

A survey on post Covid impact of IoT on cloud

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Abstract: Despite the current Covid-19 pandemic, the Internet of Things industry is growing, and it is estimated that around 30 billion IoT connections will exist by the end of 2025. Advanced smart sensors, cloud computing, big data, lightweight communication protocols, server programs, and web development tools are the enabling technologies that accelerate the development and deployment of domain-specific IoT systems. These interconnected devices can bridge the gap between the physical and digital worlds to enhance life, culture, and productivity.

Key words: Cloud data storage, Big data, IOT, Smart devices

1. Introduction:

The COVID-19 pandemic has completely changed the need for internet connectivity and for technological devices across the population. In an attempt to halt the spread of the malfunction viruses and security, many industries including IT industries, Banking sectors, education and government sectors etc., have moved to cloud infrastructures. Therefore, nowadays industrialists and peoples, having a computer connected to the internet makes the difference between being able to keep up with their work and falling badly behind. Issues of access are linked to the larger body of research surrounding digital exclusion, digital inequalities and the digital divide. Other aspects during the COVID-19 pandemic are also relevant — such as having the opportunity to stay socially connected with family, friends and peers at a time when physical distancing has been imposed in most countries.

Hence, new categories of cloud platforms dedicated to serving IoT needs are emerging. As the IoT (Internet of Things) emerges and most of the traffic will be generated from machine-to-machine communications (instead of humans-to-machines), the cloud is also adjusting to the constraints of this new client computing and networking domain. The web and cloud is largely built on client-server architecture and has evolved to support new clients, from the initial PC desktops and laptops, to the latest mobile terminals – Smartphone’s and tablets.

The Internet of Things (IoT) aims to connect billions of smart objects to the Internet, which can bring a promising future to the smart cities. These objects are expected to generate large amounts of data and send the data to the cloud for further processing, especially for knowledge discovery.

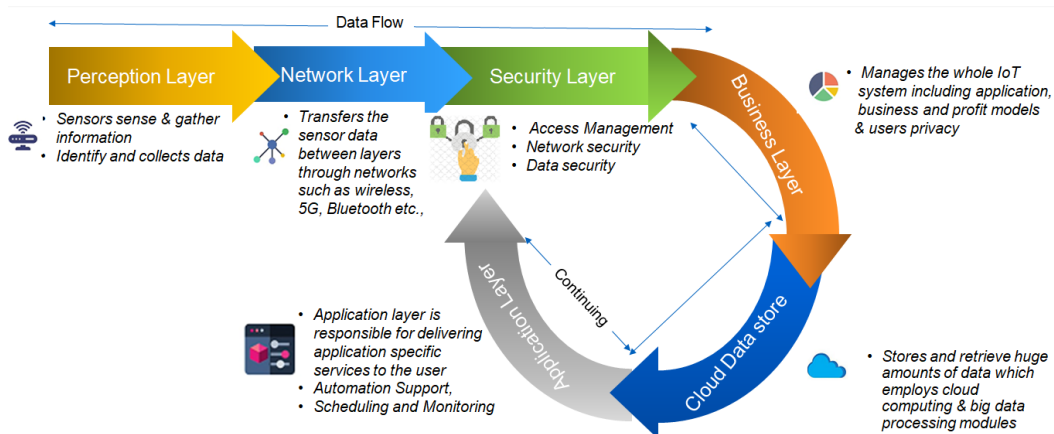
2. Internet of Things (IoT):

Internet of Things is really big buzzword out there and each person out there has its own definition for Internet of Things (IoT), out of which IoT aims to create a world where all the devices and applications are actually connected to a network. It actually collaborates with each other to complete complex tasks which require a high degree of intelligence. The intention here is to help everyone ease up their tasks or day-to-day challenges and this can be done using various devices using a connection as a network or a medium with respect to it. In this case the medium becomes the Internet.

Now another definition of Internet of Things is “an interaction between the physical and digital world sensors and actuators communicating with each other and building a smarter system”. It makes our lives much easier. Due to this when we come down to the IOT ecosystem there's no single architectural design that's out there which is agreed universally.

3. IoT Architecture:

Each organization has different requirements and when we look down to it we can break it down to a simple three level architecture wherein we have a perception layer where sensors actually gather the information from the environment around it. Once this is done this information pass to network layer. The network layer in itself takes up the responsibility of transferring this data from the sensors to the next layer which is the application layer. The main objective of this layer is the application in itself delivers the collected information to the end user or the end platform. This architecture can also be expanded to five layer architecture.



When we talk about five layer architecture, it's similar to other layered architecture. The **transport layer** (network layer), the **pre-processing layer** (security layer) and the **business layer**, these three layers doing the earlier tasks, so that we have an easier operation or a smoother system.

The **perception layer** remains same when it gathers the information from the sensors but the transport layer actually transports the data between the sensors to the processing centre. This could be through a wireless system. It could be Bluetooth or 4g/5g NFC or any medium that we choose to. Once the information has been transmitted, the processing layer comes into picture which actually stores the relevant information, analyzes this again and processes it as per the user's requirement.

This could employ various databases cloud computing services as well as big data process modules to store this information as well as process it for that matter. Once this is done, it gives the information to the application layer which is actually responsible for delivering the various services to the end-user. This is something that we can do on a system which does not require any immediate action and require a large amount of processing for that segment. But let us say for example if we are in a system where we need immediate response, then in those cases we can go for fog computing.

Where is IoT? :

IoT application can be used any where & any equipments to make human life easier.

- Building and Home automation
- Manufacturing
- Medical and Healthcare systems
- Media
- Environmental monitoring
- Infrastructure management
- Energy management
- Transportation

We will come to know the importance of IoT & automation in few test case scenarios.

4. Test case: A smart watch

A smart watch which is designed to work under the IoT is an individual device which gets the information from the person's body, i.e. their heart rate, oxygen rate, blood pressure, etc. They even get the data like number of steps they walk in a day or distance they travel using the GPS (Global Positioning System) provided within the watch.

As per medical industry we all knew that heart attack to a person most probably occurs in the early morning. So these smart watches provide the customers many advanced features like

- Messages, Calls sending
- Synchronisation of data with the user's Smartphone
- Bp, O2 level, heart rate monitor, pedometer
- Tracking the locations, heights and directions via maps or compass or altimeter
- Entertaining factors like camera, gaming, hearing to music
- Emergency calling in case of the user involved in any kind of injury or accident
- GPS (Global Positioning System)

Below example scenario shows how IoT helps significant boost to improve quality of our life.

A 65 years old man who was living in a city, had his son working in another city. He loves his father very much and gifted a smart watch to his father and asked him to wear it always. His father was happy to get that gift and he love to wear it as well. One day in the early morning when the old man was in deep sleep in his bed, his smart watch sensors identified something is wrong with the old man's heart rate. His heart rate suddenly goes high, his breathing is going abnormal. So it automatically started doing following things.

- It gently started vibrates and wake him up and inform his heartbeat is abnormal and having high blood pressure
- It also gives tip to him to take a aspirin tablet to get immediate relief
- At the same time smart watch recorded his current medical information such as his current blood pressure, heart rate, breathing level, oxygen level, etc and automatically sends to his registered medical provider hospital. In the other end at the hospital doctors received and evaluated the old man current health data and understood that he

is suffering from severe heart attack and ready with the all the required treatment kids which currently the old man required.

- At the same time, smart watch sends mail to emergency service to get ambulance to the old man's house. When the old man reaches to hospital as patents current medical situation is thoroughly known to the doctors without any delay doctors saves the person life from the heart attack and said he is fine because he reached to hospital on time.



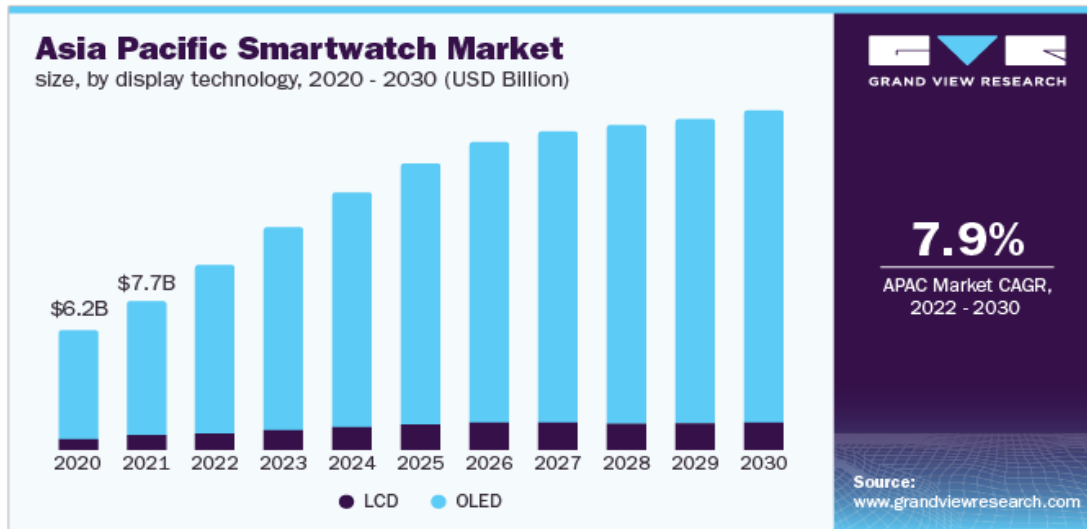
From this scenario, we can understand how technology of IoT helps to save a life. It is all because of things can interact with other things, In other words the Internet of Things (IoT) is the network of physical objects—devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity—that enables these objects to collect and exchange data.

5. IoT Market analysis

The global smart watch market size was USD 30,434.1 million in 2021 and is expected to expand at a compound annual growth rate of 8.2 % from 2022 to 2030. The Asia Pacific smart watch market size was valued at USD 6.2 Billion in 2020 and is expected to expand at a compound annual growth rate 18.6% from 2020 to 2030. Compound annual growth rate.

Smart watches include IoT-related features that allow the received information to be transmitted to a remote server, enabling real-time monitoring of individual behaviour. Furthermore, IoT-based smart watches can be connected with IoT devices to monitor users' physical activity. IoT-enabled smart watches are used across various applications, including edge analytics, computational offloading, sports sector, biometric readings, automatic device connection, and more. Smart watches have finally created IoT applications with human

components; hence, the growing applications of smart watches are expected to drive the market.



The COVID-19 outbreak led to manufacturing delays and supply chain disruptions resulting in a minor setback for the consumer electronics industry. The manufacturing and supply of the smart watches were impacted during the first two quarters of 2020. However, as manufacturing returned to operational levels by the beginning of the third quarter and high consumer demand was generated due to the work-from-home and fitness activities, the smart watch market experienced steady growth during the pandemic.

This test case scenario list does not ends here, it emerge from Smart city, smart waste management system, smart shopping etc, Although IoT is being used in all sectors of medical science, there is room for further improvement and research. The early identification of any health problem can help the patient to take necessary emergency measures, which can potentially save the patient's life.

6. Conclusions

In recent times, IoT is having a greater attraction and attention from researchers and developers all over the world. On a large scale, they have been working to extend the IoT in a possible way to benefit the society. But it can be possible only if we clear various issues and shortcomings from the technical approaches we use it now and improve its quality. It also provides us a huge amount of data. Hence the important thing is data analytics with accurate decisions which can be utilized to produce an advanced IoT system.

Internet of Things can help in this regard. IoT based health monitoring systems can monitor the patients in real-time and warn the patient of any abnormalities. The system monitored body temperature, pulse rate and room humidity and temperature using sensors. These sensor values are then sent to a medical server using wireless communication. With the values received the doctor then diagnose the disease and the state of health of the patient.

So the pandemic situation, on one end, it affected our lives, economy, and social things drastically but on the other end it enhanced the new technologies like IoT to emerge and few has becoming mandatory from optional criteria.

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