Data Monitoring System based on IoT Protocol

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Abstract : Today, the Internet of Things (IoT) is changing the world, in addition, it is also creating various connectivity mechanisms. Communication between people and machines and between machines is only possible today thanks to the Internet of Things. Since last 15 years, Internet of Things (IoT) is the leading application extending from connected smart homes to wearable devices and healthcare. Industry 4.0 is the recent revolution in the industry. It contains cyber-physical systems (CPS) that monitor the factory's production and manufacturing process and make independent decisions. In a wireless sensor network, the sensor detects the data from the device and that collected data will be sent to the router. That sensor may be different depending on your applications. As there will be so many devices connected to the Internet of Things (IoT), massive data will be generated. To extract hidden information from the generated data we have to apply different types of algorithms. A large amount of data can be monitored and controlled with the use of Wi-Fi, Internet of Things (IoT), Cloud Computing (CC), and Cyber-Physical System (CPS).

INTRODUCTION

The architecture, protocols, applications, security, real-world implementation, and future trends of IoT are explained in detail in. Technologies are evolving rapidly today. People are moving towards an “always connected” system. Wired and wireless networks are available, particularly to meet procedures where open standards are permitted and defined. Lately, concepts related to the “Internet of the future” are being studied. Across various industries, there is growing interest in the use of IoT technologies. Many industrial IoT projects have been carried out in the areas of food processing, monitoring, agriculture, environmental monitoring, security and many more By the end of 2020, between 26 and 50 billion “objects” will be connected to the Internet. IoT has given us a promising way to create powerful industrial applications and systems using wireless devices, Android, and sensors. Nowadays, everyone wants to connect their system to the cloud and make it powerful. Not only electronics and IT field personnel, but

many other industries also want to integrate their manufacturing line with IoT devices to control and monitor data in real-time scenarios from anywhere on land without any obstacle. IoT is the basic premise for implementing Industry 4.0. IoT is constantly evolving and is a hot research topic where the opportunities are endless. MQTT is one of the best IoT protocols implemented in IoT to exchange data from sensor to cloud and from cloud to sensor. For the sake of safety in the industry, it is almost necessary to monitor all the activities that pass through the internal environment of the industry to improve the safety of the employees working in the industry. IoT can connect real-world elements and configure the smart component in a communication system. Therefore, IoT is a key that can enable different types of beneficial applications and services that can support environmental transportation, economies and health that we have never thought of before.

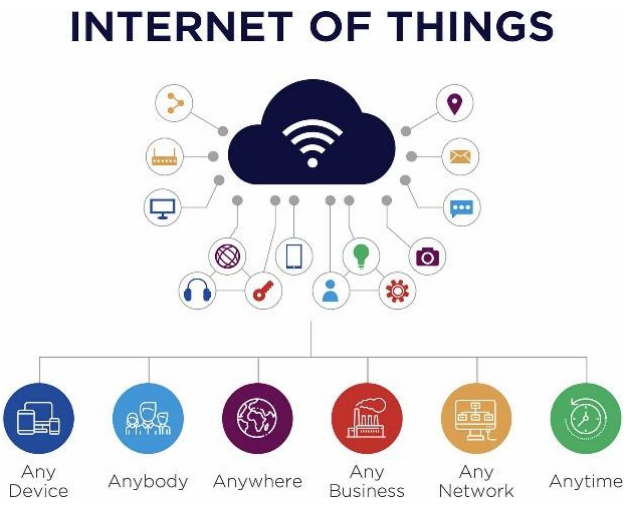

Figure. 1 The loT general scenarios

WHAT IS THE NEED AND SCOPE OF IOT?

IoT allows businesses and individuals to be more connected to the world around them and do higher-level, more meaningful work. A complete IoT solution integrates four distinct components: sensors/devices, connectivity, data processing, and user interface.

The TCP/TP was defined long time ago. This protocol plays an important role in the digital communication area. Therefore, the IoT will connect a number of devices, which will make a tremendous traffic of data. It also needs a huge amount of storage capacity to store that data. Hence, the new standard design and protocols are necessary for safe data transmission in IoT technology. Improvement of IoT depends on the different types of useful applications and business models with advances in the technology of IoT. With the industry's broadest IoT-ready portfolio of wired and wireless connectivity technologies, microcontrollers, processors, sensors and analog signal chain and power solutions.

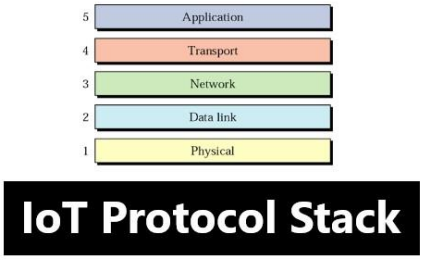

Figure. 2 IoT layers and stack

Figure 2 shows the different layers of IoT that make all IoT data transmission easy and secure. Each layer has its unique task to perform. Protocol is defined as the special set of rules and regulations that result from a telecommunications connection. It is used when they need to communicate with each other, the endpoint on the opposite side is connected to the same network or a different network. At the end of the discussion we can conclude that with the help of data acquisition we can have a large amount of data at the end point. Thus, depending on our needs, we can filter the results of our search from different nodes and intersections.

RESEARCH METHODOLOGY

In 2016, a research paper was published showing the concept of creating smart cities within the framework of Industry 4.0. was published by Kallappa, B. B. Tigadi. By connecting different IoT devices, this system is expected to change the logistics and transportation system with the best infrastructure.

Here we can see that in a smart router, many processes are will going to take place in the round of the network or a smart device.

Industry 4.0 also using this FOG Computing concept in the industry. Where it can powerfully divide the source data. Only the data which is used will be provided to management level, control and for the analysis.

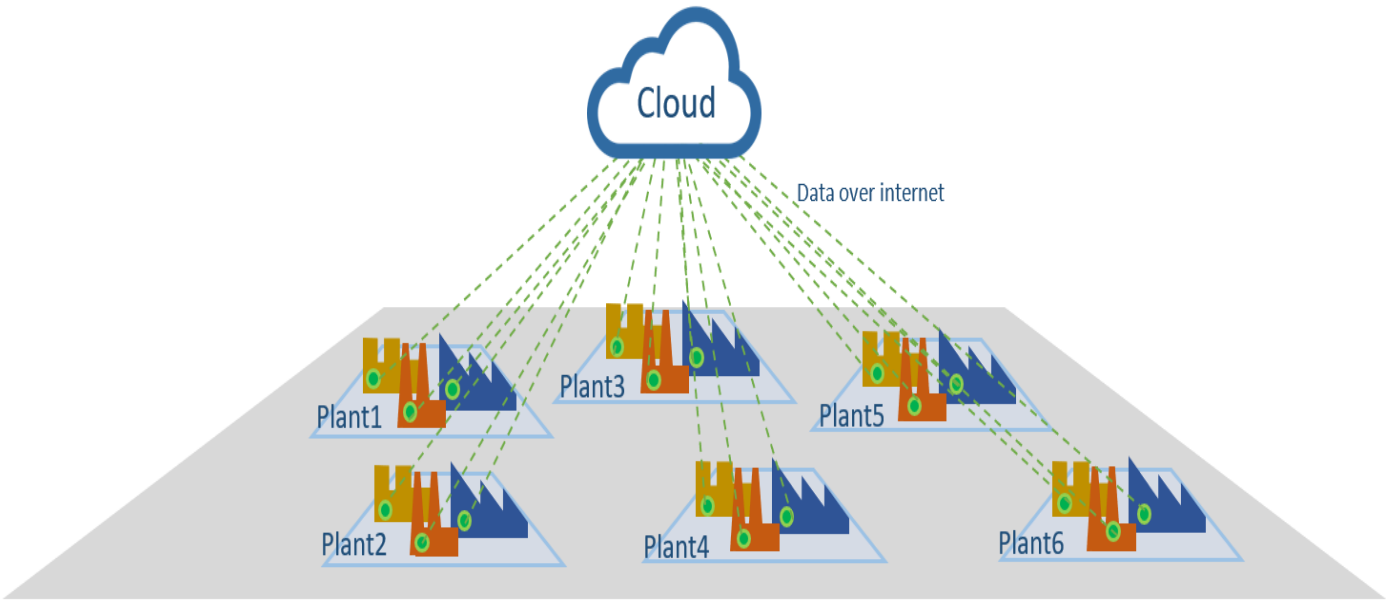

Figure. 3 The concept of FOG Computing

In this article, they discussed the concept of Industry 4.0 and the idea of Smart City. Although the definition is different, the principles should be the same. They tried to consider Industry 4.0 as the first step of smart cities, such as smart campuses, smart buildings, smart streets, etc. Another important element is also FOG Computing. This transmits exactly only the necessary data to the server. Pikes is the first city in the Czech Republic to become the first smart city. Cloud computing is considered a promising solution to provide services to end users and provide applications with elastic resources at low cost.

Big data analysis is briefly explained hereby Sunghae Jun. Data analysis is the most important part of the IoT network. We are in the era of Big Data. Big Data has three typical characteristics which are volume, variety and velocity. That is to say, the size of big data is extremely large, and the data types of big data are diverse, such as numbers, text, and figures. Furthermore, Big Data processing is very fast. Therefore, we should take these characteristics into account when analyzing big data. BDL is a big data learning technique. Once the data acquisition is completed, it needs to be analyzed to obtain the final result. In this article, they discussed the topic of learning from Big Data. Data analysis was carried out based on the article and patent of IEEE and KIPRIS. They showed the content of the different top-ranking keywords and then related the SNA graph to this data.

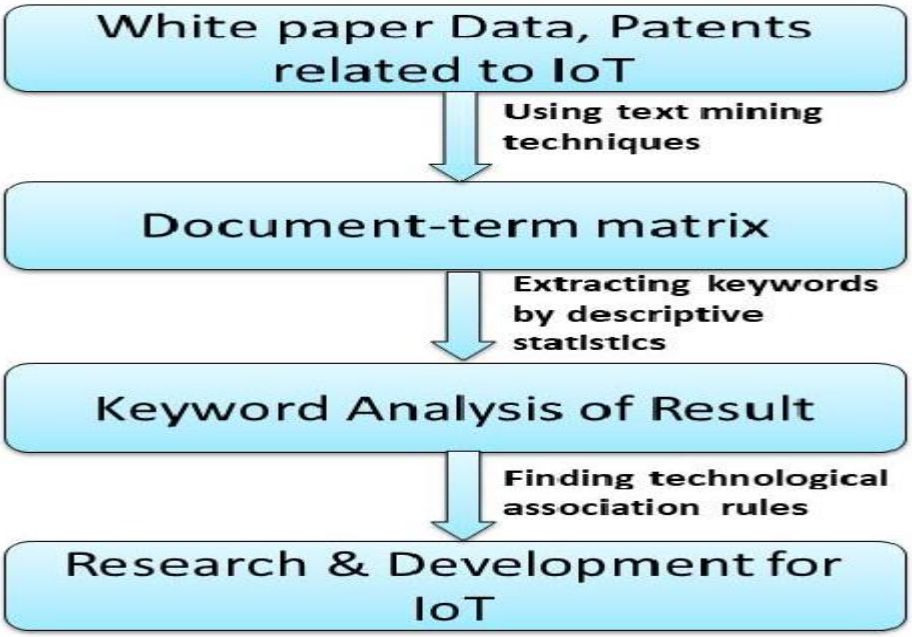

Figure 3. Dataflow of IoT technology through BDL

First, they searched for IoT-related articles and patent documents in databases such as IEEE explore, USPTO, KIPRIS. This data is too big as it includes text, numbers and others. So now they applied BDL to analyze paper data and patents. After that, they transform the text data into structured data called document term matrix . In Matrix, row and column are defined as document and term respectively. For this transformation, text mining and social analysis techniques were used using the "tm" and "sna" packages from the R project,Using descriptive statistics for keyword analysis, they ultimately extract the top ranking keywords.

IV. RESULTS AND DISCUSSION

Table. 1 Top-ranked Key Words: Patents

Rank	Frequent Term
1st	Control,data,device,information,intelligent,management,monitoring system, technology
2nd	Terminal
3rd	Gateway, equipment
4th	Communication, platform, service
5th	Access, network, wireless

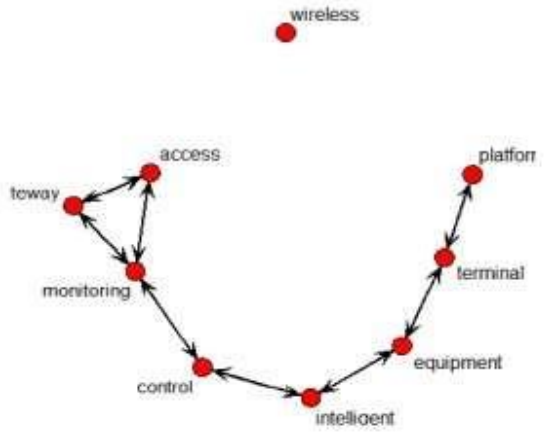

Figure. 5 SNA graph from correlation IoT Patents

Table.2 Top-ranked Key Words: Papers[14]

Rank	Frequent Term
1st	Application, information, network
2nd	Data, system, technology, smart
3rd	Management, architecture, communication
4th	Model, framework, social, use, device, object, security
5th	Service, cloud, analysis, design, global, semantic, integration, sensor

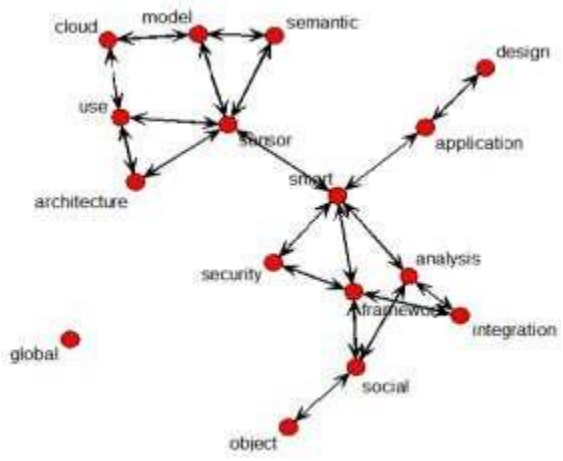

FIGURE. 6 SNA GRAPH FROM CORRELATION OF IOT PAPERS

CONCLUSION

IoT provides security to generate a change in the quality of life and the business concept. With the help of a vast network of locally intelligent smart devices, IoT has the potential to enable expansions and improvements of critical services in logistics, transportation, education, healthcare, and security, while providing a new ecosystem for application development. . Just as the Internet aspect has emerged, the Internet of Things has reached all conditions of our lives in less time. In this work I presented a model of data acquisition and analysis system based on IOT for different applications for educational purposes and other organizations. I can conclude that Industry 4.0 will be the best platform to accomplish this task in today's industry. There are three main states for IoT implementation: data acquisition, security, and data analysis. While transferring the growth of IoT, data security is the most important thing for reliable data to be transferred between millions of smart applications. Here I focused on the MQTT protocol at the application layer for secure data transmission. With the different big data analysis methods, a person can separate the particular data as they wish. This one differs from other IoT review articles because it primarily focuses on industrial applications of IoT, big data analysis, and potential research opportunities for future industrial researchers.

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