Internet of Things and Business World

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Abstract:-At present ,Internet of things is an important representative of new generation of information technology.It is the result of rapid development in the field of wireless communications in recent years and it is a network that extends on the Internet. Different various technologies with the newest features have been something very attractive that has successively gained people's attention. And with no doubt, this can be stated as the major reason behind the milestones that internet has received in very less time. With an evolution of an internet, various things related to the internet have been rapidly increased, which can relatively be termed as the Internet of Things (IoT). Rightfully so, the combination of technology and fun creates IoT for us. Since the use of IoT is a huge number in this short span of time, the growth of IoT, especially in this generation has been immense and incomparable to any other entities evolved in the recent times. In addition to this, IoT"s success has also risen because of its reliability in daily life application and its effective use in business areas that have been ruling the market. Various studies and research also signify the need to have more focus on the term Internet of Things (IoT). Hence, IoT is also supposed to be the future internet in the upcoming years. The detailed explanation about the origin and existence of IoT have been discussed further in this paper below.

Keywords:- Internet of Things, Internet technology,business,market,future of internet.

1. Introduction:- The Internet of Things essentially enables us to connect 'things' to the internet. People can connect to digital networks and the internet with devices such as smartphones and computers ,in order to share information, chat, buy and so forth. Digital world revolutionizes our life styles by incorporating the things and the internet in a more organized and disciplined way. This merger had a great impact on our economy, governance, and industry in terms of efficiently utilizing the resources as well their better organization. One of the main ideas that play a big part in the revolution of the digital world is Internet of things. It was first coined by British Scientist kavin Ashton in 1999 when he was working on item identification with RFID tags in supply chain management in which all operation performed without the involvement of humans. After that many developments have been made in the IoT and it becomes an emerging field for future. In 2019, the market revenue of IoT reached $212 billion. There are about 26.66 billion connected IoT devices worldwide, and this number is set to reach 75.44 billion by 2025. The UN estimates that, in February 2020, the world population is currently 7.7 billion people. Simple math tells us that the average person owns around 3 to 4 IoT devices. Moving further, the population is expected to reach 8.1 billion people in 2025. The same math calculation shows us that, in 2025, an average person will have from 9 to 10 smart devices in their possession. It will greatly impact on the economic growth in almost all fields of life.

  The COVID-19 pandemic has created significant disruption across every line of businesses, including enterprises, industrial, and government sectors. However, in recent times, with lockdown restrictions getting relaxed in almost every region across the world, businesses in various industry verticals, are resuming their operations. During the pandemic, the adoption of IoT devices has been increasing across many industry verticals such as healthcare, utilities, manufacturing, and transportation and logistics. Therefore, the demand of IoT platform is increasing across these industry verticals. For instance, in healthcare, IoT platforms are increasingly used in application areas including telemedicine solutions, such as remote patient monitoring, remote diagnosis, along with solutions, including connected ambulance and connected worker. Hence, the rising cases of COVID-19 leads to the rising demand for IoT-based solutions to improve the conditions of patients and staff of care providers. Moreover, the COVID-19 outbreak has gravely impacted the energy

industries, enabling business leaders to think of IoT platform as a replacement for manual intervention of field workers in the infrastructure. Organizations have started thinking of intelligent asset management solutions for remote monitoring, alerts and notifications, remote services and control, and predictive analytics and preventive maintenance using historical and real-time data analysis to combat potential failures.

2. Internet of Things in Business

The use of such technology in the business world is no different. IoT devices record and transfer data to monitor important processes, give us new insights, boost efficiency, and allow companies to make more informed decisions. They tell organizations what's *really* happening, rather than what they *assume* or hope is happening. And the reams of data they gather are grist to the mill for analytics and AI systems, which can identify patterns of use or behaviour that were previously hidden. The IoT market – which includes hardware, software, systems integration, and data and telecoms services – is expected to grow to $520 billion by 2021. That figure represents a more than 100 percent rise on the $235 billion spent in 2017.More companies are running proof of concept trials than two years ago. And the number of enterprise customers considering exploring new use cases is up to 60 percent in 2018, compared with less than 40 percent in 2016.

Meanwhile, the Industrial Internet of Things (IoT) market is forecast to surpass $176 billon by 2022, according to a new report by analysts at Market Research Engine.

Here are five key ways that the IoT is enabling successful digital transformation today.

2.1 Improved business insights & customer experience

Connected equipment in manufacturing, aviation, the supply chain, agriculture, healthcare, and many other industries, is creating more data streams and analytics potential, meaning that companies are gaining much greater insights into their business operations and how their customers use their products or services. In many cases, this has been enabled by cloud platforms provided by the likes of Microsoft Azure, AWS, IBM, and Google (alongside hundreds of more specialised vendors), but there is also now a shift towards edge computing in some industries, in an effort to reduce the latency (and other drawbacks) introduced by relying on remote third party data centres. When a company understands how its customers use its products they can better fulfill their need and customers experience. The future of retail lies in connecting with the customer and reducing friction for them. The 'need it now' mentality of today's shoppers sees convenience take precedence loyalty with many customers favoring online shopping. The link between IoT technology and an improved customer experience can be witnessed most readily, perhaps, in retail settings.In a shopping environment, IoT is all about reducing friction in the buying experience and helping customers to interact with products, often in a virtual or augmented reality environment, pre-purchase. For some solutions the experience is still a little clunky, but the message is that the IoT can give high street and main street stores a much-needed boost at a time when conventional online retailing undermining it.

In the US, Amazon is employing a more advanced solution for its own physical Amazon Go store: its system detects products that have been moved, places them in a virtual cart and knows once customers have left the premises.
This enhancement of the user experience coupled with new data streams and insights is a common benefit across all IoT applications. For all types of organisations, this has enormous strategic and operational potential.

2.2 Cost & downtime reductions

One of the benefits of these new insights is often a reduction in operational expenditure and downtime. For example, the rapid emergence of digital twin technology – digital models of physical assets built from real-time data, either in pure data form or as explodable 3D representations – is a key competitive differentiator in industrial IoT applications. This type of technology could help slash both operational costs and system downtime in factories and other industrial installations, while helping workers to learn on the job about how machines work and/or can be broken apart for maintenance and upgrade – perhaps via tablets, AR headsets, or smart goggles. Construction giant Laing O'Rourke is using digital twin technology to begin solving problems that many people face in their daily lives: unreliable railways. Speaking at this year's Internet of Manufacturing event in London, Dr Graham Herries, Laing O' Rourke's director of Digital Technologies, explained how the construction company is using its Optimised digital twin platform to rework the operations of the West Coast Mainline – one of the UK's busiest and most important rail corridors, currently operating as Virgin West Coast. Using digital twins, Herries said that it's possible to forward-plan for up to 23 days, significantly reducing over-maintenance. Rolling stock usage is also balanced across the fleet to ensure that certain trains aren't subjected to more journeys than others.

The result, claimed Herries, should be a more reliable network, with fewer last-minute cancellations or platform swaps, reduced maintenance costs, and more balanced train usage.

Digital twins can provide similar benefits across many industries, from oil, gas and other energy sources, to manufacturing and the supply chain.

2.3 Efficiency & productivity gains

By connecting a business's key processes, leaders can more easily identify ways to boost efficiency and productivity. Thanks to these gains, businesses expect the Industrial IoT to boost revenues by $154 million, according to a recent Inmarsat report. Employees at Ford's Valencia Engine Assembly Plant in Spain are using a special suit equipped with body-tracking technology. The pilot system, created by Ford and the Instituto Biomecánica de Valencia, has involved 70 employees in 21 work areas. The technology is similar to the motion-tracking systems that record how athletes sprint or turn, or actors move and speak. Ford has been using the same type of technology to design less physically stressful workstations to enhance its manufacturing processes. By accurately tracking its workers' movements, Ford is enabling data-driven changes to its vehicle production processes, making them safer and more efficient. The same principles can be applied to machines to identify bottlenecks or problems in production lines, however small.

2.4 Asset tracking & waste reduction

Nowadays, many companies have adopted automated asset management and don't rely anymore on physical counting in the form of Excel spreadsheets. However, IoT can bring asset management one step further, by making systems smart in addition to being automated. Even if you are still debating whether or not digitalization is the right step for your business ,you can acknowledge the potential benefits of an inventory that assesses and self-corrects. IoT powered asset management empowers business to optimize their resources, reduce risks and leverage real- time information for increased efficiency and a more effective sales cycle.

2.5 New business models

While the most obvious use cases for the IoT revolve around efficiency, productivity, and process monitoring, we're increasingly seeing companies recognize the scope for it to provide them with information about their customers and how they use their products. Few of these things were originally designed to be connected, but the IoT can add new value to them, and help improve their future design via the reams of data gathered about their real-world usage. Companies that successfully integrate the IoT into their products in a way that benefits both the customer *and* their own internal processes stand to reap huge benefits. The IoT also allows organizations to move away from conventional business models to new revenue streams. The data acquired often holds value in itself, but, more significantly, customers can be offered subscription-based services that draw on the connected nature of the company's products, often offsetting the initial cost of entry. As Amazon has proved in the consumer world, products that provide businesses with valuable data can enable them to offer the same products at reduced costs, opening up new markets by replacing revenue from customers' capital expenditure (capex) with operational expenditure (opex), via subscriptions.

3. Application Of IoT

IoT is now become very exciting and challenging technology for applications developer due to its diverse nature which covers different aspects of life. IoT application domain not restricted to one aspect of human life like building concept as a smart building or smart homes but also dominant in other fields like health,

(a). Environmental Monitoring

 Nowadays people are very concerned about the environment. IoT technology can effectively use for environmental monitoring like temperature, rain fall and river height etc. All these systems integrate with a central or global system for decision making with the help of IoT technology.Further with the development of wireless sensor network linked with IoT, we can monitor those areas where a human can't reach like

volcanic eruption areas, mountain abysses and some of the remote areas. One of the application scenarios of IoT in this regard is the fire

detection mechanism or monitoring the fire. It also includes the safety of human with the technology. For example, with the help of IoT sensors, temperature sensors sense the fire and quickly inform the rescue team. Further, it also incorporates the other data like a number of human beings, assets, the intensity of the fire, material present over there and some other related information that help people for better rescue as well as it reduces the damage.

(b). Health Care

Health care devices represent one of the fastest-growing sectors of the IOT market .In fact ,the value this sector –which is sometimes called the Internet of Medical Things(IoMT)-is predicted to reach $176 billion by 2026. IoT improves the health care department due to its innovative applications. IoT technology changes the way of medication and treatment by using some innovative ideas. Now monitoring the patient becomes easy and manageable with IoT technology. Sensor technology senses the patient blood pressure, body temperature, breathing activity of patient etc. The data from those sensors either periodically or real time will collect and share to health management system equipped with IoT technology. Further patient living can also be a monitor for proactive measures related to health.

(c). Smart City

As populations and urbanization rise in the coming years,many cities may turn to technology and advanced networks to help them manage resource constraints .In particular ,cities could increasingly turn to a section of IOT known as smart city. Smart cities use IOT devices such as connected sensors ,lights and meters to collect and analyze data .This will solve various problems related to traffic, lack of water, lack of electricity, waste management, pollution, creating safer cities and resolving existing crimes and preventing them. Products such as cellular communication enabled by Smart Buick waste will send a warning to city services when a bin has to be emptied . By using sensors and the internet, people can find free parking places in the neighborhood. Google uses an application called 'Google Neighbor' .

(d). Home Automation

IoT home automation is the ability to control domestic appliances by electronically controlled, internet-connected systems. It may include setting complex heating and lighting systems in advance and setting alarms and home security controls, all connected by a central hub and remote-controlled by a mobile app.The Smart Home has become a scale of revolutionary success in residential areas, in the modern world and predicts smart homes will be very common as smartphones in the near future. This gives us control over our homes by automating the lighting system, dimming, electrical equipment, audio systems and security. It connects all devices and equipment in our homes so that they can communicate with each other. Everything that uses electricity in our house can be placed on the home network and based on our order. We give orders with voice, remote control or computer, the house reacts. Smart Homes works with a fairly simple system; receiver and transmitter. The receiver detects a certain signal from the transmitter issuing the order. Simply put, the history of the Smart Home begins with the installation of telephone and electrical cables in our homes. Also, General Electric Company was one of the first pioneers to develop a series of products for smart homes in the mid-1960s [9]. Every device on the network, such as lighting, light switches, door openers, pool controls and others, has its own code. When you program one of the controller options, the codes are automatically recognized. When you press the right button, the controller sends the character to the device to tell you what to do. The price of Smart Home really depends on how much 'smart' you really want.

(e).Smart Retail

The IoT in retail market by platform has been segmented into device management, application enablement and connectivity management .By platform, the device management platform is estimated to hold the highest market share of the IoT in retail market ,due to the increasing use of IoT based end points and devices. The IoT in retail market by application has been segmented into operations management ,asset management, customer experience management and advertising and marketing. The operations management application is projected to lead the IoT in retail market in terms of market share as it includes core operations ,such as supply chain optimization ,workforce management and surveillance and security. Retailers can track products in their respective parts and fill them when the number of products decreases .

(f). Smart Agriculture

Smart Agriculture ,a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature ,soil moisture etc.) and automating the irrigation system. IoT based smart farming is highly efficient when compared with the conventional approach. Growing population, the agriculture industry will have to adopt new technologies to gain a much needed edge. New agricultural applications in smart farming and precision farming through IoT will enable the industry to increase operational efficiency, lower costs, reduce waste and improve the quality of their yield.

4. <u>Research Challenges</u>

IoT is still under development phase that means much more works needs to be done to make this concept. During the last decade's lot of work has been done in the different domains of IoT which includes application development, security, privacy, its connectivity, protocols, architecture, and much more. Since the IoT concept ensues from heterogeneous technologies that are used in sensing, collecting, action, processing, inferring, transmitting, notifying, managing, and storing of data, a lot of research challenges are bound to arise. The _Internet of Things_ (IoT) has quickly become a huge part of how people live, communicate and do business. All around the world, web-enabled devices are turning our world into a more switched-on place to live. If you look back even two years, research from IDC suggested that the number of devices connected to the internet, including the machines, sensors and cameras that make up the IoT, would be hit 41.6 billion devices, or "things," generating 79.4 zettabytes (ZB) of data in 2025.

The World Economic Forum agrees with these predictions and estimates that there will be 41 billion devices capturing data on how we live, work, move through our cities and operate and maintain the machines on which we depend. However, not every researcher believes that the figures will be this high and there are signs that many companies are beginning to downplay the estimated number of devices that will be in play. Statista, for example, estimates that the total installed base of IoT connected devices worldwide will amount to 30.9 billion units by 2025, a sharp jump from the 13.8 billion units estimated for this year. These research challenges that require attention have consequently spanned different research areas.

4.1 Maturity

Jens Beck is director of IIoT, Analytics and Innovative Cloud Services at Canada-based Syntax. He believes that 2021 and beyond will be a good and prosperous year for industrial IoT. However, there are still problems among them being maturity. Digitization is not simply plugging a "smart solution" to your devices and then getting all the positive outcomes, insights and actions. Most companies have a quite heterogeneous shop floor with some of the machines not even being ready for gathering data. At the start of the industry 4.0 wave, the offerings from a technology standpoint, as well as the availability of experts, was very limited and the upfront investment cost was rather high. This led to a lot of early adopters having their first experiences be negative. This is a fairly common reason why IoT projects fail today.

"The IoT world is very rapidly changing and so you need to keep your landmarks in sight and stay open to integrate what is useful for you, change what can be optimized."

4.2 Lack of skills

IoT requires a breadth of experience that most companies don't have, Dean Croshere, COO at Sacramento-based Geocene, said. Converting a sensor to IoT provides easily digestible data that leads to effective (and cost saving or revenue generating) business decisions, but it's expensive to build and maintain. Building a successful IoT product requires a breadth of skills. While a standard sensor can store data locally or communicate it over some relatively simple standard protocol like Modbus, the data collected by an IoT sensor must traverse a considerable breadth of custom-developed systems. The sensor must connect to a custom hub or a mobile app, requiring an additional device or a mobile app developer. The hub or mobile app must be uploaded to a backend server in the cloud and managed there, requiring a backend developer. To have a useful IoT product, a company needs to aggregate and analyze the backend data. They can use traditional analytics or advanced machine learning techniques, but quality analytics requires a data scientist. Finally, they will also need to present the data back to users in a helpful way in an effective front-end system, requiring a front-end developer.

4.3 Software Vulnerabilities

Many IoT devices run low-quality software susceptible to the kinds of vulnerabilities that were prevalent in the late 90s and early 00s, Jacob Ansari, chief information security officer (CISO) of Tampa, La.-based Schellman & Company IoT, said. Devices are vulnerable due to software exploits, weak cryptographic usage, authentication failures, and the difficulty in deploying software. Device manufacturers also cease

software support long before the users of the devices are ready to replace them. This is to say nothing of devices that capture video or audio and send it to other parties without the user's knowledge (e.g., voice assistants building voice profiles of individuals or cameras providing data to law enforcement without direct, informed consent). Further, weaknesses in IoT devices lead to attack points that expose the networks on which they reside. This is true for both residences and businesses, as an IoT device that fails to secure the wireless network's security credentials then exposes the entire network. In the current situation, where so many people now work remotely, a single IoT failure can yield an attack that affects both home and business networks.

4.4 Privacy

In IoT trillions of users connected with each other and there is a massive amount of data that we can share on this platform but there is a problem of privacy.Lack of security on privacy: IoT devices undoubtedly provide consumers with a fantastic experience, but security issues have always surrounded the Internet of Things, Damien Knight , CEO of Workever, said. To achieve the desired results, IoT devices must first exchange data over the internet, which is a place where hackers can often be found in large numbers. A data breach of any magnitude can severely disrupt an individual's personal life.IoT devices must share information with top-notch encryption to avoid data leakage. It would take a long time for this to happen. Increased complexity is another aspect that raises doubts about the reliability of the system. Since the Internet of Things is such a vast and diverse network, it is possible for apps to malfunction or for the IoT infrastructure to collapse.

4.5 Scalability

IoT systems are shifting the way we interact with the world. The infrastructure model lends itself to global scale and global scale leads itself to worldwide public cloud developments, Mike O'Malley, SVP at Oak Brook, Ill.-based Seneca Global, said. Large scale public cloud projects started off as porting software into the cloud. This lift-and-shift approach, where on-premises applications can move to the cloud without redesign, works but doesn't take full advantage of native-cloud features and creates lots of waste, high AWS/Azure bills and inefficiency. As a result, many companies are now revamping their IoT strategies by creating updated Kubernetes based public cloud deployments, which means big additional investments before rolling out IoT on a global scale.

5. Future Of IoT

Today, more businesses are taking advantage of and acknowledging the benefits of IoT than ever before. Machine learning, AI, instant feedback and remote monitoring and operations are not merely the future - they're already here, and they're showing no signs of slowing down. With the explosive growth of IoT uses and adoption, there are some great opportunities for businesses who join the IoT revolution early. The corporations who manage to transform and empower themselves through the benefits of IoT could create undeniable competitive advantages.

Here are just a few reasons why IoT will shape the future and not only be a simple trend.

5.1 IoT Market to Reach $1111.3 Billion by 2026

According to Cision, PR Newswire, the IoT market has an unbelievable compound annual growth rate of 24.7%, and big-name companies such as Google, Cisco, Microsoft, Dell, Apple, Facebook among others are investing heavily in IoT applications. Organisations such as these are increasingly adopting advanced technologies, which is driving the global IoT Market. Year on year growth for demand of technologies such

as cloud computing and artificial intelligence continues to fuel the IoT market which has wide applications for financial institutions, security, retail, government, healthcare, transformation and manufacturing, to name a few key industries.

5.2 The 'Smart City' Solutions Market will amount to over $400 billion by 2020

'Smart Cities', as in cities that use IoT sensors to collect data and generate insights for better management, are already a major market, but continue to grow with each year. Cities like London, San Francisco, Rio de Janeiro and Copenhagen already implement IoT driven applications, and most of the IoT projects in 2018 were in the 'smart city' segment. These cities are expected to continue to use solutions such as smart meters, which are expected to grow to nearly 1.1 billion in investment by 2022.

5.3 94% of businesses will use IoT by the end of 2021

According to a new report from Microsoft, almost all businesses will use some form of IoT by the end of next year. The core IoT industries such as manufacturing, retail, transportation, government and healthcare continue to introduce new IoT applications and solutions to their daily operations. Among the current IoT business adopters, 88% believe IoT is 'critical to their business success', and project a 30% ROI, inclusive of cost savings and efficiencies, two years from now due to IoT applications.

5.4 $1.1 Trillion Will Be Spent on IoT in 2023

Statista says the projected global IoT spending is valued at over 1.1 trillion dollars and has been steadily growing. While this is a substantial amount, IoT has also demonstrated the potential to save us money, with driverless cars generating over 5.6 trillion dollars in savings world-wide, and IoT in agricultural technologies set to cut food prices nearly in half by 2050.

6. Conclusion

  Internet of things improves the business world by incorporating the internet and things together. The IoT technology has massive impact on the Business World. This technology is used by several business to gather more intelligent data, automation of the business process and to fulfill customer expectations. Either a small device or massive equipment this technology becomes an integral part of almost all products. So to stand in the competitive market or to fulfill customer demands faster business need to implement IoT technology in their products and services.

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