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# To improve the performance of IoT by Edge computing technology

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***Abstract:*** **The base of IoT is originated from Grid Computing. Grid computing from a network of machines which are connected via internet. These machines com-municate with each other and same time produce a large amount of data. This data is transmitted over the internet for further analysis and action to take,. In coming days as every device is connected huge data will be transferred, and hence will be traffic congestion on the internet. To avoid an edge computing machines are useful in order to reduce this data. And thus improve overall performance and systems can work fastly. In this paper, we discussed about the edge computing device which provides the solution over not only huge data generation, but also avoids network traffic congestions. We highlight the distinc-tive design concepts that we believe should be addressed in an IoT data management solution and discuss how they are approached by the proposed solutions. We finally propose an IoT framework which smartly distinguishes among the data generated and decides which data should be transmitted on the internet. In proposed solution presented in this paper introduces Edge technology in IoT devices.**

***Keywords:*** **Internet of Things, cut edge technology, data management, sensor networks**

## I. INTRODUCTION

Kevin Ashon first proposed an IoT system, where all ubiquitous devices take data from human and machine and transmit information between machine and man, after processing. Adapting a new technology brings some positive as well as negative things. IoT is enabling us to control our devices from a distance,

but same time, also it is generating more and more amount of data [8]. In future, it will be a challenge to handle this huge data. Also, all data cannot be eliminated as this data may contain the answers to some problem which may happen in future. However, making systems smart and efficient it can improve the performance. A similar model in the telecommunication industry in Indonesia has adapted and improved a lot.

## II. LITERATURE REVIEW

2.1 Internet of Things: the IoT concept is adopted by most of the processing units of leading firms. This technology can be invoked and can be utilized in any sector. As distances now a days are minimized by satellites, and we can to or see persons who are remote from us. Furthermore, we can say IoT has also reduced the distance between man and remote machines, and machines can communicate with each other as well as human being irrespective of distances. Huge Construction Projects like bridges, tunnels are becoming safer and we can ana-lyze the situation at another side of the tunnel. We can say these projects are becoming more and more smart due to edge computing devices.

Smart devices are now invoked into major projects of India and abroad. The Chennai-Nashri road tunnel. The country's smartest road tunnel cuts through the heart of the Himalayas and is 10.9 km long. It is the best example of how smart IoT devices can importantly reduce the loss in order to perform functions without any break due to device failure or natural calamity. [3]

The 9 km long two-lane, a bidirectional tunnel is Southeast Asia's first and longest state-of-the-art Intelligent Highway Tunnel. A trans-verse ventilation system ensures the safety of tunnel users while the Fully Integrated Tunnel Control System manages and automates power supply, communication, fire-fighting and traffic control systems. But still, any IoT based project has to consider lot many situations and the challenges that IoT brings. The performance of your infrastructure depends on following key factors.

- Large volume of data
- Devices with different functionality
- Network congestions
- Reliable networks and
- Increasing requirement of IP:V6

If we consider a smart IoT tunnel it will be responsible for smooth traffic of trains and cars through it. All systems are automated, like con-trolling the traffic, For this purpose internet should also be strong enough and reliable one. An IoT environment relies on real -time communi-cation between IP-enabled devices (the "things") to collect up-to-the-second operational data and provide tunnel operators the information they need to ensure all systems run smoothly and safely. It must be resilient and able to operate at all hours and in all temperatures and envi-ronments. This means having data switches that go beyond the ordinary, designed to operate with uninterrupted traffic and zero communica-tion errors in some of the harshest working environments. The SMART Tunnel in Kuala Lumpur won the UN Habitat Scroll of Honor Award for its innovative and unique management of storm water and peak hour traffic. So we say that IoT technology and smart sensors are providing the world's engineers with more efficient means of monitoring, maintaining, and protecting vital transportation

 

infrastructure. Even tunnels built nearly 100 years ago are now being equipped with IoT sensors. This provides the aging infrastructure with mass amounts of data in real time on how best to maintain and protect it for future use [3].

To increase the performance of IoT based devices, it is necessary that network must be strong reliable, and fast. These devices can work indi-vidually as well as in bulk. They keep themselves secure also. So use of edge device enable the devices to increase its performance.2

As given in white papers by Amazon web services it lets devices to form a group and this fleet of machines can reduce the cost and efforts of managing large IoT device deployments. Hence communication management of devices with each other on the internet, is easy compared to other protocol.[5]

In article by Wei Yu∗ , Fan Liang∗ , Xiaofei He∗†, William G. Hatcher∗ , Chao Lu∗ , Jie Lin† , and Xinyu Yang has discussed about details of operational system on it and also drawbacks about current operational systems on IoT, that they are not upto expectations of customers According to them, performance can be improved by coordinating all functional units. The chart of these units can be maintained to support IoT services. [6]. The IoT can be consisting of several components [9]: they are technical dashboard – helpdesk, technical dashboard – application layer, technical dashboard – connectivity layer, customer complaint or problem handling, infrastructure or facility, NOC as services, training, M2M customer, and technical dashboard – network/system legacy, which forms a complex system.

Still research is going on for introducing edge computing devices. As suggested in survey done by ei Yu∗, Fan Liang∗ , Xiaofei He∗†, Wil-liam G. Hatcher∗, Chao Lu∗, Jie Lin† , and Xinyu Yang† they mentioned the use of edge computing device on IoT based project, to improve the performance the avoid unwanted data generation[7] . However they have not given any specific method or specific way to achieve this.[9]

The factors that play an important role in IoT based system are

1)Object-to-Object Communication: Communication system consist of multiple objects which are connected to each other through wired or wireless system or a network. A common example is given in figure 1

Fig 1 IoT based simple block diagram for bulb

These device-to-device networks allow devices to exchange information in hybrid communication protocols, which combine device-to-device and particular communication protocol to achieve the QoS requirements. This model is commonly used in numerous applications, such as smart home systems or automatic control in electrical systems, which communicate with each other via sending small data packets and have relatively low data rate requirements. The typical IoT devices of this type are smart door locks, smart switches, and smart lights, among oth-ers, which also typically only exchange small data packets. From the users perspective, the problem of Machine-to-Machine communications is lack of compatibility, in which different devices from different manufacturers use different protocols. Using smart home devices as an example, ZWave protocol devices cannot communicate with the ZigBee protocol devices [30]. These compatible issues limit the users choice and experience. Machine-to-Cloud Communication: In a device-to-cloud communication model, IoT devices demand service from a cloud application service provider, or store data into cloud storage disk because of the limitations of the devices computational ability or storage space.

## III. CHALLENGES

One of major challenge is the network traffic. When there is communication of each device with other, the network traffic is certainly going to increase. Also, that alters the performance and speed at scale. Am I able to monitor new devices as they come online, regardless of the communication standard or source of performance metrics?

Another challenge is visibility of components in network every second.

All synchronization in hardware and software systems are well and handle all hybrid environment.

Also, it has to rely on the traditional network system.

## IV. PROPOSED SYSTEM

Our proposed system consists of three main components attached to any machine. The first component is sensors; the second one is edge computing device third their one is a cloud for storing and operating the device globally.

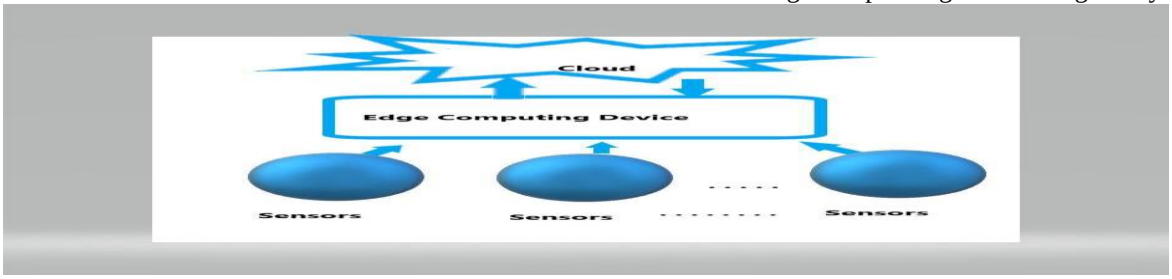


Fig 2: Outline of proposed system

First components is

1) Devices: Here devices means the actual machines to which edge computing device will be attached to the outer

 

layer of the device. The3se devices produce data as they perform or work. Readings of the parameters which are related to the device is send on the edge device. This is as shown in figure 3.

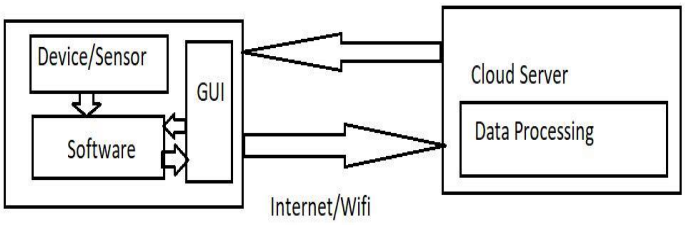


Fig 3: Device with edge computing

**2) Connectivity**

The devices are connected to each other through internet or wifi or Bluetooth etc.

**3) Data Processing**

Data that may for example temperature of surrounding is input for software programme where it is evaluated whether to send the data on the internet or is it an acceptable range? Or input like the image from the camera is a new object? Is it accepted or denied? Etc.

**4)User Interface**

This is output for the user. It can be a figure on display monitor, or an alert alarm or an SMS, or an email. These can also be stored so that user may like to see them when required.

Again if the user can control the working of the device via phone, then he must be careful to make or send a command to the device. If some wrong value sends by the user may result into the failure of the device. For example, sending certain value if the temperature for cold storage through the phone.

Also sometimes through software setting the values are taken automatically by referring some rule, set in software programme.

## V. ADVANTAGES

Due to the device at the edge it simplifies the simple inputs from the sensors and gives instructions to the device at the same place. Hence no transmission of unnecessary of data over the internet. It also as edge device is a small programmable device consisting of connectivity to sen-sors which also controls the operation of the device.Thus edge computing device has the ability to compute and control the device. Also, edgedevice decides which data is to be sent on the cloud, which is going to be useful etc. this not only increases the performance of the device but also reduces the internet traffic.

## VI. CONCLUSION

The proposed system suggest the way to improve the performance of IoT based device thus by introducing edge device technology. In future, we can improve the same one in a number of aspects.

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