

Internet of Things: Current Analysis of IOT Applications, Architecture and Security Issues

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Abstract - Needless to say that the current hype around the Internet of Things (IoT) is huge. In everyday life a new company announces IoT enabled product. And it gives some (biased) prediction of the market is going where. What companies search for on Twitter, what companies write on google, and what companies talk about on LinkedIn. IoT market will hit \$7.1 trillion in revenue by 2020. This paper comes up with a current analysis of IOT Applications. The following sections comprise of a conceptual study of a overview of IOT requirements and the security, privacy, legal and regulatory implications of IoT and future concerns of IOT.

Keywords - Analysis of IOT trends, Architecture and requirements, Security Issues, Challenges, Future concerns of IOT

1. Introduction

There are various definition available for Internet of Things that is followed by the world community of users. The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to serve billions of users worldwide. It is a network that consists of millions of public, academic, private, government, business networks, of local to global scope, that are linked by optical networking technologies.

The another definition for the Internet of Things will be: "An comprehensive network of objects that have the capacity to , share information, data and resources ,auto -organize reacting and acting in face of situations and changes in the environment.[1]

Internet of Things is continues to be the latest, most concept in the IT world. the last decade the term Internet of Things (IoT) has attracted by projecting the vision of a global infrastructure of networked objects, anytime, anyplace connectivity for anything [2]. The IOT can also be considered as a network which allows the communication between human-to-things, human-to-human and things-to-things, which is anything in the world by providing unique identity to each and every object [3]. Internet of things describes a world where anything can be communicating and connected in an intelligent manner that ever before, "being connected" of

electronic devices such as computers, servers tablets, and smart phones[4]. In the IOT actuators and sensors embedded in physical objects—from roadways to pacemakers—are linked through networks media, using the same Internet IP that connects the Internet[5]. When the IOT objects can both sense and monitor the environment and communicate, they become tools for understanding complexity.

In fact, there are many different groups including researchers, practitioners, academicians, innovators, developers and corporate people that have defined the term, although its initial use has been attributed to Kevin Ashton, an expert on digital innovation. All of the definitions have common idea that the first version of the Internet was about data created by people. Revolutionary in IOT is that these physical information systems are now deployed, and some of them work largely without human intervention. The "Internet of Things" refers to the designing ,coding and networking of everyday objects and things to render them individually traceable and machine-readable on the Internet .

2. Analysis of IOT applications ranking on the basis of survey

Smart city spans a wide variety of use cases, from water distribution to traffic management, the waste management,

cities security and environmental monitoring. This application popularity is fuelled by the fact that many Smart City solutions promise to alleviate real pains of people living in cities these days. The internet of things solutions in the area of Smart City, reduce noise, solve traffic congestion problems and pollution and help make cities safer.

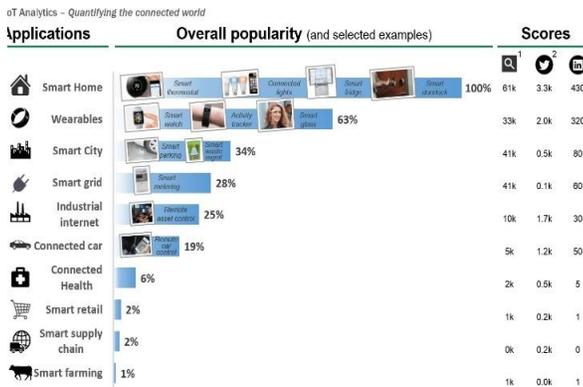


Figure 1

Smart Home means ranking as highest Internet of Things application all over the world. More than 60 thousand people currently search for “Smart Home”. The Internet of things Analytics organizations database for Smart Home includes 258 companies and start-ups. Even more companies are active in smart home than many other application in the field of IoT. The total amount of funding and revenue for Smart Home start-ups currently exceeds \$2.8bn. This list includes start-up names such as Nest or Alert Me as well as a number of multinational companies like Philips, Haier, or Belkin.

The connected car is slowly aware application. Coming to the fact that the development life cycles in the automotive industry typically take 2-5 years. Most of the auto makers as well as some brave startups are working on connected car solutions. And if the Fords and BMWs of this world don’t present the next generation internet connected car soon, other well-known giants will microsoft, Google and Apple have all announced connected car platforms.

Wearables is a hot topic in IOT applications. As consumers was eagerly await the release of Apple’s new smart watch in April 2015, there are plenty many other wearable innovations to be excited about: like the, Sony Smart B Trainer, the Myo gesture control, or. Of all the IoT start-ups, wearables maker Jawbone is probably one of the biggest funding to date. It stands at more than a half

of billion dollars!

The industrial internet is also special IOT applications. While market researches such as Cisco or Gartner see the industrial internet as the IoT concept with the highest overall potential, its popularity doesn’t reach the people like smart home or wearables do. The industrial internet has a lot going for this. The industrial internet gets the biggest attention on Twitter (~1,700 tweets per month) as compared to other non-consumer-oriented IoT concepts.

A future smart grid use information about the behaviours of consumers in an automated companies and electricity suppliers and to improve the reliability, reliability, and economics of electricity. 42,000 monthly Google searches highlights the concept’s popularity.

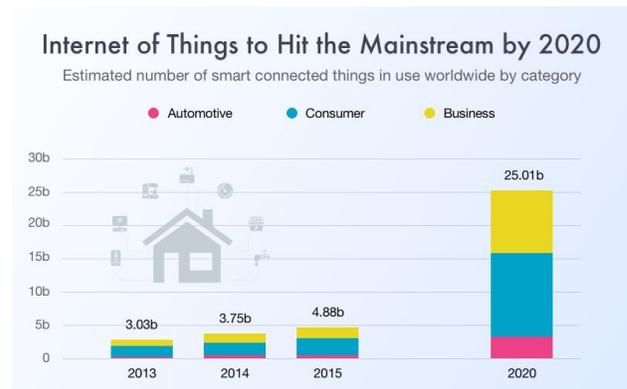


Figure 2

The connected smart medical devices and health care system have enormous potential, because companies also for the well-being of people in general. Connected health becomes the sleeping giant of the Internet of Things applications. Connected Health has not reached the masses yet.

Supply chains have been getting smarter and smarter for recent years already. Tracking and monitoring goods while things are on the road, or getting suppliers to exchange inventory data have been on the market for years. So while it is perfectly that the topic will get a new era with the Internet of Things, it seems that so far its popularity remains constant.

Smart farming is an overlooked business-case for the IOT because it does not fit into the various categories such as mobility ,health, or industrial. However, due to the

reason the large number of livestock and remoteness of farming operations that could be monitored the Internet of Things could revolutionize the way farmers work. Smart farming will become the important application field in the agricultural-product exporting in all the countries.

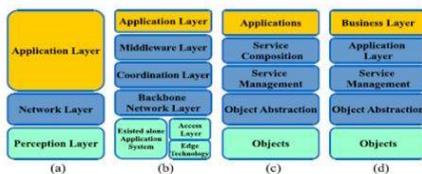
YEAR	NUMBER OF CONNECTED DEVICES
1990	0.3 million
1999	90.0 million
2010	5.0 billion
2013	9.0 billion
2025	1.0 trillion

3. Requirements of IOT

For the successful implementation of Internet of Things (IoT), the requirements are :

- (a) Dynamic resources on demand
- (b) Real time system is needed
- (c) Exponential growth of demand
- (d) Availability of applications on the basis of demand
- (e) Data protection, security and user Privacy
- (f) Efficient power consumptions of applications
- (g) Execution of the applications according to end users
- (h) Authorization of an open and inter operable cloud system.

IoT Architecture



The IoT architecture. (a) Three-layer. (b) Middle-ware based. (c) SOA (d) Five Layer



IoT Elements

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4. Architecture of IOT

a) Hardware—composed of Actuators ,sensors, IP cameras, embedded and CCTV communication hardware

(b)Middleware—Middleware includes on demand storage and computing tools for data analytics with cloud and Big Data Analytics

(c) Presentation Layer —easy to understand interpretation and interpretation tools that can be designed for the different applications.

5. The security, privacy, legal and regulatory implications of IoT

The Internet of things is highlighting a number of security, regulatory and privacy concerns, many of which existed prior to the growth of IoT. A selection of main concerns relating to smart devices include the following:

- Privacy concern – the majority of devices should be clear to collect personal information through the device, the cloud or the device’s mobile application.
- Insufficient or weak authentication/authorization – either no passwords or weak and very simple passwords.
- Lack of Transport Encryption – the majority of devices use unencrypted network services.
- Web interface vulnerabilities/Duplication – persistent cross-site scripting, poor session management and weak default credentials.
- Insecure /unauthorized Encrypted software – a majority of device software updates not encrypted during downloading process.
- Lack of control and security on information asymmetry – the generation, storage and sharing of IoT allocation data over which the user has no control or power and where many IoT devices do not contain an valid point where the user can give consent.
- Extrapolation of inferences from data information and repurposing of original processing – disclosure of information to third parties and the regeneration of data for new purposes.

Limitations on the probability of remaining anonymous – wearing IoT devices that are close to the data subjects result in a range of identifiers being a variable.

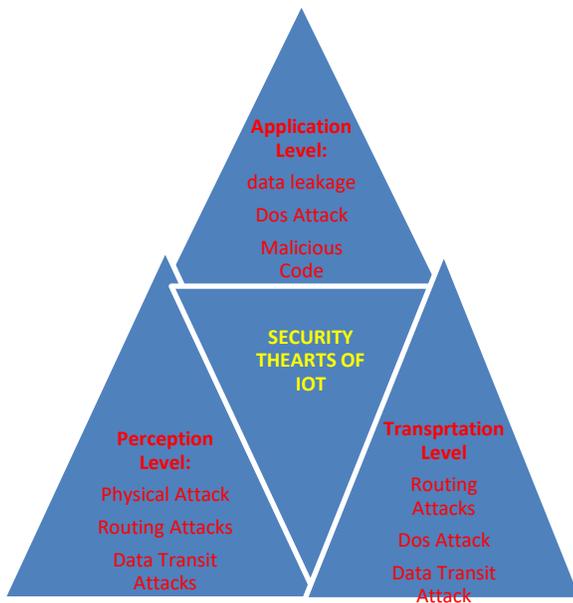


Figure 5

5. Challenges

Rather Than the huge possibilities and opportunities in the Internet of Things. There are some challenges involved like Privacy, complexity and Security issues, Data storage Issues and some more issues. But there are also many ways with which we can overcome these challenges. Blockchain is playing a major role in the Internet of Things it enhances the security concerns, makes transactions more secure /seamless and creates efficiencies in the supply chain.

Security & Privacy concerns:

With the help of internet of things more numbers of devices are connected to each other. The poorly designed device can cause the main security issues like data theft, corrupted and possibilities of hacking the other devices will increase due to this reason. This also increase the data privacy issues, since more amount of personal data or information is collected by IOT devices. Sometimes the end user could not even be aware of what data or information of the devices are collecting from them.

Stability:

Reason of how devices perform without internet or connectivity may also be considered when developing or designing the devices. Making the device to implemented in the similar way without the connectivity is also a challenge.

Standards:

There are no proper standards and rules are followed or available for developing IOT devices. The improper standard may lead to the poorly designed and developed IOT devices which will increase the cause of security and other major issues. At least in the future strong standard ,best practices and rules should be followed to develop IOT devices.

Compatibility:

Since internet of things requires lot of devices to be interconnected with the other devices should be made compatible with each other. This needs the special hardware and software tools for design.

Intelligent Data Analysis:

A large amount of data should be analyzed to make the required actions. Even a small data can create a cause of the false assumptions. Handling unstructured data or information is also a big challenge.

6. Future Concerns Of IoT

Some of the major opportunities are: process optimization, sensor-driven decision analytics, instantaneous control and response to complex autonomous systems, energy distribution, utilization tracking buying behavior for real-time marketing and reporting, smart home devices and health care monitoring.

A business must take advantage of useful analytical internet of things information and data for actionable insights to stay ahead of the curve by predicting business trends, reduce operational failures and ensure smooth operations.

With the advancement of IoT devices coming onstream, the business must develop a holistic approach to IoT management, including IoT security, privacy to ensure that IoT is both an enabler and secure.

Business transformation is incorporating in the IoT and cloud computing is becoming the foundation for IoT data management, hosted by service providers, to reduce the complexities associated with huge and diverse data collection pools.

7. Conclusion

Based on the studies and analysis report of the Internet Of Things (IOT), we can say that this sector is in the first steps of development and have a lot of scope/potential in the development of applications. It looks like a trend in all the fields to have one of these products and that is very good scope for the future of the Internet Of Things. The security and the privacy of the data are two of the most important points. A lot of researches concerns about the security of the products regarding these problems. Our proposed purposal of the iot security include in which culture of security considered throughout the entire development lifecycle of an IoT product, not treat security as a single instance.

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