THE RISE IN AUTOMATION AND INTERCONNECTION OF COMPUTING DEVICES

AN ANALYSIS AND STUDY OF THE IMPACT OF THE
INTERNET OF THINGS (IoT) ON MODERN COMPUTING DEVICES

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Abstract:　The purpose of this research work is to highlight the opportunities and challenges that prevail in the contemporary business organizations, large firms and industries. The main aim of this paper is to provide a deep insight into the onset of analytics and how it is pertinent with business firms in the current age and deals with a new term called the Internet of Things (IoT). The world of internet is revolutionizing at every step and it makes communication and work easier. The type of communication is either directly between two humans or between humans and a specific device. IoT changes the way we look at things and gives a positive asseveration of the future ahead of us. IoT and business analytics have helped the business firms to overcome their challenges. The analysis reveals how the modern IoT technologies have been developed and how they are connected to each other and the ways they have an intense impact on the business organisations and the scope it carries.

Key words: Analytics, Business organisations, Communication, Internet of Things, Impact

OBJECTIVE OF THE STUDY

- To thoroughly understand the framework of Internet of Things (IoT).
- To study the application of various IoT systems in the business organisations and how it aims to improve the work culture.
- To study the trends about IoT and its scope.

RESEARCH METHODOLOGY

Data is collected using secondary sources. Secondary data is collected through books and various web sources.

ORIGIN

Internet of Things was initially invented to promote RFID. It is the acronym for Radio Frequency Identification technology. This type of technology uses certain electromagnetic fields to automatically identify and track the tags that are attached to the objects. The RFID reader is also known as the interrogator. The RFID sensors are similar to that of a barcode but the main difference is that a barcode scanner can be used to scan many different tags but just analyses one tag at time while the RFID scanner maintains a line of sight with each code and can scan multiple tags at a single time. The actual terminology of IoT leads back to almost 20 years. It was first coined by Kevin Ashton in the year 1999 while he worked at a company called Procter & Gamble. IoT systems did not gain traction until the year 2010. The International Data Corporation (IDC) published a report in the year 2013, stating that the Internet of Things would be a massive $8.9 trillion market in 2020. They reached the concept of mass production in early 2014 when Google announced to buy Nest for $3.2bn. At the same time the Consumer Electronics Show (CES) in Las Vegas was held with the main theme of the conference being that of IoT.
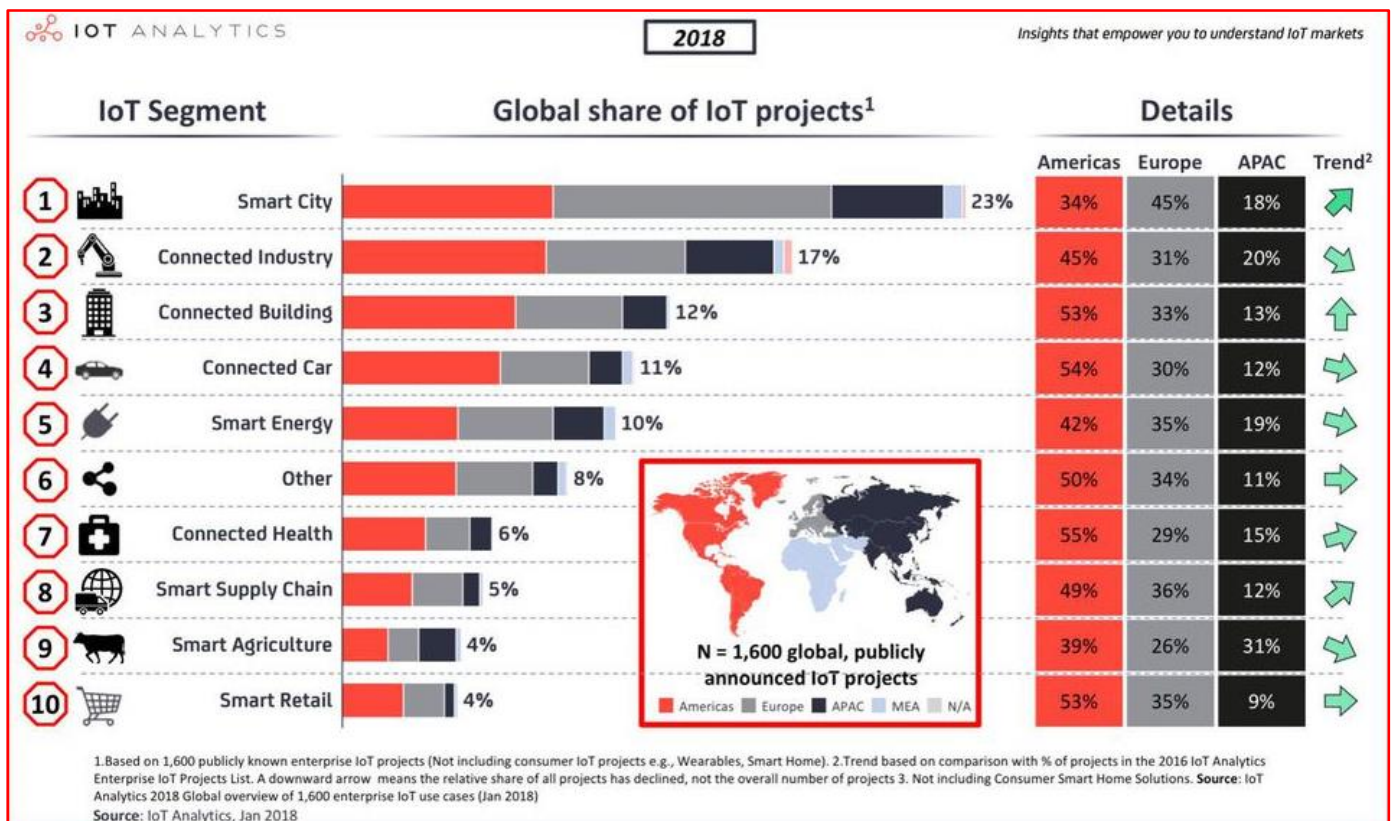
One of the first archaic examples of an application of Internet of Things is from the early 1980s. It was devised from a Coca-Cola machine, located at the Carnegie Melon University. Local programmers and students would connect by Internet to the refrigerated vending appliance, and check to see if there was a drink available, and if it was cold, before making the purchase. And thus, IoT paved its way into the market.

SCOPE OF IoT

With the onset of technology, IoT has not only revolutionized the way we interact with intangible objects, but has also transitioned from an optional luxury feature into a baseline system. In addition, the following points list the scope of IoT technologies.

- Creates more job opportunities in the IT industry.
- More M2M (Machine to Machine) communication.
- Replace physical technology and systems in the coming years.
- Creation of embedded technology in inanimate objects.
- Genesis of smart cities across the globe.
- Use in the medical and healthcare field.

Many new benefits and scopes of the IoT technologies can be highlighted and they depend on the trends of the market place and economic conditions across the globe. New IoT products are developed according to the needs and behavioral patterns of the individual consumers to suit their needs and those of the organization.

IoT Analytics — 2018 — Insights that empower you to understand IoT markets

IoT Segment	Global share of IoT projects[1]	Americas	Europe	APAC	Trend[2]
1. Smart City	23%	34%	45%	18%	↗
2. Connected Industry	17%	45%	31%	20%	⇨
3. Connected Building	12%	53%	33%	13%	⬆
4. Connected Car	11%	54%	30%	12%	⇨
5. Smart Energy	10%	42%	35%	19%	⇨
6. Other	8%	50%	34%	11%	⇨
7. Connected Health	6%	55%	29%	15%	⇨
8. Smart Supply Chain	5%	49%	36%	12%	↗
9. Smart Agriculture	4%	39%	26%	31%	⇨
10. Smart Retail	4%	53%	35%	9%	⇨

N = 1,600 global, publicly announced IoT projects
(Americas, Europe, APAC, MEA, N/A)

1. Based on 1,600 publicly known enterprise IoT projects (Not including consumer IoT projects e.g., Wearables, Smart Home). 2. Trend based on comparison with % of projects in the 2016 IoT Analytics Enterprise IoT Projects List. A downward arrow means the relative share of all projects has declined, not the overall number of projects 3. Not including Consumer Smart Home Solutions. **Source**: IoT Analytics 2018 Global overview of 1,600 enterprise IoT use cases (Jan 2018)
Source: IoT Analytics, Jan 2018

OPPORTUNITIES AND CHALLENGES

Opportunities always follow some challenges and confrontations. To handle these challenges and issues, we need to know various in-depth complexities, security and safety threats, and computational techniques of big data and IoT to analyze analytical problems and issues relating to big data files. Risk related to identity theft, malware and phishing, hacking,identity theft, etc., leaves people feeling vulnerable to more risks and harmful effects in the long run and they still prevail in the systems. It affects their personal life directly. Time and energy required to clean the mess of identity thefts is often massive. IoT enables the communication of intangible lifeless objects but their methods don't always work out. For instance, the mathematical and statistical methods that work well for small data sets do not work well with large data sets. We have the profusion of data and the amount of data that is generated here is nothing as compared to the larger data sets. All of this can prove to be a valuable weapon for making decisions which will be lucrative and can either save money or help a business organization gain profit of millions.

The unbeatable potential of Internet of Things to change the way organizations work and conduct their operations and simplify day to day activities for the consumers cannot be compared. It is a revolutionary big data and analytics-driven era so there are problems which could be addressed and resolved by right usage of software and hardware tools in order to tackle the problems. These problems can be large and small but IoT can help to combat these issues. Their demand is so high that many major companies are investing billions of dollars for IoT strategies actively in the current market.

In the near future, the problem of lack of expertise to perform best practices will be gone. IoT is no longer considered to be an optional luxury feature. In fact, it is now used as a baseline or default feature in many web computing application systems. Many companies will now provide the cloud platform and thus lead to an increase in the immense competition between the providers. People will be able to carry all data over a personal cloud hence the necessity of files and folders might not be present inside the PCs, as the data if not only a part, but also keeps moving with the person. Visual data discovery tools will grow faster than Business Insight and IoT tools because of high demands in the future. Analytical and self-user service will become an inherent part of a business enterprises. Big data end-user self-service will become a mandatory service for all enterprise. We can thus say that IoT is no longer just a mere physical concept, but it is REAL.

APPLICATIONS OF IoT

The concept of IoT is increasing at a rapid pace. Its main focus is to redefine lifestyle while serving the people better quality of products. Common examples of IoT embedded technologies include Thermostats or Baby monitors. Here are some more examples:

1. **MEDICAL USE**

   IoT applicants are now widely available in the healthcare field. People will be able to use wearables or bands on their arms or body which will predict the risk of any cardiovascular disease so that they can initiate their treatment in the right time. It also alerts the hospital which will then dispatch the EMT/First Responders. Applications which have embedded technology are now able to monitor sleep disorders and track sleep patterns over a period of time and then further communicate the results with the healthcare providers to avoid any health risk and take precautionary measures. Health bands has also been introduced to the market which will now efficiently track the fat loss or burn after your cardio workout, measure the number of steps you have taken in a day, etc. A common example is that of the Fitbit devices by Fitbit, Inc.'s family of fitness products.

2. **CONSTRUCTION AND ENGINEERING**

Certain companies have now started with the idea of embedding the IoT censor RFID devices in the cement during construction. This device will completely change the way construction and civil engineering works. It helps to measure the corrosion levels in the cement as the architecture seems to age over time. It will enable the structure to report and communicate on its health. The physical structures will connect to all other structures across the globe and communicate on how they are subjected to different stress and weather conditions. These structures together form a line of neural networks which will help in the maintenance of architectural buildings.

3. **BUILDING SMART CITIES:**

The meteoric growth of Smart cities paired with IoT embedded technologies has increased to a great extent. Smart cities are initiated to minimize the costs and to increase interaction and communication. With the technical support being simultaneously received from the IoT embedded systems, a smart city will have 3 main features; Interconnected, instrumented and intelligent. These embedded RFID systems will further require an in-depth understanding of various inter related concepts and will also face many engineering challenges in its initial development stage.

LITERATURE REVIEW

- Hota, Jyotiranjan& Kumar Sinha, Pritish. (2015). Scope and challenges of Internet of Things: An Emerging Technological Innovation. 10.13140/RG.2.1.1012.6241. – "The ongoing research in the field of IoT and its implementation in full or partial manner will definitely improve the quality of life of human civilization. Today IoT is being implemented everywhere which is of human concern like smart city, smart environment, security and emergencies, smart business process, smart agriculture, domestic and home automation and healthcare. Though many IT companies are now busy in addressing interoperability issues and the challenge of controlling hardware devices through software, the world community is now moving towards creating opportunity to live in a "connected life" environment."

- Madakam, Somayya& Ramaswamy, R & Tripathi, Siddharth. (2015). Internet of Things (IoT): A Literature Review. Journal of Computer and Communications. 3. 164-173. 10.4236/jcc.2015.35021. – "IoT has been gradually bringing a sea of technological changes in our daily lives, which in turn helps to making our life simpler and more comfortable, through various technologies and applications. There is innumerable usefulness of IoT applications into all the domains including medical, manufacturing, industrial, transportation, education, governance, mining, habitat etc. Though IoT has abundant benefits, there are some flaws in the IoT governance and implementation level. The key observations in the literature are that (1) There is no standard definition worldwide (2) Universal standardizations are required in architectural level (3) Technologies are varying from vendor-vendor, so needs to be inter-operable (4) For better global governance, we need to build standard protocols. Let us hope future better IoT."

- Farooq, Muhammad & Waseem, Muhammad & Mazhar, Sadia &Khairi, Anjum & Kamal, Talha. (2015). A Review on Internet of Things (IoT). International Journal of Computer Applications. 113. 1-7. 10.5120/19787-1571. – "With the incessant burgeoning of the emerging IoT technologies, the concept of Internet of Things (IoT) will soon be inexorably developing on a very large scale. This emerging paradigm of networking will influence every part of our lives ranging from the automated houses to smart health and environment monitoring by embedding intelligence into the objects around us. In this paper, we discussed the vision of IoT and presented a well-defined architecture for its deployment. Then we highlighted various enabling technologies and few of the related security threats. And finally we discussed a number of applications resulting from the IoT that are expected to facilitate us in our daily lives. Researches are already being carried out for its wide range adoption, however without addressing the challenges in its development and providing confidentiality of the privacy and security to the user, it's highly unlikely for it to be an omni-present technology. The deployment of IoT requires strenuous efforts to tackle and present solutions for its security and privacy threats."

- Vung, Pham & Nguyen, Vinh & Dang, Tommy. (2018). IoTViz: Visualizing emerging topics in the internet of things. IEEE BigData 2018, At Seattle, USA. – "In this paper, we present a novel approach that unites coordinated multiple views to highlight various attributes of the HackerNews. We introduce an interactive data analytic prototype to help viewers to summarize the emerging IoT topics along with the user opinions and ratings on those topics. IoTViz supports of a range of interactive features, such as linking and filtering, allowing users to quickly narrow down events of interest. We demonstrate the usefulness of our tool through different use cases. An important aspects of the paper is the human-centric IoT. The paper aims to address the tool gap in human interacting with the system, a well-known gap and a known research challenge."

- Zubiaga, Arkaitz& Procter, Rob & Maple, Carsten. (2018). A longitudinal analysis of the public perception of the opportunities and challenges of the Internet of Things. PLOS ONE. 13. e0209472. 10.1371/journal.pone.0209472. – "Among the six topics we identified in the dataset, the two most popular topics include "Big data & Tech" and "Security." This reveals that despite the business interest that the IoT presents for big data analytics, the challenges posed by the limited security of today's IoT devices are a major concern for the general public. We further confirm this with the predominantly negative sentiment that is associated with posts discussing security issues. This is again further confirmed when we look at the top news stories shared each year, with negative news being predominantly about security issues associated with IoT devices. Our study raises awareness on the importance of keeping IoT devices secure, reminding manufacturers that it is a concern that is being continually discussed."

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