**Internet of Things : Survey**

**Submitted by : Sakshi Chandel**

**Student ID : 1124298**

**Canvas handle : schandel@student.unimelb.edu.au**

**Outline**

1. Introduction
2. Related Work
3. Comparison of Key Approaches (benefits and disadvantages)
4. Conclusions and Future Directions
5. References

**Introduction**

Internet of things is a paradigm which is gaining popularity day by day in the current scenario of modern wireless telecommunications since the term was introduced in 1990s.The basic idea of “Internet of things” as what mentioned in different research papers is, things such as Radio-Frequency Identification (RFID) tags, sensors, actuators, mobile phones, etc. –which through unique addressing schemes, are able to interact with each other. It allows ‘people and things to be connected Anytime, Anyplace, with Anything and Anyone. Sensors and actuators are devices, which help in interacting with the physical environment. The data collected by the sensors has to be stored and processed intelligently in order to derive useful inferences from it. IoT has a basic “Three-Layer-Architecture” which includes Perception layer, Network layer and Application layer. Perception layer takes data/information from the physical environment with the help of sensors and actuators such as temperature sensors etc. Network layer is responsible for connecting to other smart things, network devices, and servers. Its features are also used for transmitting and processing sensor data. Application layer is used to display desired output from these sensors as an application in a way better understand by the end-users like deploying this application on devices which support IoT such as smartphones .Such technology will help to create ‘a better world for human beings’, where objects around us know what we like, what we want, and what we need and act accordingly without explicit instructions. In this context, assisted living (smart AC, refrigerators), e-health, enhanced learning are only a few examples of possible application scenarios in which the new paradigm will play a leading role in the near future. Similarly, from the perspective of business users there are also other domains and environments in which the IoT can play a remarkable role and improve the quality of our lives. These applications include transportation, industrial automation, and emergency response to natural and man-made disasters where human decision making is difficult. According to one of the research papers of IEEEE published in 2019 saying 23 billion devices were connected to the internet in 2019 , which will stretch to 30 billion devices by 2020 .Apart from advantages ,there are possible threats as mentioned in one research paper of DIEE, University of Cagliari, Italy concerning the threat due to information security and privacy .It also mentions the fact that this threat can cause harm more than that of internet has been today.

**Related Works**

There are different research papers published related to Internet of Things .One of them of which is published by IEEE in 2020 discussed about Multimedia of IoT: A comprehensive Survey . The article focuses on giving a detailed survey of various M-IoT network architectures. The survey also discusses the various M-IoT applications i.e., trafﬁc monitoring, habitat monitoring, surveillance for public safety, industrial monitoring, and health monitoring. It also comprehends the design for M-IoT communication by summarizing performance metrics for M-IoT architectures. The survey also tells the M-IoT computing paradigm comprising multimedia data compression, event processing, fog/edge computing, cloud computing, and Software Deﬁned Networks (SDNs) for data computing. It also discuss various routing protocols in the context of multimedia data delivery in M-IoT. It also provide a survey on different physical MAC (PHYMAC) protocols for M-IoT. It discussed open issues, challenges, and future research directions involving M-IoT. This article does not shows the different architectures of IoT like other surveys mentioned below. This survey is basically a complete comprehensive survey about Internet of things. This survey give detailed survey on IoT’s applications .

Another survey of Hindawi as [Journal of Electrical and Computer Engineering](https://www.hindawi.com/journals/jece/) in 2017 discussed about different sensors of IoT like neural sensors , RFID , medical sensors , environmental and physical sensors .It also displays different layers of IoT as well like discussed in IEEE survey 2020.The survey states different applications of Internet of Things like Health care, Home Automation, smart cities. It also mentions different middlewares of IoT like OpenIoT, FiWare. It discussed about different architectures of IoT like Three-And-Five-Layer-Architecture, Cloud and fog based architecture .It relates different research papers on IoT . The survey also discusses the various M-IoT applications i.e., trafﬁc monitoring, habitat monitoring, surveillance for public safety, industrial monitoring, and health monitoring. It also comprehends the design for IoT communication by summarizing performance metrics for IoT architectures. This survey also mentions of different applications of IoT like healthcare, and business models of IoT. This survey did not mention of different protocols used in IoT like mentioned in one survey of Ad. Hoc Network in 2015. This survey mainly focusses about IoT architecture, protocols and applications .It also give a brief understanding and comparison of other surveys/articles about IoT.

Another survey paper by Ad. Hoc Network published in 2015 discussed about Internet of Multimedia things and contributed about vision of the IoMT, whose potentialities are discussed with the help of specific use-cases. It also mentioned the distinct [architectural design](https://www.sciencedirect.com/topics/computer-science/architectural-design) and characteristics of IoMT as compared to the existing multimedia systems are comprehensively discussed. The technical specifications and requirements posed by the IoMT systems are identified and discussed. The communication protocols designed for IoT are discussed and their feasibility for IoMT is analyzed. The potential multimedia processing technologies are presented that can facilitate efficient multimedia communication, specifically via wireless multimedia device. The solutions to the processing/computational issues are provided by introducing the notion of multimedia-aware cloud combined with multi-agent systems in IoMT architecture. The survey mainly focusses on the multimedia of Internet of things .This survey did not mention about different protocols of IoT but discusses about how Internet of things related to multimedia things. It focusses on how IoT can play a role in improving multimedia communications.

Another survey which was published by Information Systems Frontiers in 2016 and mentioned about different classification/components of IoT like software and hardware . The survey also mentions about different applications like of healthcare sectors ,Social applications ,smart infrastructure .The survey discusses about challenges and security issues of Internet of Things. This survey mentions the facts about different hardware of IoT like RFID, sensors networks ,NFC, etc. The survey mentions the fact that how different software of IoT like middleware , searching and browsing .Different architectures of IoT are also explained ,some of them which are hardware or network architecture ,software architecture ,process architecture and general requirements . This article also compared different focusses of varieties of surveys written on IoT and it mentions the facts that about 42 percentage of IoT surveys focussed on Technology ,25 percentage of IoT surveys focussed on applications of IoT,11 percentage of IoT surveys focussed on overview/surveys of different surveys ,17 percentage of surveys focussed on challenges on Internet of things ,only 3 percentage of surveys focusses on business models, and only 2 percentage of surveys focussed on future directions.

**Comparison of Key Approaches (Benefits & disadvantages)**

# **Conclusions and Future Directions**

This survey of Internet of Things covers a comprehensive study of Internet of Things which discussed about different work done in this field. This survey gives an information about different architectures of Internet of Things. This survey focusses on different applications of Internet of things, its challenges, information security and more .The survey also gives a comparative study of different research papers and works already done in this field of IoT. There is no doubt that Internet of Things has a very good future in improving the quality of life by connecting smart devices around us .Some example of it will be a Smart Air conditioner which can be controlled via our smart phones automatically .Internet of Things has also played a role in improving the healthcare sector by connecting various health care devices like fit bit etc. Internet of Things has played an adequate role in improving the quality of life for people in the world. But there are many challenges which IoT should address as to successfully live up to its future expectations and these challenges cannot be ignored in a long run. One of the most important challenge is security as there were many instances where IoT devices were easily accessible by hackers and information was compromised. In order to take confidence of the people in business around the world , this challenge cannot be ignored .Other challenges includes legal accountability, privacy which also should be addressed. Since the IoT has not yet been realized, it might seem early to forecast the future directions of the IoT. One future vision for the IoT is the Web of Things. The Web of Things suggests the use of web standards to fully integrate smart objects into the World Wide Web. Using web technologies can make it easier for developers to build applications using smart objects and existing web protocols can more easily enable communication of different devices. Another future direction should be to make IoT devices more secure and maintain privacy. Future research should also focus of Quality of Experience (QoE) which is an important factor in making IoT a success in future. The IoT will create new legal challenges that must be addressed. Another future vision that involves integrating more devices to the IoT. This survey also mentions challenges and future directions that should be addressed. This survey focuses on comprehensive study of different survey papers in a brief way. This survey also gives a comparative study of advantages and disadvantages of this technology.

**References**

1. [Ali Nauman](https://ieeexplore.ieee.org/author/37085449371); [Yazdan Ahmad Qadri](https://ieeexplore.ieee.org/author/37087239672); [Muhammad Amjad](https://ieeexplore.ieee.org/author/37545798700); [Yousaf Bin Zikria](https://ieeexplore.ieee.org/author/38320930200); [Muhammad Khalil Afzal](https://ieeexplore.ieee.org/author/38092770200); [Sung Won Kim](https://ieeexplore.ieee.org/author/37086216145) “Multimedia Internet of Things: A Comprehensive Survey” published by IEEE in 15th Jan 2020 <https://ieeexplore.ieee.org/abstract/document/8950450>
2. Pallavi Sethi1  and Smruti R. Sarangi “[Journal of Electrical and Computer Engineering](https://www.hindawi.com/journals/jece/)” /Hindawi/ [2017](https://www.hindawi.com/journals/jece/contents/year/2017/)  ID 9324035 | <https://doi.org/10.1155/2017/9324035>
3. S. A. Alvi, B. Afzal, G. A. Shah, L. Atzori, and W. Mahmood, ‘‘Internet of Multimedia Things: Vision and challenges,’’ Ad Hoc Network., vol. 33, pp. 87–111, Oct. 2015.
4. L. Atzori, A. Iera, and G. Morabito, ‘‘The Internet of Things: A survey,’’ Computer. Network, vol. 54, no. 15, pp. 2787–2805, Oct. 2010.
5. A. Whitmore, A. Agarwal, and L. Da Xu, “The internet of things—a survey of topics and trends,” Information Systems Frontiers, vol. 17, no. 2, pp. 261–274, 2015.