the top of the ladder in the production of low-power chips to connect IoT devices.
- 2) **Volkswagen**- It has added an SAP system that keeps track of their parts' entire supply pipeline to help them track where items are located at all times.
- 3) **MediaTek**: MediaTek has launched LinkIT ONE development platform which helps design and prototype IoT devices and wearables. They have been working greatly in nurturing and mentoring a lot of start-ups as well.
- 4) **Hero MotoCorp**- The largest two-wheeler company in the country, with the help of IoT keeps tabs of vehicles

available in different locations so that the dealer can be kept informed all the time.

5) **Hindustan Petroleum-** By using IoT, it automates processes and creates real-time insights into the business. It has installed sensors in field units to capture information such as temperature, pressure etc.

6) **Apollo Hospitals-** It has envisioned IoT will transform Health care and are exploring IoT in disease management. SUGAR is their diabetes management initiative which enables constant monitoring of the specific blood sugar levels using IoT enabled technology and transform them to personal health record system. It is also looking at IoT in effective inpatient care, post-discharge care and overall preventive health and wellness.

7) **Cisco-** It is investing in the IoT space by building large teams and localized products.

8) **Bharti Infratel-** It is using IoT for management and live monitoring of its passive infrastructure like tower, fuel management, energy distribution,

monitoring and surveillance on the site etc.

9) **TVS Motor** – It uses IoT for process automation, process quality control and traceability in shop floor, pollution control and monitoring, measurement of water flow and power consumption.

10) **IBM-** It is investing heavily in enterprise application infrastructure and databases for connected devices. It is also promoting its cloud-based platform IBM Bluemix heavily amongst the developers.

Start-ups

Another player in the ecosystem is Startups. Bangalore, Mumbai, Pune and Hyderabad are the four major cities where you would discover quite a few startups that are making a breakthrough. These are silently disrupting and innovating thereby breaking and creating newer realms each day within the IoT space.

One of the pioneering communities in IoT space is IoTBlr which is based out of Bangalore and has been instrumental in driving the IoT ecosystem in India. It is the 2ndlargest IoT-focused meet-up community across the world and helps organize different talk, workshops,

Hackathons, DIY sessions etc to help spread knowledge and awareness about IoT.

IoT HackDay is another group which is a Pan India initiative based out of Hyderabad. This group conducts Hackathons which helps bring collective knowledge and innovation to address the challenges in IoT and smart cities space. This event works towards addressing social challenges with the use of technology which is the need of the hour.

All in all, India is making progress and we have exciting years to look forward to. The synergistic working of Government, Industry and Startups will drive the ecosystem to new heights.

CONCLUSION

- IoT market in India is expected to grow to \$ 15 billion with 2.7 billion units by 2020 from current \$ 5.6 billion and 200 million connected units.
- IoT market in India is projected to grow at a CAGR of more than 28% during 2015 – 2020.
- As the global IoT business is expected to touch \$300 billion by 2020, India

aims to capture 20 per cent market share in another five years.

- The government has taken initiative and framed a draft policy to fulfill a vision of developing a connected, secure and a smart system based on our country's needs. Government's objective is to create an IoT industry in India of \$ 15 billion by 2020.
- The industrial applications of IoT, primarily in manufacturing, automotive and transportation and logistics, are expected to drive the IoT revenue by 2020.
- IOT market in India currently stands at \$130 million annually in revenues.
- Growing adoption of Cloud in IoT services and shifting focus over industrial IoT (IIoT), rising market of M2M communication and increasing trend of wearable technology applications are among the major factors driving IoT market in India.
- In terms of sector type, Telecom is the largest sector being served by IoT in India. Of the total revenue earned by IoT industry in India, 36% or \$47 ,million comes from telecom.

- Electronics comes second at 29%, followed by Oil & utilities sector at 23% of IoT revenues in India.
- Finance, retail & healthcare; the 3 big sectors in terms of size, are late adopters of IoT, providing single digit millions in revenue to IoT sector.
- Consumer IoT, which includes smart home devices as well as wearables, account for the remaining 40% of the IoT market. This is set to change, with consumer IoT's share rising to 45% by 2020.
- There are currently more than 400 companies providing IoT related services in some form.

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