Methods for Integrating 5G and IoT

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Abstract

The current study is based on the methods of integrating 5G and IoT. The implementation of IoT in several stages is described in this research. The main objects such as the working style of the industries before IoT implementation and the changes after IoT implementation are described in this study. Several stages such as industrial automation, smart robotics, predictive maintenance, integration of smart tools, smart logistics, software integration, autonomous vehicle, power management etc used for the improvement of the implementation of IoT in the companies. The secondary data collection method is used in this research. The qualitative data helps to maintain the research.

Keywords : IoT implementation, integration of 5G network, the infrastructure of smart cities, smart robotics, industrial automation, and software integration.

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Introduction

In this study, the methods of integration of IoT and 5G networks will be discussed. The implementation of IoT in several stages is discussed briefly in this study. The changes after applying IoT will adobe discussed in this study in detail. Several stages of implementation of the IoT and the benefits of the implementation will also be described in this study briefly. The implementation of various tools and devices will also be mentioned in the study. The overall implementation of the internet of things in several industries will also be mentioned in this study. The application of 5G networks in the devices and tools of the industry will also be discussed in this context.

Aim and objectives

Aim: The current research is aimed at the method for integrating 5G and IoT.

Objective:

- To analyse the working style of the industries before IoT implementation
- To analyse the changes after IoT implementation

Literature review

The implementation of IoT will escalate in all types of devices. The infrastructure of a smart city is contributed by the application of IoT. Every corner of society will be covered by this device. The produced data retrieve and delivered by calling for city-wide networks (Wang et al. 2018). A digital transformation is undergone by the industrial automation industry. Integrating 5G can provide the flexibility to serve individual needs. 5G network can make the process faster which helps the company to grow. Integration of IoT devices in industrial automation helps to increase their capacity to work and it will help those industries to improve their situation and increase their ratings. Industrial IoT systems are including in smart sensors, software platforms, cloud servers and applications. Smart sensors are positioned at every step of the manufacturing floor for some specific implementations. The IoT gateway constantly gets data from those smart sensor networks. With the help of this, the data are received and transmitted to the cloud application server for the processing and analysis (Sodhro et al. 2022). A large amount of data are handled by sophisticated application programs. It can secure data and the use of smartphones will be accessible for this.

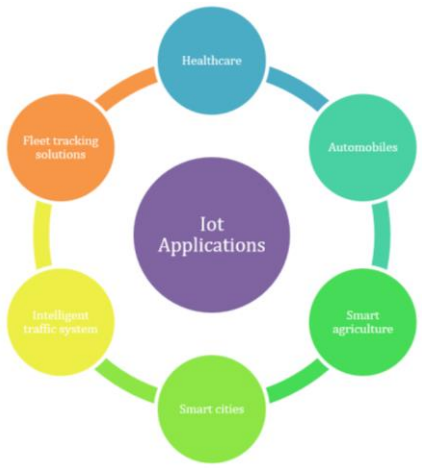


Figure 1: IoT applications in different area

(Source: Created by Author)

One of the most common and significant applications of the internet of things is industrial automation. The automation of machines, tools and device empower companies to operate with sophisticated software devices in a well-organised way to monitor and build for the next process. Accurate3 process steps can be improved to a greater position using the automation in the machine. Smart sensor tools are connected to the automation tools which are used in the automation of a central cloud system that collects a huge amount of data. To analyse the data and the behaviour of the data for improvement, especially designed software is applied (Peng et al. 2021). Automation in the industry develops efficiency, and accuracy and also decreases errors. Industry automation is effective to control and remotely accessible via implementations. The machine can handle harsh environments than humans. Manpower requirements can be reduced by the automation of machines in some tasks. Connected factories are another solution for improvement in all areas of operation.

For easy management and access, the major component such as machines, tools and devices are connected to a network (Fang et al. 2021). There is some way to do industrial IoT solutions such as the overview of process flow, timely monitoring, checking the status of inventory, and shipment, maintenance of the schedule and pausing a particular process for future analysis. The robotics system for IoT-enabled factors of many companies is improving. Smart robotics system helps to handle the tools and materials smoothly in the manufacturing line with accuracy and efficiency. With intelligent robotic arms, predefined specifications can be set for maximum precision. The complexity of operation will be reduced by the concept of man-machine interface design. The improvement in productivity and empowerment of manufacturing in future will be reflected by the IoT implementation (Hu et al. 2021). The complex task can be performed by the programming of robots with high and immersive sensors for real-time analysis. These robotics networks are connected to a cloud which is secure for controlling and monitoring.

Year	Adoption of 5G network
2020	212m
2021	600m
2022	1154m
2023	1939m
2024	2132m
2025	2684m
2026	3313m

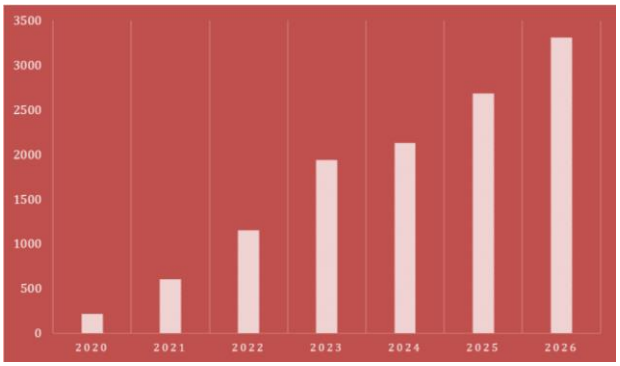
Table 1: adoption of IoT

(Source: Created by Author)

The data can be accessed, and data also be analysed by the engineering team to take instant actions for the improvement of products or to prevent an unexpected failure during a machine fault. The data can be analysed by the maintenance engineers and the plan is also be taken for schedules maintenance effectively without affecting any task. The unnecessary downtime in the line of products can be avoided by predictive maintenance. It is an effective solution. The unexpected failure of the machine can be the cause of damaging products, delays in delivery the loss of business for manufacturers. The cloud system is used to storied the status of each machine (Sekaran et al. 2021). The overall history of each machine, its performance, and the next scheduled maintenance can easily be accessed via smartphones. Calculations and implementation of each machine by performance and the stages of the process of products are used for the collecting data analysis. IoT implementation can also offer solutions for power management in industries. Specific sensors can identify the environment to control the lights, air conditioners, humidity, and

liquid flow. It is effective for efficient power management.

IoT is used by the automotive industry to enable self-driving vehicles to complete the supply chain for goods and logistics management (Marwat et al. 2018). Implementation of IoT technology in manufacturing enhanced the quality of products. Constant monitoring and analysis of each stage make sure the better quality of products and the products will be secured by constant monitoring. The use of a 5G network in devices can make the device faster and it can fulfil the needs of individuals. The supply chain will be faster with the implementation of 5G networks in devices of the industries or companies. A lot of convenience and efficiency for the manufacturing units are getting through the implementation of IoT technology in package management. IoT software integration is also helpful for product optimization. Major companies are using IoT to optimise the products of their companies. Detailed analysis of data can help to a better overview of the procedure of improvement strategies for product optimisation. Logistics is one of the important parts of several industries (Alawad et al. 2021). It needs constant improvement to support increasing demands. Smart sensor technology can help to fix logistic problems and manage goods efficiently. Airlines also use IoT for irregular operation in the maintenance of aeroplanes in service at both production and predictive.



Graph : Global 5G adoption

(Source: Created by Author)

Methodology

There are two methods for data collection such as primary data collection and secondary data collection. Primary data are collected from the survey or the interview which can be happening at that company or industry. Secondary data are collected from books, journals, websites and social media etc. In the mentioned research the data are collected from the websites (Zhong et al. 2019). The secondary data collection process is used in this study. This secondary data can help the researcher to collect accurate information for this research to create effective results.

Data analysis

The collected data need to be analysed to get accurate information and to check the accuracy of the data. There are some types of data such as qualitative data and quantitative data. In this research qualitative data is used. Qualitative data help to get accurate data which helps the researcher to study the research and an effective result can be made by them without any manipulation. The data helps the researcher to understand the main focus of the study. Qualitative data or numerical data helps to maintain the research properly (Khujamatov et al. 2021). With the help of this statistical data, the researcher gets relevant information about the research and they can make an effective result for the future researcher or the readers.

Conclusion and future scope

From the above text, it is concluded that the implementation of IoT and 5G networks in several sectors can grow the ratings and the overall process of that industry of the company. Industrial automation, smart robotics, predictive maintenance, integration of smart tools, smart logistic maintenance, software integration for product optimisation, smart package management, enhanced quality and security, autonomous vehicle, and power management are the stages to improve IoT implementation in the companies or industries. 5G network implementation in devices and tools makes it faster and it can fulfil the needs of individuals. The future scope of the integration of IoT and 5G networks is huge because it is a system which makes a company or any other industry progress. The use of IoT in several made a huge change in its growth and it is the reason for the great scope of IoT in future.

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