

Contribution of IoT & its Prospect in Bangladesh

Md. Kabir Hossain¹, Md. Mokedul Alam²

¹Assistant Professor (ICT), Bandarban Cantonment Public School & College, Bandarban, Bangladesh.

²Assistant Professor (Electrical), Sheikh Kamal Textile Engineering College, Jhenaidah, Bangladesh.

Abstract - Currently, the world economy is at the stage of forming the fourth industrial revolution, which is said to raise the industry to a new qualitative level. In this article we have defined the impact of IoT along with the industrial revolution, its basic features and the most progressive aspects. We have analyzed the special features of industrial development in Bangladesh along with the industrial revolution of different countries. We have reviewed the experience of foreign countries in implementing state programs in the context of the Fourth Industrial Revolution. We have analyzed the concept of Internet of Things as the basis for the development of a new wave of industrial revolution. We have studied its main benefits, its impact on the domestic and global economy and the expected consequences. We have investigated various challenges and remedies in the implementation of IoT related projects in the industrial sector of this country. We have initially identified the application areas of IoT in the country and evaluated the overall issues of how they can be used for economic growth.

Key Words: IoT, IR 4.0, COVID-19, ICT, Global Market, etc

1. INTRODUCTION

In the wake of the Fourth Industrial Revolution, the world is experiencing technological advancements and innovations every day. There are so many technological advancements that it's becoming more difficult to keep track of them all! From being created using intelligent machines to artificial intelligence used by an app on your mobile phone, there's a lot to keep track of! Among all the technological advancements and innovations, one stands out – IoT (Internet of Things). IoT is an umbrella term for a set of hardware or devices that can communicate with each other over the Internet to form a system. Kevin Ashton, a consumer sensor expert and inventor, coined the term IoT in 1999 to describe the network of connected objects over the Internet. However, it was only after Industry 4.0 that IoT technology boomed. According to a report by The Economic Times, the average household has ten connected devices and this will increase to 50 in 2021.

2. What is IoT

The concept of IoT is based on the concept of a large number of items or objects. Radio-frequency identification (RFID) tags, sensors, actuators, cell phones, and other connected devices are widely used in IoT technology. In

general, IoT devices connect to one or more sensors or actuators to produce an output in response to an input. Such systems can provide custom controls as well as other features as per the needs of the users. Consider your friend's smart air conditioner: At the most basic level, it has a sensor that collects thousands of data points on room temperature and humidity every minute, reads and makes decisions based on that data, and sends the data to his smartphone, which he then One can use an app on his smartphone to set the air conditioner temperature remotely while parking the car in the garage.

Although almost all of us have heard about IoT, some of us are not sure what exactly IoT is. IoT stands for "Internet of Things" which is a network of unmanned devices and components. Often with IoT, we mean IoT devices. It is a physical or digital device or system connected to the Internet capable of sending or receiving data without human assistance or intervention.

With the touch of the fourth industrial revolution, IoT has reached everywhere in the modern world. Using IoT smart kitchen system you can monitor gas consumption in smart stove and optimize gas consumption with IoT connected smart gas stove. It remotely checks for leaks and safety hazards and notifies the user. Again the oven can be controlled remotely.

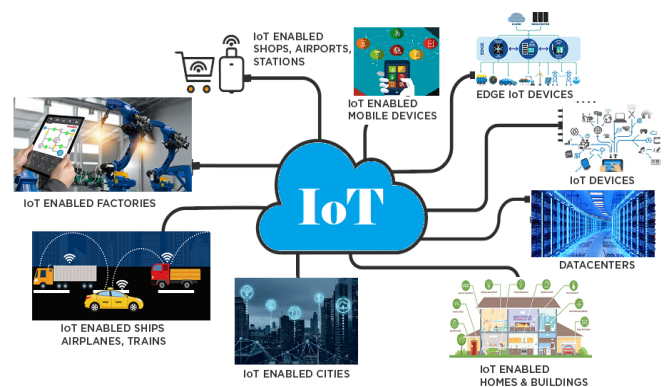


Fig -1: Pros and cons of internet of things (IoT)

In smart home applications, many sensors monitor room temperature, room air quality, outdoor air quality, outdoor light quantity, etc. to optimize indoor air quality, temperature, lighting and other comfort and safety parameters. In addition to smart home applications, it

ensures that your energy usage is optimized. So it is reached the bedroom, living room and balcony.

A smart factory or connected factory uses IoT. It has different sensors attached to each important point of movement in a production chain. It monitors which machine is turning at what speed, how it is using fuel or electricity. How does it perform in terms of efficiency and reliability? AI connected IoT smart factory can find out which manufacturing plant or which part of the industry is slowing down your manufacturing process. Then factory owners can easily replace that part or machine to achieve overall higher productivity.

Further, IoT-enabled farming systems are now in motion. It senses real-time weather, rain and moisture conditions, soil nitrogen, potassium, phosphorus, pH, and other important parameters around the crop. Next, these farming IoT systems advise when and how much to sow your crops and automate the watering process to reduce costs and maximize production.

Thus IoT has touched every sphere of life and raised the standard of living to a different level in terms of comfort, profit and productivity rate.

3. IoT worldwide

Globally, the applications of IoT technology have a wide spectrum. Below is mentioned a list of a few such applications:

- Agriculture
- Consumer Use
- Healthcare
- Insurance
- Manufacturing
- Retail
- Transportation
- Utilities/Energy
- Wearables
- Traffic Monitoring
- Fleet Management
- Hospitality
- Smart Grid and Energy Saving
- Water Supply
- Maintenance Management
- Smart Home
- Smart Pollution Control
- Smart Cities
- Water and Waste Management

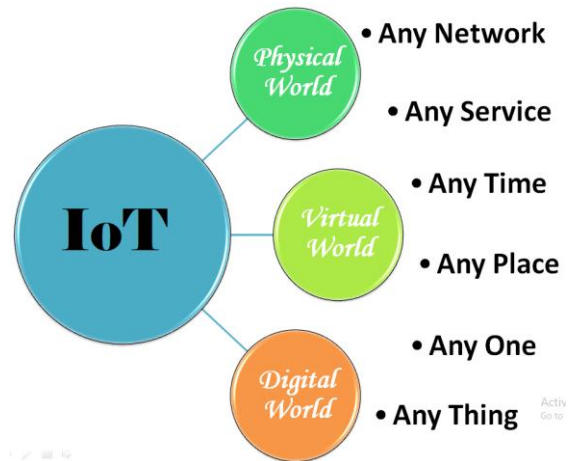


Fig -2: Interaction with IoT and various worlds

Due to its adaptability to any sector capable of providing accurate information about its services, efficiency, management and even environmental conditions that can be monitored and managed, IoT technology is widely used across the globe. According to Statista, a German company that specializes in business and consumer data, the IoT technology market is projected to expand to 28.7% CAGR to nearly \$1.6 trillion by 2025. Smart home solutions, one of the most used consumer segments. IoT technology will grow to \$53.45 billion by 2022 (Statista). In contrast, the IoT market in manufacturing was estimated at \$187.33 billion in 2018, with a CAGR of 18.07% forecast to reach \$487.30 billion by 2024 (MarketWatch). Since the onset of Industry 4.0 there has been a high demand for transparency and traceability in manufacturing processes and supply chain networks. Due to its strong position in data collection and analysis, IoT devices meet most of the requirements needed to meet such needs. As a result of the development of network hardware used in IoT, businesses have a constant demand to implement a new generation of systems that enable automated and real-time interaction between different components of multiple business domains.

4. IoT in Bangladesh

Like other countries of the world, the IoT market is growing at the same rate in Bangladesh. In 2018, Bangladesh Telecommunication Regulatory Commission (BTRC) issued an order to legalize IoT in Bangladesh. It mentions nine sectors where IoT technology can be used in the country: smart building, industrial automation, smart grid, water management, waste management, smart agriculture, telecare, intelligent transport system, environmental management, smart urban lighting and smart parking. Sectors that contribute the most to our country's economy are increasingly adopting such technologies. For example, the country's agriculture sector, which employs the majority of the country's population, has started adopting IoT technology. Local startups have started offering IoT-based

advanced agriculture solutions, including systems that track livestock sleep, heat cycles and behavior in real time and provide timely recommendations to farmers. Millennials are becoming increasingly dependent on smart home assistants like Amazon's Alexa to provide more convenience in their daily lives, demonstrating growing market demand in this area. IoT has a huge untapped potential in many sectors in Bangladesh, such as transportation security, environmental monitoring, healthcare management, utility management, smart grid and social security management.

5. Areas that can benefit from IoT

Think of the sectors that contribute more to the country's economy. They are probably the best field for IoT application as well as other latest innovations. If we can take advantage of IoT, we can stay ahead of our competitors. The opposite is also true. If we don't bring technologies like IoT where we are a little ahead of other countries, we will lose our upper hand in no time.

Bangladesh is doing well in the garment sector. It is true that we have very cheap labor. But if we can use this labor more efficiently, productivity will surely improve. Various IoT applications can track workers and show statistics that can help decision makers make critical decisions more accurately. IoT Smart Factory, Connected Industry Such applications can help us reach a position where we are comfortably ahead of others. The western world is trying to create an automated garment factory where clothes will be made without any human intervention. We have enough manpower. But if they really do automate it, it will make things difficult for us. Then again, to grow an industry you'll need some supporting industries nearby. So even if they are automated, it will be some time before we have a complete ecosystem in place there. We can use this fact. We can go for a hybrid approach. Find out what are the categories of automatic dressmaking work that we can achieve high speed in production. We can then try to automate those departments using artificial intelligence-driven IoT (AIoT). In the rest, where human beings are doing great work, we can have human workers.

The agricultural sector of Bangladesh is one of the sectors where most of its population earns their livelihood. Bangladesh ranks second in freshwater fish production in 2020. The use of IoT can increase the efficiency of fish production and take us to a place where no one can beat us in a short period of time. Various IoT based water monitoring and environmental control solutions can significantly increase fish production. Again high precision agriculture or precision agriculture can increase our crop productivity and increase our GDP by a significant amount. Blue economy or ocean based income is another promising sector that we can use IoT. Bangladesh has huge potential in blue economy. 16% of our country's total fish production is from the sea. Alarmingly, a dead zone has been found in the Bay of Bengal.

The area of this dead zone is 60000 square kilometers. There is not enough oxygen in this area of the ocean for fish to survive. Most of this dead zone is within India's maritime boundaries, but Bangladesh also has a portion. We need IoT based monitoring and research to track dead zones and find out problems and solutions. Most importantly we need to ensure that it no longer enters our maritime borders. If this happens, our fish production will surely decrease and many people in the coastal areas will become jobless. Dhaka's traffic jam problem is known to everyone. Smart city applications can be used to reduce traffic problems and save people's effective time. There are many other sectors where specific domain experts can suggest improvements using IoT.

6. Contribution of IoT in IR 4.0

IoT is a key part of the Industry 4.0 strategy that works to create flexible and connected digital factories where communication between all parts of the system is facilitated. The best aspect of today's technologies like IoT, AI and Big Data is the huge range of applications and services they offer. These technologies are working directly and indirectly in various parts of the factory which are visible to all. Besides, they continue to work in other fields like planning and management in factories. Manufacturers can even integrate customers and business partners into standards and business processes.

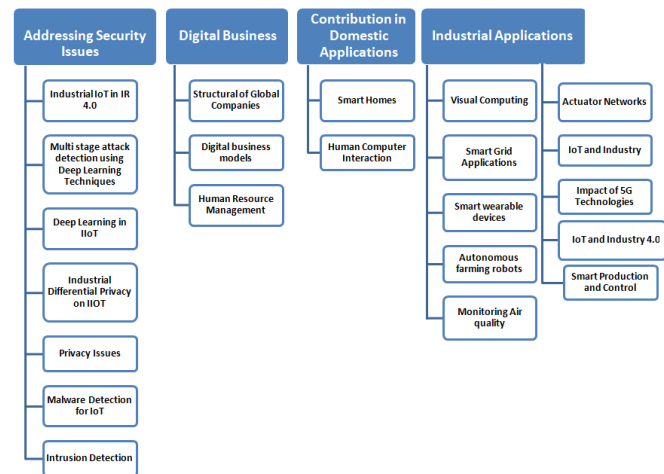


Fig -3: Contribution of IoT in IR 4.0

7. IoT in different sectors during COVID-19

Various sectors were asked to ensure the use of Internet of Things (IoT) services during COVID-19. 64% of our largest population used IoT services during COVID-19 in the education sector. About 36% of users use IoT in the office. A significant number of users (28%) used Internet of Things (IoT) services in the banking sectors and the medical sector was about 15%.

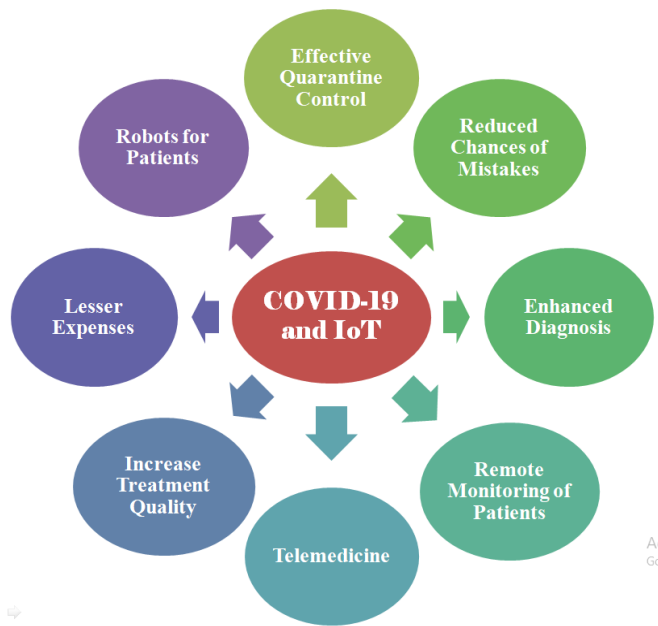


Fig -4: Areas of Internet of Things (IoT) during Covid-19

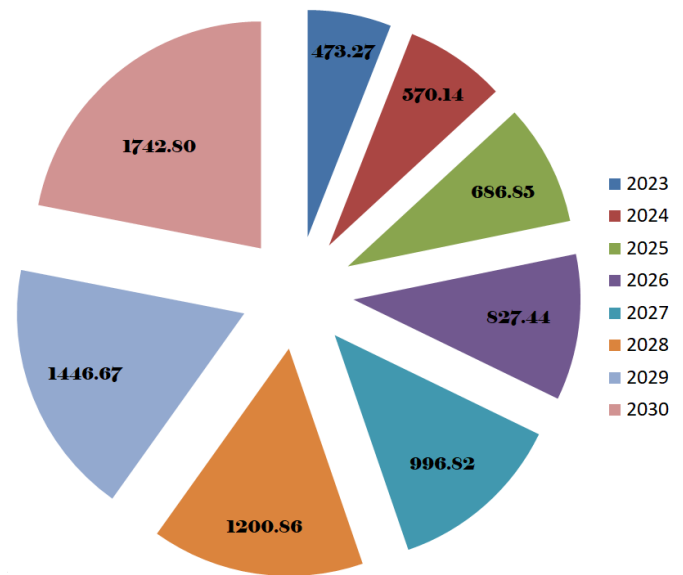


Fig -5: Global industrial IoT market size (Billion Dollars)

8. IoT Market Fundamentals

Implementing an IoT solution requires generating data, network connectivity and computing power to process data sent over the network to generate information and insights from sensors/RFID tags. Taken to a higher level, the information generated can be fed back into systems to automatically control manufacturing processes such as product manufacturing, monitoring blood sugar levels in diabetics and more efficient inventory management. According to IoT Analytics, the majority of IoT projects are in smart cities, connected industries, connected buildings and connected cars with most initiatives focusing on cost-cutting applications. Recently, Datasoft has been at the forefront of IoT development in Bangladesh (and serving clients abroad as well), although major telecom operators have also started offering services such as vehicle tracking systems and plan to launch a wider range of services in the effort. To diversify their offerings as revenues from non-data services decline. In April, Datasoft plans to launch 4 IoT devices to enable subscription-based customers to detect gas and water leaks, as well as smoke and intrusions in their homes. The company has signed an MoU with Grameenphone for greater IoT development in the country. The 3 major telecom operators in the country have also started offering a number of IoT-enabled solutions such as smart security, smart presence, smart homes, industrial IoT and smart enterprise. They also announced plans to develop a wider variety of services in the future.

The global industrial IoT market size was estimated at USD 473.27 billion in 2023 and is expected to hit around USD 1742.8 billion by 2030.

8. Challenges

Despite the huge market potential in this technology, some hurdles needs to be addressed first for rapid market growth.

- ❖ First, the country needs to ensure a strong internet connection is properly distributed as this is the most fundamental part of IoT technology. Although Bangladesh has successfully tested the launch of 5G mobile internet, 3G penetration is still lacking across the country.
- ❖ Second, weak industry-academia partnerships in local relevant industries result in a lack of technically skilled manpower, which creates a substantial deficit in research and development (R&D) resources.
- ❖ Third, most market leaders are either concerned or not interested in taking advantage of the benefits that IoT technologies can provide One of the reasons for such concern is that incorporating such technology may create disruptions in the day-to-day processes of their business.
- ❖ Finally, the most important challenge is the instability of power supply across the country, both for households and industries. IoT technology requires an uninterrupted power supply to operate at its full potential.

9. Specializing on IoT

Despite such challenges, Bondstein Technologies is working at full capacity to incubate the growth of IoT technology in Bangladesh. It is helping businesses integrate with such connected technology and leverage operational efficiency.

The company makes advanced B2B IoT solutions using hardware produced by its assembly unit. The company's envisions creating a network of connected devices and ensure the ability to remotely monitor and control them through a secured process.

9. What is the solution?

Although IoT is one of the most difficult sectors to secure when it comes to digital security, it is not impossible. We need to ensure that we deploy secure, certified and approved IoT solutions. Even if it is not certified, the organization or individual receiving it should verify it with a digital security expert or private organization. It doesn't have to be a government agency but it can also be a private organization that you can trust.

IoT security is a major area of research and along with a simple but proven cyber security solution; there are also new ways that are coming to secure the IoT once and for all. Blockchain-based IoT security is one of the newest ways to protect IoT. Also, we need to explore new ways. Besides, to be successful in IoT, you need to do well in hardware. We need to ensure that we can manufacture ourselves to ensure the use of IoT in every sector in Bangladesh. Otherwise, we cannot accept it at a fast rate. Not all IoT applications can possibly be produced by a single country. But we can try to create as many categories as possible by evaluating the impact and importance of those devices and keeping in mind our capabilities. Thank God, Bangladesh has a young generation making its mark in international ICT competitions like ACM ICPC, International Mathematical Olympiad, International Blockchain Olympiad, etc. We have cheap labor which is essential for manufacturing IoT devices on a large scale. We have a government that wants digitization. By combining all these we can achieve an unprecedented position in the adoption and export of IoT development. If we are able to do this, we believe our economy will be one of the brightest digital economies in the world.

10. Factors that can be a positive catalyst

As we develop IoT on a large scale to drive our economy we must focus on other technologies that are disruptive and will work alongside IoT. Some of these are blockchain, artificial intelligence, big data analytics, hardware development, embedded system development, etc. These are similar to the fitness required to run the IoT race. I believe quantum computers could be the key to future security governance. We need ready and loaded experts in this field. The government has been investing in these sectors for some time. But we don't see enough private sector investment in this advanced computing field. Also, various public and private organizations should also develop the habit of using local IoT solutions instead of expensive foreign products to inspire local entrepreneurs.

11. Way Forward to IoT

For Bangladesh to accelerate growth through IoT, it must overcome the challenges associated with implementing IoT solutions. This includes raising awareness of the issue among senior leaders in both public and private enterprises and building strong industry-academia collaboration to prepare the workforce for the ever-changing technological landscape. Despite some initiatives by some companies in an effort to foster greater collaboration with higher education institutions, current practices lack adequacy. For Bangladesh to become truly digital addressing, the challenge will go a long way in writing the country's growth story.

12. Conclusion

Although Bangladesh still has a long way to develop its infrastructure in internet connectivity; electricity and its people have to be more adaptive to incorporating new technologies. To host the fastest and most demanding technology – IoT, the country has to be heavily responsive to overcome the challenges within a short period. Bangladesh still has a long way to go to develop internet connectivity, electricity infrastructure and its people need to adapt more to incorporate new technologies. To host the fastest and most demanding technology – IoT, the country needs to be massively responsive to overcome challenges in a short period of time.

REFERENCES

- [1] <https://www.google.com.bd/>
- [2] <https://www.precedenceresearch.com>
- [3] <https://bn.wikipedia.org>
- [4] <https://www.simplilearn.com>
- [5] <https://www.youtube.com/>
- [6] <https://www.iotforall.com>
- [7] <https://encyclopedia.pub>