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**Contact Address:**

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Sakarya-Turkey

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## Message from the Editor-in-Chief

**Dear Colleagues,**

The Online Journal of Distance Education and e-Learning (TOJDEL) welcomes you. TOJDEL would like to thank you for your online journal interest. The online journal system has been diffused very fast since January, 2013. It has continued to diffuse new trends in distance education and e-learning all over the world. We hope that the journal will also successfully accomplish our global distance education and e-learning goal. Any views expressed in the journal are the views of the authors and are not the views of the Editor and TOJDEL. We hope that volume 11, issue 1 Chapter 1 will also successfully accomplish our global publication goal. TOJDEL is confident that readers will learn and get different aspects of distance education. Any views expressed in this publication are the views of the authors and are not the views of the Editor and TOJDEL.

The editors of this issue are Prof. Dr. Satish Pawar, Assoc. Prof. Dr. Nilesh Anute, Assoc. Prof. Dr. Amirul Mukminin, Assoc. Prof. Dr. Figen Yaman Lesinger, Assoc. Prof. Dr. Dilan Çiftçi, Assoc. Prof. Dr. İrfan Şimşek, Assist. Prof. Dr. Mustafa Oztunc, Assist. Prof. Dr. Hüseyin Eski, Çiğdem Karagülmez Sağlam & Gamze Peler Şahoğlu. TOJDEL thanks for their valuable effort to review the papers.

TOJDEL will organize INTE-2023 International New Horizons in Education Conference ([www.int-e.net](http://www.int-e.net)) between July 28-29, 2023 in Roma, Italy. This conference is now a well-known education event. It promotes the development and dissemination of theoretical knowledge, conceptual research, and professional knowledge through conference activities. Its focus is to create and disseminate knowledge about education science.

TOJDEL invites your article contributions. Submitted articles should be about all aspects of distance education and e-learning. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJDEL. Manuscripts must be submitted in English.

For any suggestions and comments on the international on-line journal TOJDEL, please do not hesitate to send mail. TOJDEL is guided by its editors, guest editors and advisory boards. If you are interested in contributing to TOJDEL as an author, guest editor or reviewer, please send your CV to [tojdel.editor@gmail.com](mailto:tojdel.editor@gmail.com).

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## ROLE OF IOT IN MAKING SMART COMMERCIAL ENTERPRISE

Ms. Umeshwari Patil, Research Scholar,  
School of Computer Application Satya  
Sai University of Technology & Medical Science, Sehore,  
umeshwari\_patil@rediffmail.com

Dr. Sudhir A. Atwadkar, Principal,  
SNBP College of Arts Commerce Science & Management Studies, Pune.  
sudhir.atwadkar@gmail.com

### ABSTRACT

Technological modernization targets enhancing a thing or presenting a new method with a leading edge of technological features to distinguish it from before. Today's generation is used in a choice-making manner and retaining statistics. Technological innovation brings blessings and improves the great. The internet of things (IoT) is a combination of different devices interconnected with each other through the internet, usually called smart devices or gadgets. In forthcoming years, IoT technologies will offer a wide range of gadgets and almost change the lives of people. The Internet of things (IoT) is an era that permits everyone should talk about everything themselves over the internet via devices without using computers. The IoT is majorly characterized by 2 things – automation and connectivity. IoT plays an essential function in bringing automation to nearly every area of business. IoT is the backbone of the buzzword 'smart'. This paper is an overview-based paper and highlights the fundamental features of IoT that are accountable for bringing clever business generation.

**Keywords:** Generation, Internet, Automation, Connectivity, Smart enterprise

### Introduction

Technological advancement aims at boosting a thing or introducing new ideas to perform procedures with new technological features to separate it from earlier. Once they may be brought inside the market, it's far considered as innovation and works as a bonus to the employer concerned or to most people. Era can be used to shield statistics, private decisions method, and other important facts that end in competitive benefits. Surely positioned, generation enables companies to maintain their ideas far away from their opposition. Technological advancement brings benefits that increase utility and provides higher goods and helps improve their ordinary lifestyle. The advantage of modernization is every so often gradual to materialize. This innovation develops opportunities for marketers to discover new organizations and establishes aggressive situations as incumbents' sources of gain decay. It additionally creates uncertainty and hazard for incumbents due to the fact its results may be best imperfectly predicted. Over 90 lakhs of things (physical gadgets) are presently linked to the internet, as of today. In the future, the quantity of gadgets will increase and whooping reach 2000 crores. The purpose of the article is to analyze the role of technology in making smart businesses and understand the changing nature of enterprises. The present study is based on secondary data which is generated from various websites.

### Review of Literature

Khattab (2016) discussed in his article Design and Implementation of a Cloud-based IoT Scheme that IoT technologies presently structuralized human life in different features. The three-layer architecture was highlighted to gather the data and analyze it. A prototype of architecture has been developed to show the performance.

Ferzund, Tausi & Suryani (2016), has found that to enhance productivity and reduce wastage there is the use of the state of the art technology. This system collects which is IoT based and uses real-time data which will help to take proactive and preventive actions to reduce losses. Awareness, representation, and interaction are the competencies of any IoT-based smart system.

Jaishett & Patil (2016) studied the system that connects physical sensing devices with the cloud and connects control mechanisms with the cloud which is an extensive analysis and problem-solving abilities to the overall architecture. In the present study, various architectural technologies have been studied and technological improvements have been suggested. And have been accepted over the periods to improve efficiency. The purpose of the present research is to study the control of technologies by using IoT.

Brewster, Roussaki, Kalatzis, Doolin, & Ellis (2017), has presented a system approach based architecture and outlined the challenges and constraints of an LSP deployment of IoT. Sectoral And Technological constraints are described in order to identify a set of technological requirements. This article also highlights the

requirements for interoperability challenges and explains the requirement authority of data, security, and privacy as well as new business models. The technologies interlinked with IoT have a great ability in view of environmental and social challenges.

Kumar, Ray, Dutta, Chattopadhyayi (2018) has discussed on Machine Learning and IoT integration solutions. The present article's work has highlighted how unmanned aerial vehicles are becoming more and more popular to meet the demands. IoT is interlinked with different technologies and more commercialization helps in increasing the demand.

Foughalia, Fathallah & Frihida (2018) has focused on Cloud IoT. The decision support system devices permit productivity improvement, decrease cost and affect the environment by predicting future actions.

Sinha, Shrivastava & Kumar (2019) has proposed architecture and a novel framework for a mobile-based application that would facilitate the application engineers to develop the applications required for implementing the various functionality of the proposed system. Recent advancement in technology has paved the way for the optimization of traditional industrial practices.

Khoa, Man, Nguyen, Van Dung and Nam (2019), it has focused on the design of circuit diagrams of devices which is enhanced by a two-layer combination and operated by software optimization. The programme network is tested and controlled by the author.

Feng, Yan and Liu (2019) have emphasized that the probability of three WSN architectures is proved by corresponding tests. By measuring the normal communication time, the power consumption of three wireless communication technologies is compared. There is an effort to develop appropriate wireless communication technologies for smart agriculture through various IoT setups.

Khanna and Kaur (2019) have studied the primary aspects of IoT in which humans can control each action through the internet. This study assesses efforts taken by various scholars from the past and highlights the existing challenges faced along with future directions for research.

Madushanki, Halgamuge, Wirasagoda, & Syed (2019), it has discussed the essentials to increasing the efficiency of yield and farming processes that became cost-effective with new technology such as the Internet of Things (IoT).

Salam (2020) has found that the communication structures and architectures and underlying sensing technologies and communication mechanisms are presented with coverage of recent advances in the theory and applications of wireless underground communications.

### Objectives of the Study

- To study the role of IoT in making Smart Commercial Enterprise
- To understand the fundamental features of IoT that are accountable for bringing clever business generation.

### The Internet of Things

The internet of things (IoT) describes the group of substances which might be embedded with sensors, software, and other technology for the purpose of connecting and exchanging facts with other devices and systems over the internet. In the future, every industry faces the rapid requirement for IoT-based technologies. The internet of Things (IoT) is the connection of different physical gadgets that include electronics surrounding components.

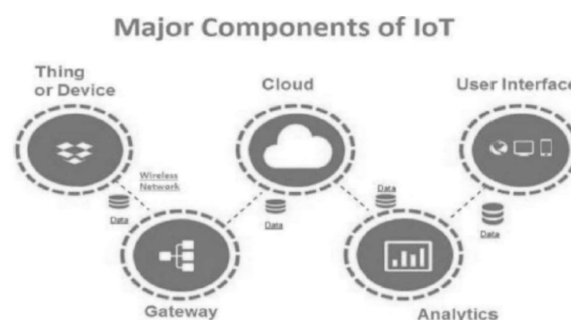


Figure No. 1: Major Components of IoT



Figure No.1:Major Components of IoT (Source: <https://www.rfpage.com/what-are-the-major-components-of-internet-of-things/>)

These structures are a way of communicating and interacting with each other with respect to the outside surroundings. In different phrases, IoT is a machine of interconnected objects, normally referred to as clever devices, via the net. With help of embedded systems, these substances engross the outside environment which enables those in making selections. Due to this reason, these devices can upgrade and become digitally permanent. Whereas IoT comprises the words internet and matters is universallyworking technology works as an individual key to shrinking this entire world to a tiny global that exactly depicts the definition.

The idea of IoT is categorized by defining functions:

- 1) **Automation** is the general concept of IoT that entails direct information through separate gadgets by using different hardware without any human interference.
- 2) **Connectivity** is enhanced by networking within one community on an international standard or scale to provide direct and easy access to diverse data. Things of IoT need to be linked to the IoT infrastructure. Everybody, anywhere, any time can join, this needs to be assured in all instances.
- 3) **Intelligence and identity** create the information and based on that make the decision from the generated data and records. Every IoT technology and device has a complete sole identification. Every solid identity is useful in observing the devices and instant solutions to any problem.
- 4) **Scalability** is the quantity of the performance of the device. Every day the various technologies linked with the IoT sector are increasing the way of performing day by day. As a result, a setup of IoT needs to be able to handle the large development.
- 5) **Dynamic and Self-Adapting (Complexity)** as the changing nature of the technologies and increase in IoT gadgets ought to dynamically adapt themselves to the changing contexts and eventualities.
- 6) **Hybrid Architecture** There is a need for hybrid infrastructure for supporting special technological products to feature underneath the IoT network. The IoT application must be dynamic and have the flexibility to adapt the changes in working circumstances and move. This ought to allow us to work together with a variety of devices and be self-configured to attain positive capability and communicate. It is important for the tool and data safety, such as validation of devices and privacy and the truthfulness of data. It should be applied and work for walks safety operations at IoT parameters and achieve required necessities and requests. It should meet overall objectives and necessities consistent with the use case. However, all complete IoT systems are equal in that they represent the integration of four distinct additives: sensors/gadgets, connectivity, records processing, and a user interface.

### IoT Architecture

IoT systems include Sensors, Actuators that senses the statistics and connect to the cloud via internet gateways and different verbal exchange media. After processing the data, it generates a series of actions for the mechanical activation or deactivation of additives without the want of a person. The community of artificial wireless substances is created through things which become entangled like gadgets, motors, and house appliances and even connect with herbal residing beings like plants, animals, and so on.

The parameter which converts the sensor wave into electrical alerts like temperature, movement, etc. IoT devices are enabled through the advanced sensors essentially. Smart farming is the automated monitoring, collecting and storing of the data and according to the contemporary condition of farm or yield to provide the inputs and satisfy the needs. This automation will be possible with modern technologies which are based on IoT. The variation in temperature, moisture, soil will be detected by the smart sensors. These sensors are communicated to the microprocessor systems which include advanced programming like Raspberry-Pi, Arduino forums. The alerts will be provided through the internet by using pathway such as Wi-Fi and notifies the operator.

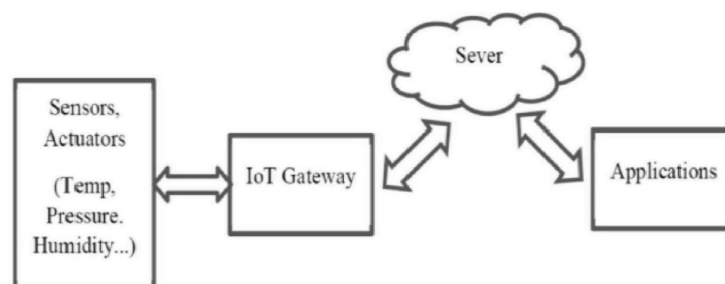


Figure No. 2: IoT Architecture

Figure 2: IoT Architecture (Source: <https://iotdunia.com/iot-architecture/>)

The function of actuators is to convert electrical signals into physical actions. Every sensor and actuators are transducers that convert one form of single into some other. The trade of data is the maximum essential key component in IoT. Therefore, sensors and actuators play an important role here.

Radio Frequency Identification (RFID) Tags are wireless microchips and are utilised to compute wi-fi wireless of something by means of cataloguing it over them. Such chips are used in various electronic banking cards, automobile devices and so forth seeing that interrelation of various substances through IoT is the main goal. RFID tags and IoT technologies work together and offer the precise identity of wireless networking to interrelate things. In many IoT devices the communication protocols are used for transforming the data and interlinking.

**IoT Application**

The Internet of the element in business could be a recreation changer in coming years by incorporating automation in each quarter of enterprise. IoT incorporation will assist in resolving problems in a brief way, enhances business operations & increases productivity. Whether or not it is a production business, manufacturing enterprise, provider enterprise, IT zone automobile zone, or medical career every commercial enterprise and every sector is prompted in an appropriate way with the help of IoT. In the imminent years, IoT-primarily based generation will provide superior degrees of offerings to practically change the manner human beings lead their day-by-day lives. Improvements in medication, electricity, gene healing procedures, agriculture, towns, and homes are specific examples where IoT is strappingly mounted.

A smart business manner accomplishes the smart purpose intelligently. A commercial enterprise can be made a wise one with the incorporation of technology in measuring, in analysing, doing time-bound and specifically assigned duties, and taking corrective actions as consistent with the need of the enterprise. IoT plays a critical position in making smart enterprises.

The internet is the factor which enables technology to talk everything with everyone via the internet through gadgets without using human interference. here comes the maximum important and time-honoured term in IoT known as ‘clever’ it is an automation– the manner of reducing anthropological (human)interfere or involvement which enhance the gadget cleverness to carry out each enterprise (task) by using the situation, which can be accomplished by using IoTfound in four exceptional famous areas - manufacturing/commercial (40.2%), Healthcare (30.3%), safety (7.7%) and Retail (8.3%). In the following couple of years, IoT will discover in many areas smart Grids and electricity saving devices, smart towns and houses. It also provides the devices for healthcare, earthquake, radiation, gasoline, and so on. A number of the regions are noted in the table given under. It depicts how IoT involvement can make a traditional work region into a smart operating machine.

**IoT in Smart Business Areas**

With the help of IoT the traditional system of work can be converted into smart corporations. The primarily based structures of conventional systems can make into smart firms, which will support in increasing the effectiveness and extra productivity, creation and handling of Records and control can be effortlessly and effectively controlled with the implication of IoT in numerous areas. Real-time users can assist in making the gadget more productive. IoT is all about the improvement of areas and processes that gather data and provide solutions with various applications or devices which can make intelligent decisions.

Sr. No.	Traditional Business Areas	Smart Businesses	IoT Role
1	Education	Smart Education	Self-directed and useful real-time educational models, Student live tracking and attendance tracking systems
2	Inventory Control and Monitoring	Smart Inventory	Inventory management and tracking in real-time
3	Health Management	Smart Healthcare System	Keeping track of and managing patient records and medication records with expiration dates.
4	System for Personalized Health	Smart Personalized System	Medication and other regular examinations Reminding the patient to act promptly
5	Management of Safety and Security	Smart Safety and Security	Child locks, home security systems, car safety locks Door safety locks, gas leak detection, and water leak detection alarm system
6	Tour and Travel	Smart tours and	Online vehicle monitoring, route detection,

	System	Travels	alarm systems, Booking and vehicle management system online.
7	System for Waste Management	Smart Waste Management	automatic trash management systems that do not require human intervention
8	System for Waste Collection and Segregation	Smart Bins	Wet, dry, and plastic wastes are accepted or rejected by the bin itself.
9	Pollution Management	Smart Pollution Management System	Automatic real-time pollution level detection and alert setting
10	Hotel Industry	Smart Hotel	Automatic table occupancy, food quality, and booking monitoring checks, increasing productivity while decreasing waiting time

Table 1: IoT in Smart Business Areas

### Challenges in IoT

The IoT has been facing many challenges like the privacy and security of statistics data and analytics reports, and infrastructure for the development and other etc. The primary focus on the protection of privacy and security as it is the key purpose for different demanding situations such as authorities' participation. The united determination from the various authorities, society peoples and private sectors might play a crucial role in caring the protection of IoT from the harmful practices and the subsequent principles specified below-

- **Scalability**-Thousands of internet-based devices are interconnected in a wide network and a wide range of realities and facts are needed to be managed. The device that gathers, analyses, proceeds and stores the data from those IoT applications needs to be standardised. In the present situation, the evaluation of IoT technologies is interconnected with other devices through the internet. To store the unused data which is acquired from various devices need huge analytics tools and cloud storage for the clarification of such valuable information.
- **Interoperability**-Incorporation of different types of technologies required maximum flexibility to cover the nonetheless fragmented. The interoperability will support in setting up a not-unusual structure and the standard for IoT applications. Because the calibration manner remains absent loopholes, interoperability of IoT with legacy devices must be taken into consideration vital. Through the clever gadgets the loss of interoperability is stopping and actually connecting normal interoperable devices.
- **Lack of Government Guidance**-There is lack of guidance by government authorities. The government and regulatory bodies should come forward and develop rules and regulations by forming a committee to the protection and security of gadgets and people.
- **Safety of patients in the medical profession**- most IoT devices are left unattended, as they're linked with actual-international gadgets. If used on sufferers as wearable gadgets, any technical errors in protection may be existence-threatening for the patient.
- **Safety**- There is a most important issue of safety of such devices and the information. The majority of the devices are linked with international networks and gadgets are left unattended. If used on sufferers as wearable gadgets, any technical errors in protection may be existence-threatening. Safety facts protection is the predominant project. Except, the system concerned is big. IoT networks can also be a hazard. Consequently, device protection is likewise essential.
- **Protection and private privatives**- Here was no research on safety vulnerabilities and their enhancements. It ought to make sure Confidentiality, Integrity, and availability of private information of an affected person.
- **Design primarily based challenge**- With the development in era layout demanding situations are growing at a quicker charge. There were issues regarding design like constrained computation electricity, constrained strength, and constrained reminiscence which need to be looked after.

### Conclusion

For decades, the concept of IoT is the mixing of various technologies – sensors, networks to screen and control devices. A recent combination of advanced technologies and marketplace developments is steering a new way for the IoT. The relationship between things and surroundings becomes more tangled and promises development. The prospect of IoT as the global selection of devices assured primarily exchange will be possible through the internet. The people reflect it with the consideration of what it means to be 'online'. Whilst the ability results are considerable, some of the potentially demanding situations may additionally stand in the way of this imaginative and prescient.

Now the traditional system is being replaced by the internet of things and there is a need to handle the demanding situation by maximizing the benefits and minimizing the risk. The growing issue is how people and organizations are engaged and encompass the internet and society connection with human social, private, and financial subsists. There is a need for polarised discussion to increase the benefits of IoT and decrease the risk.

In the following couple of years, IoT will be implemented in lots of areas especially in the service sector for different reasons. Very soon IoT will become a crucial part of human life. IoT is rightfully regarded as one of the most promising virtual technologies that will genuinely come to be greater, enormous and beneficial inside the nearest destiny. Even in a cutting-edge country, the abilities of IoT solutions are dazzling, and their blessings are tempting. However, it's farvital to comprehend that the mixing of IoT in an enterprise calls for quite a few efforts and competencies as a way to gain those benefits without suffering from its drawbacks. That's why the most affordable path of action is to apply the offering of accountable and experienced professionals on the way to get a powerful IoT answer. There is a need to adopt IoT technologies because IoT plays a crucial role in making a smart enterprise in the future.

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