



Significance of Cloud Computing to ensure Road Safety

Presented by---

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Outlines

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Introduction

- Cloud computing is a technology that uses the internet for storing and managing data on remote servers and then access data via the internet.

Example: Amazon AWS, Microsoft Azure, Google Cloud Services etc.

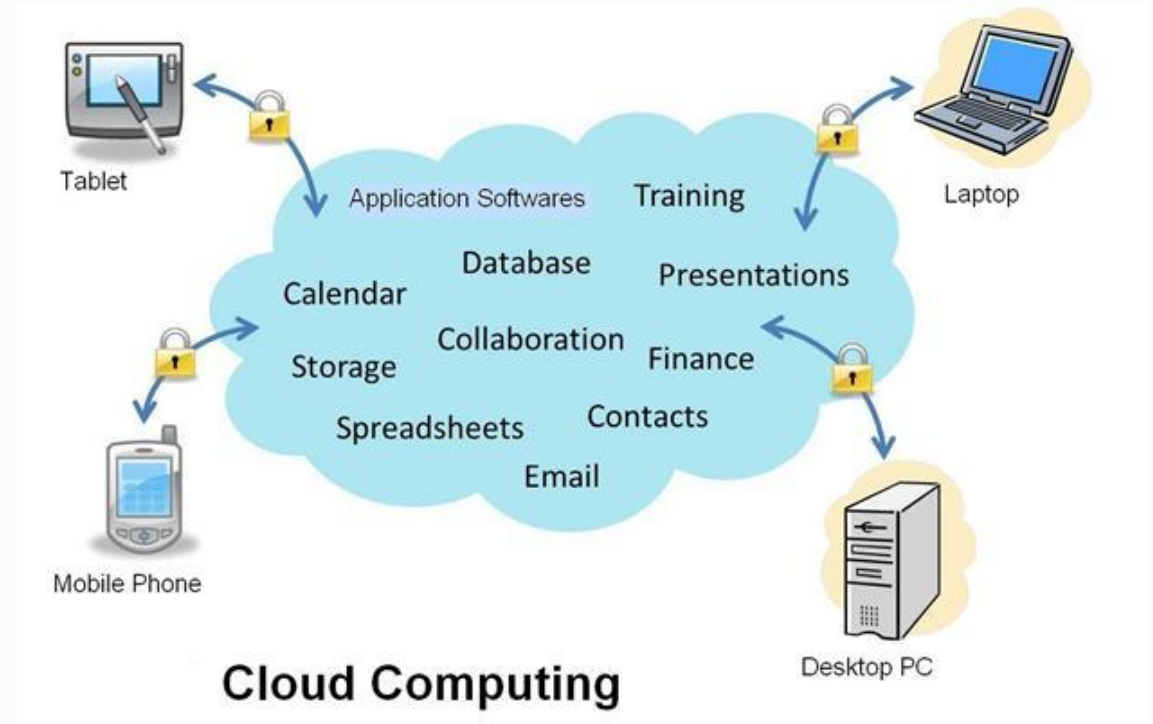
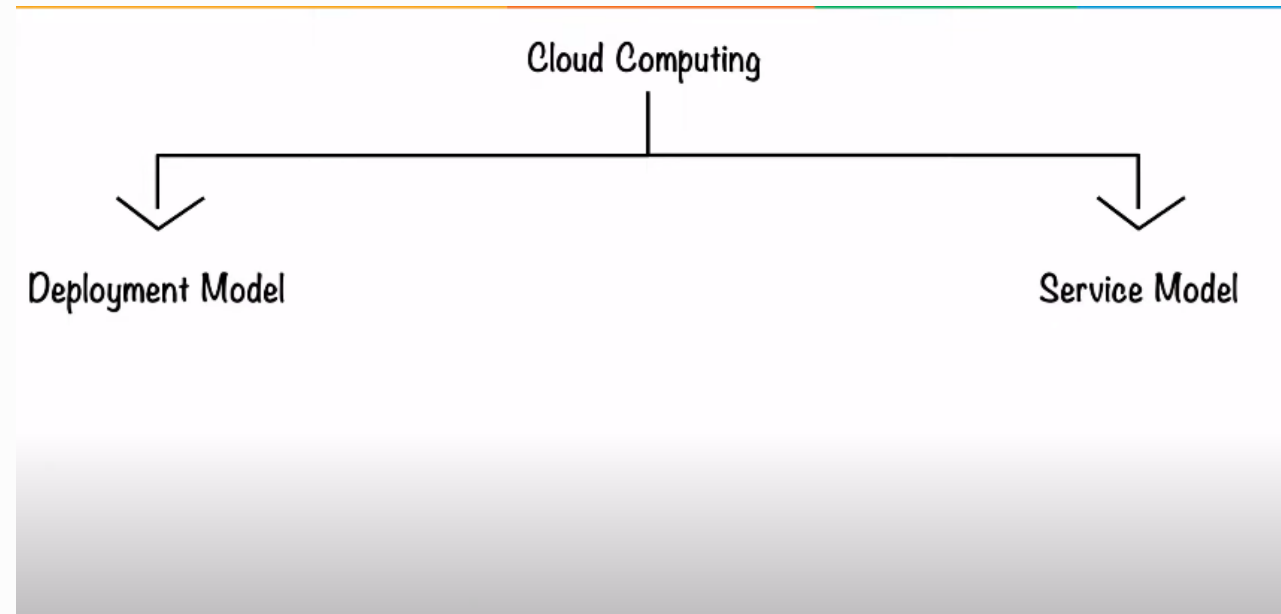


Fig: Cloud Computing

Cloud Computing

Cloud Computing has 2 types of model---

1. Deployment model
2. Service model



Cloud Computing (Cont'd)

Cloud computing can be categorized into 3 general types[1]---

❑ **Public Cloud** provides a shared platform that is accessible to the general public through an Internet connection.

Examples: Amazon Elastic Compute Cloud (EC2), Microsoft Azure, IBM's Blue Cloud, Sun Cloud, and Google Cloud.

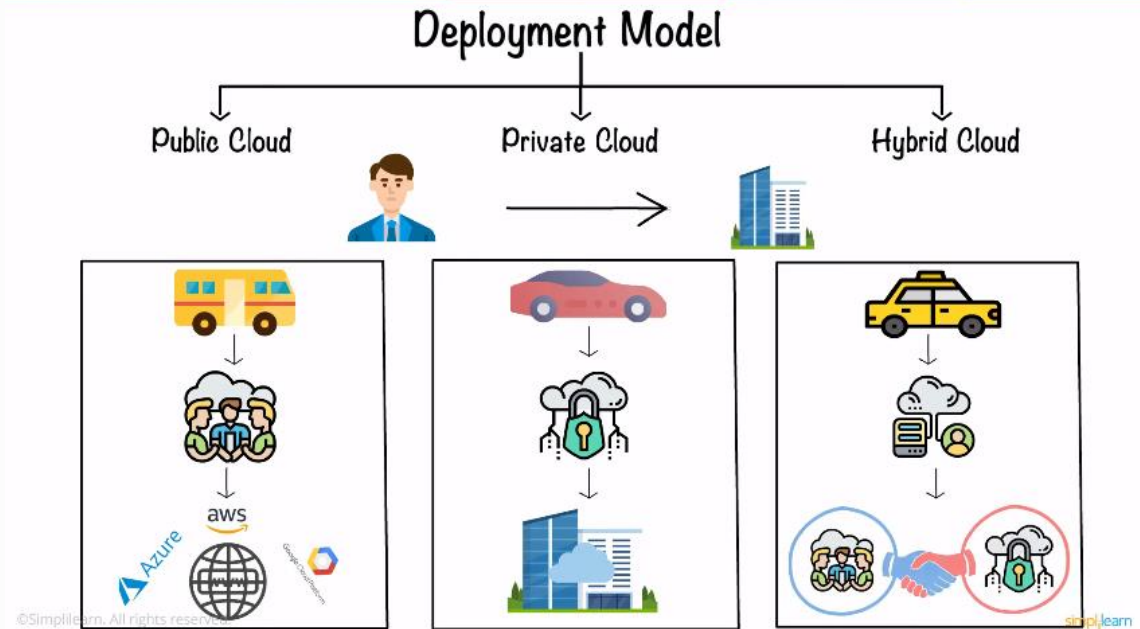


Fig: Deployment model (Cloud computing)

[1] <https://www.bmc.com/blogs/public-private-hybrid-cloud/>

Cloud Computing (Cont'd)

- ❑ **Private cloud** is cloud computing that is dedicated solely to one's organization. Private cloud provides computing services to a private internal network (within the organization) and selected users instead of the general public.

Examples: HP Data Centers, Microsoft, Elasta-private cloud, and Ubuntu

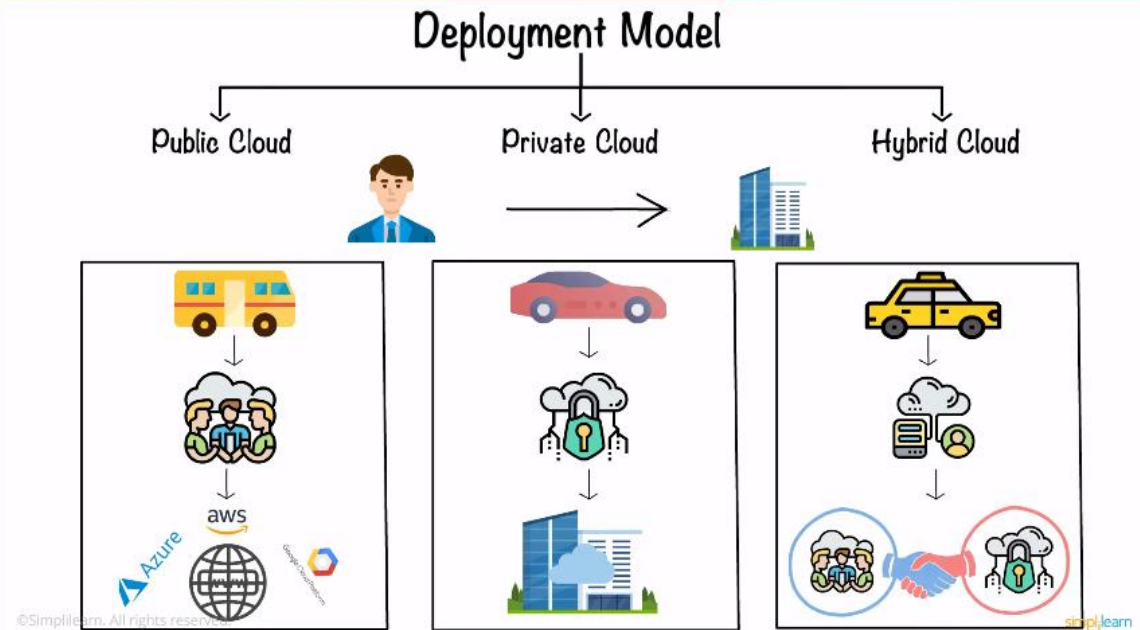


Fig: Deployment model (Cloud computing)

[1] <https://www.bmc.com/blogs/public-private-hybrid-cloud/>

Cloud Computing (Cont'd)

- ❑ **Hybrid cloud** is any environment that uses both public and private clouds.

The best hybrid cloud provider companies are **Amazon, Microsoft, Google, Cisco, and NetApp.**

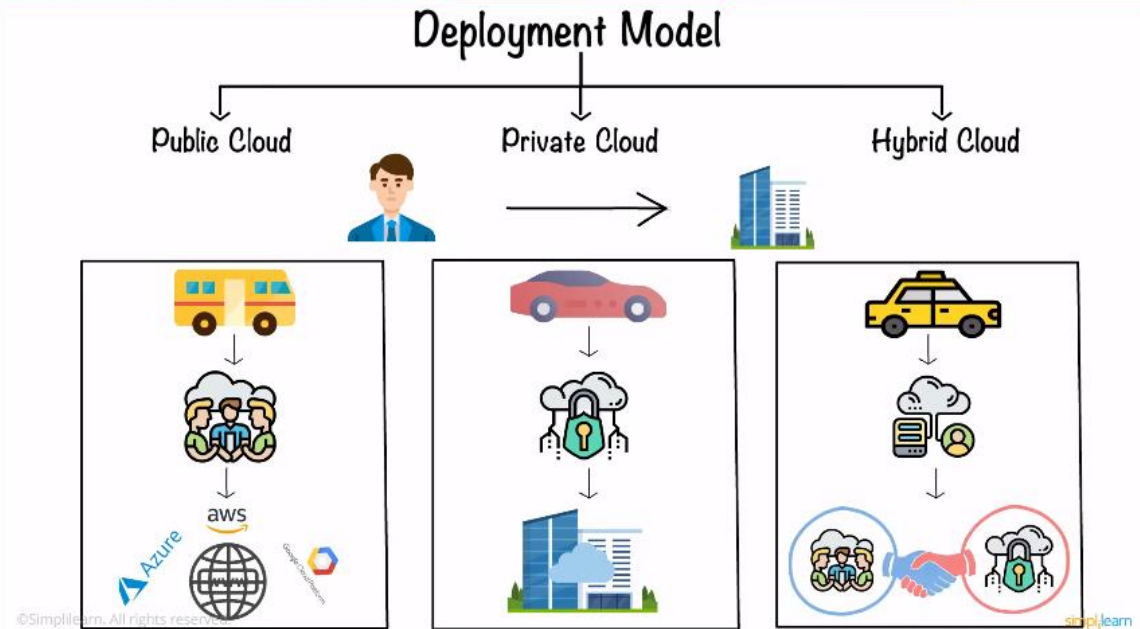


Fig: Deployment model (Cloud computing)

[1] <https://www.bmc.com/blogs/public-private-hybrid-cloud/>

Cloud Computing (Cont'd)

There are 3 main types of Cloud computing service model such as **SaaS, PaaS, IaaS**.

❑ **IaaS:** IaaS is the on-demand availability of almost infinitely scalable computing resources as services over the internet. It eliminates the need for enterprises to procure, configure, or manage infrastructure themselves, and they only pay for what they use. **cloud-based services, pay-as-you-go for services such as storage, networking, and virtualization.**

❑ **PaaS:** **hardware and software tools available** over the internet i.e. AWS Elastic Beanstalk, Heroku, OpenShift, Apache Stratos, Magento Commerce Cloud.

❑ **SaaS:** **software that's available** via a third-party over the internet i.e. Google Apps, Salesforce, Dropbox,

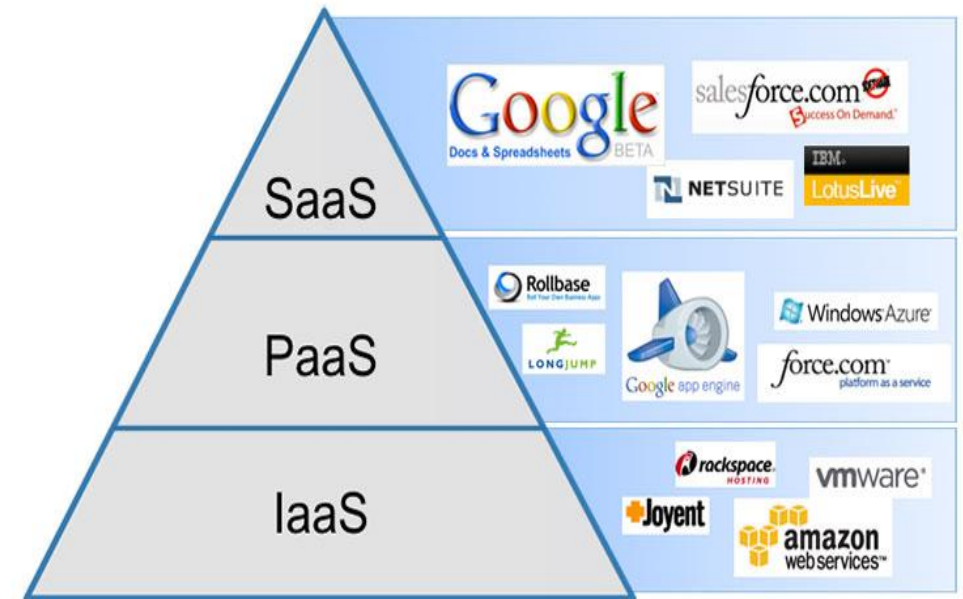


Fig: Cloud computing services

Cloud Computing (Cont'd)

❑ **On-premise:** software that's installed in the same building as your business.

1. Installation --- **Time-consuming**
2. Availability --- **When bought and deployed**
3. Investment --- **High**
4. Business Risks --- **High**

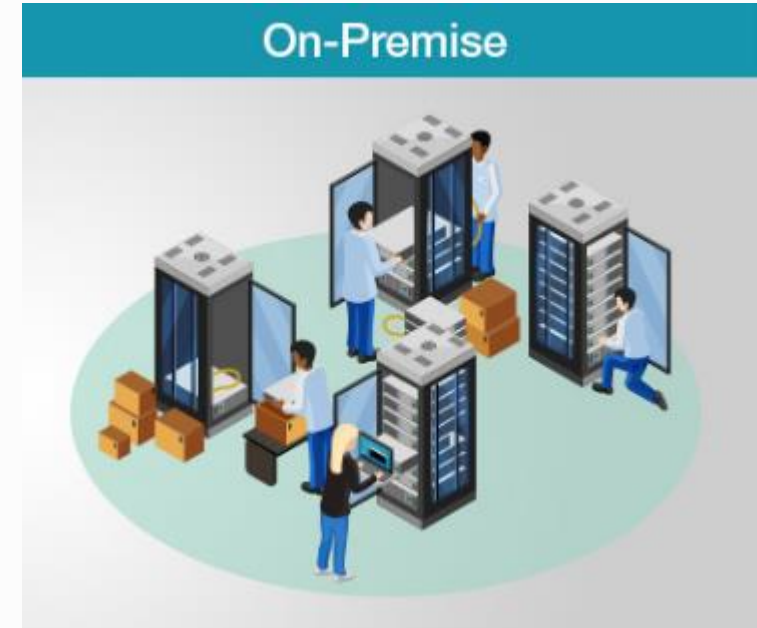
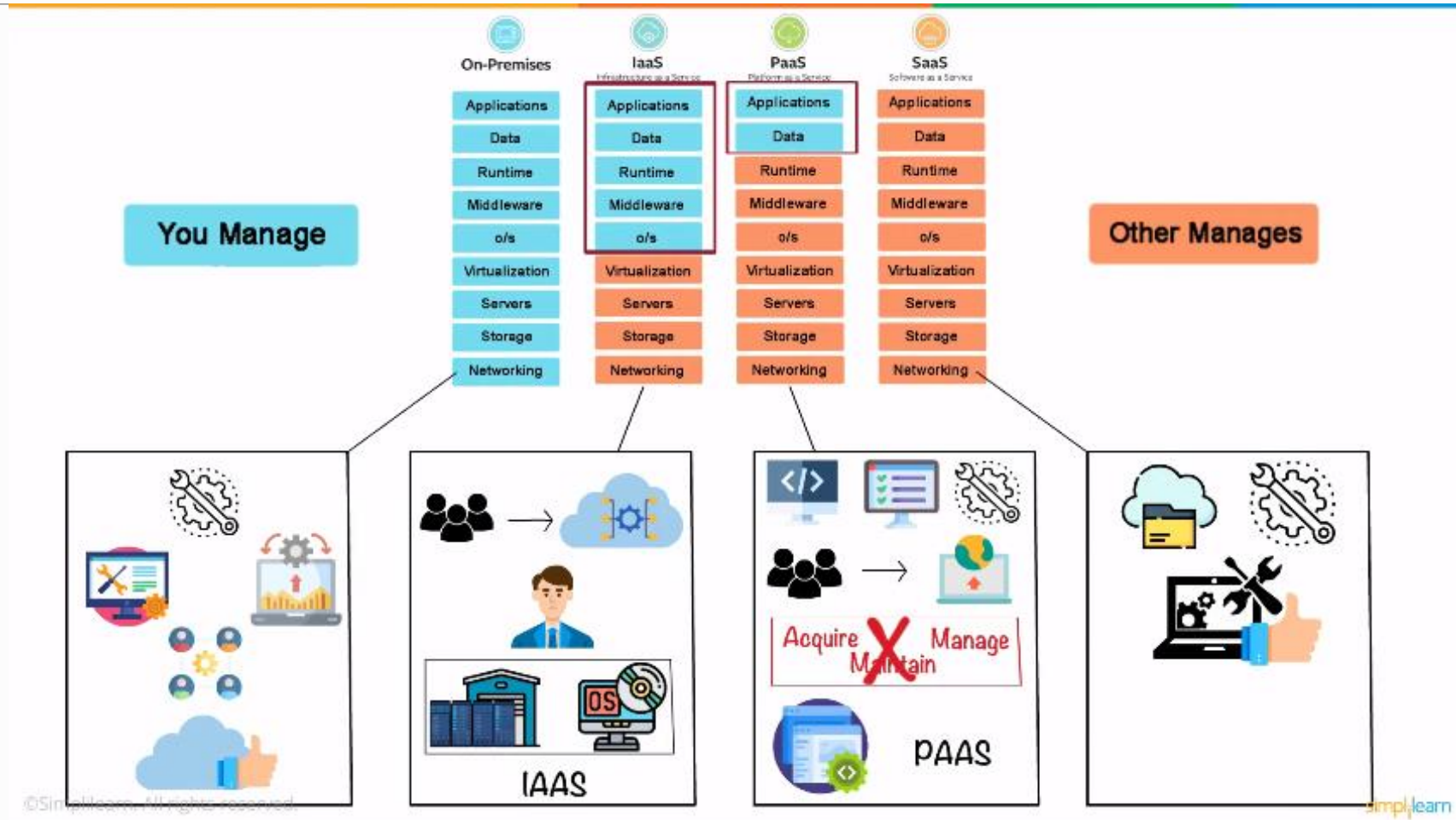


Fig: On-Premise model

Cloud Computing (Cont'd)



Causes of Road Accident

1. Violations of Traffic Rules
2. Reckless driving
3. Over speeding



Fig: Violation of traffic rule



Fig: Reckless driving



Fig: Over speeding

Causes of Road Accident (Cont'd)

- 4. Illegal & Dangerous competition
- 5. Hazardous Road
- 6. Lacking of vehicle fitness



Fig: Hazardous road



Fig: Illegal & Dangerous competition

Causes of Road Accident (Cont'd)

- 7. Overloading
- 8. Overtaking
- 9. Driving Long time without any break
- 10. Frequent change of lanes
- 11. Bad weather condition
- Etc.



Fig: Overloading



Fig: Driving Long time

Related Works

1. Intelligent Accident Management System using IoT and Cloud Computing (2016)
2. IoT based real time traffic control using cloud computing (2018)
3. AVRA BANGLADESH Collection, Analysis & Visualization of Road Accident Data in Bangladesh (2013)
4. Mobile Cloud System for Road Safety (2018)
5. PREVENTING Road Accident using Cloud Computing (2020)

Keywords & Terms

- ❑ Cloud Computing
- ❑ Internet of Things (IoT)
- ❑ Sensors
- ❑ Wireless Sensor Network
- ❑ Road Safety
- ❑ Web Services
- ❑ GPS
- ❑ GSM
- ❑ Accident Monitoring and Detection
- ❑ Image processing
- ❑ Object recognition

Intelligent Accident Management System using IoT and Cloud Computing (2016) [1]

Introductions:

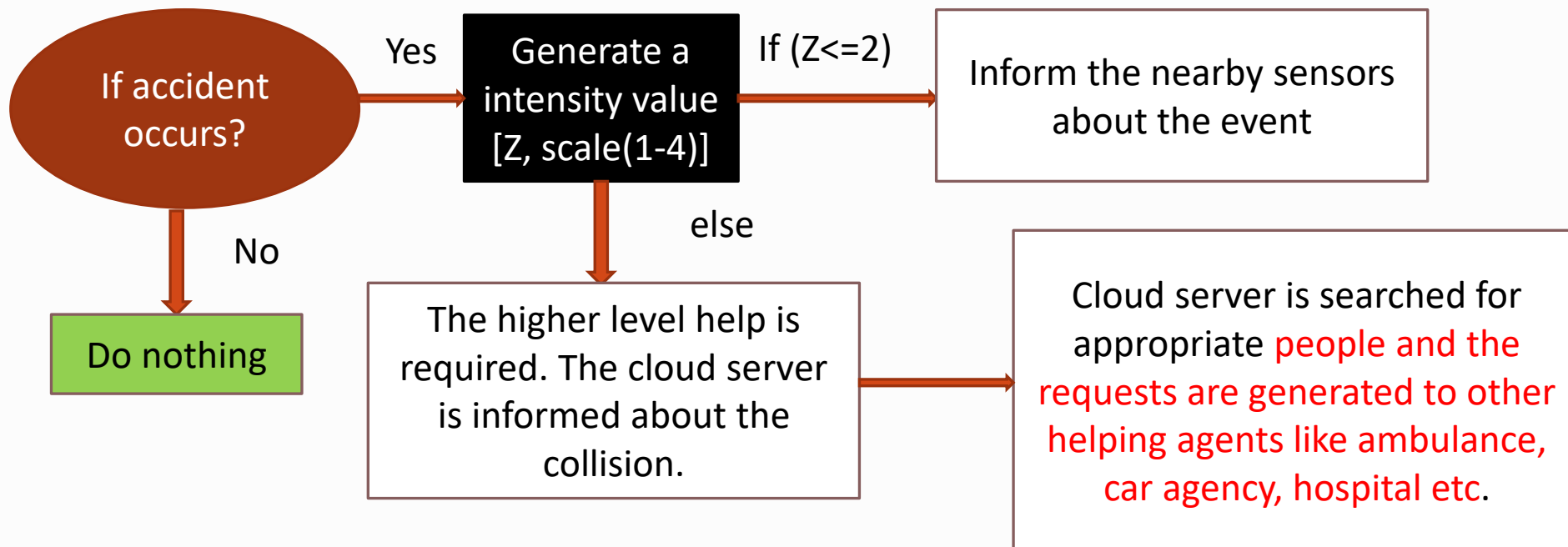
- ❑ implemented the concept of IoT, with crash sensors.
- ❑ sensors will help the vehicles which have collided or are in need of any help. In case of accident, there will be some collision in the vehicle which will be sensed by the sensors.
- ❑ The crash sensors will measure and report the intensity of collision based on certain parameters and operations related to the automotive design of the vehicle.

Motivation:

Presently, the vehicles are coming with a built in accident tracking system but they are not very popular among the public. Major disadvantages of such systems comprises of factors like non-portability, high cost, limited options, false delivery etc.

Intelligent Accident Management System using IoT and Cloud Computing (2016) [1] (Cont'd)

Proposed Methodology:



Intelligent Accident Management System using IoT and Cloud Computing (2016) [1] (Cont'd)

Proposed Methodology:

The model presented here involves a collective integration of different types of **sensors as well as microcontroller** units which acknowledge emergency calling system. This technology includes the benefits of GSM modem used as automatic emergency calling system and **GPS sensor for location calling. GSM modem requires a SIM card and works with a GSM wireless network.** Accelerometer sensors and vibration sensors are collaborated.

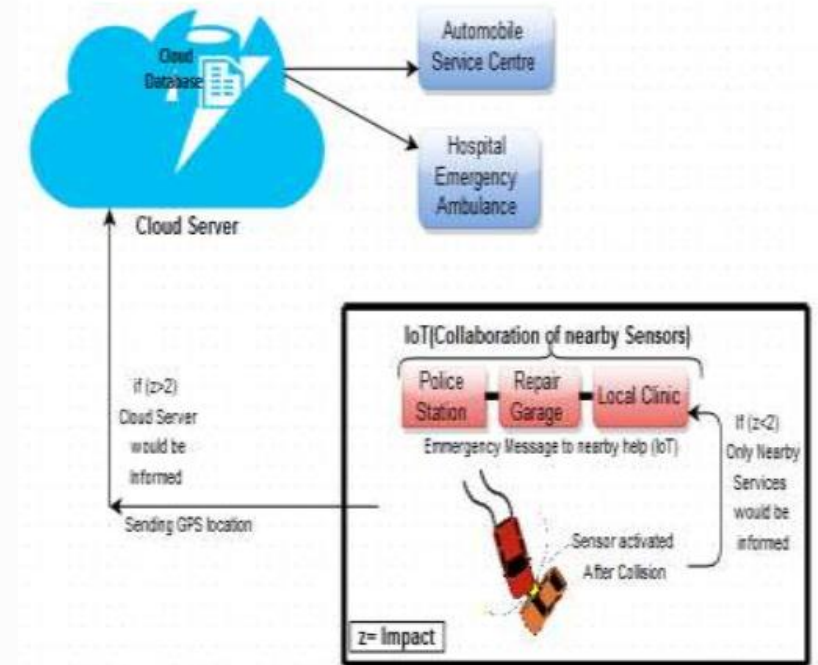


Figure 2: Diagrammatic representation of the working of the system.

Intelligent Accident Management System using IoT and Cloud Computing (2016) [1] (Cont'd)

Result analysis:

The **estimate of g-forces measured by the accelerometer sensors** can be used as a reference to be rated on a scale in order to provide an idea about the depth of the accident.

TABLE I. ACCIDENT DETECTION FOR VARYING VALUES OF G-FORCES

Accident severity	Value of z	Approximate value of G range
Safe level	1	0-4 g
Slight level	2	4-20 g
Moderate level	3	20-40 g
Critical level	4	40+ g

Conclusion:

With the help of **IoT, Cloud and the Wireless Sensor Network**. Given the idea that could be taken into study using **just the GSM modem and required sensors** to globally inter-connect with the IoT and the cloud because with the use of cloud computing, the higher impact **i.e. the emergency situation could be monitored by the cloud server, saving the precious lives.**

IoT based real time traffic control using cloud computing (2018) [2]

Introduction:

Increasing number of vehicles in the road has given rise to the traffic jam. This effects the operation of ambulance. To avoid the traffic jam for the ambulance, a new idea is proposed here with **image processing, CCTV camera monitoring, sound detection & Cloud-Computing**.

Motivation:

Due to this there exists a lot of traffic on road which will affect the daily life of an individual. Lot of time and effort is wasted by spending time on road. The patients struck in the traffic will have to suffer a lot and this may threat their life too.



Fig: Ambulance waiting in Traffic Jam

IoT based real time traffic control using cloud computing (2018) [2] (Cont'd)

Proposed Methodology:

1. **CCTV and an microphone**, which continuously monitors the traffic and sends the information to the processor for further processing.
2. **The image processing** algorithms are implemented to detect the presence of the ambulance and **audio processing** is done to detect the siren. **Once when the vehicle is detected, necessary signal is transmitted to the next station through internet to indicate the arrival of the ambulance.**
3. **The announcement of the ambulance** arrival is notified by the speaker and all the vehicles are insisted to make way for the ambulance.

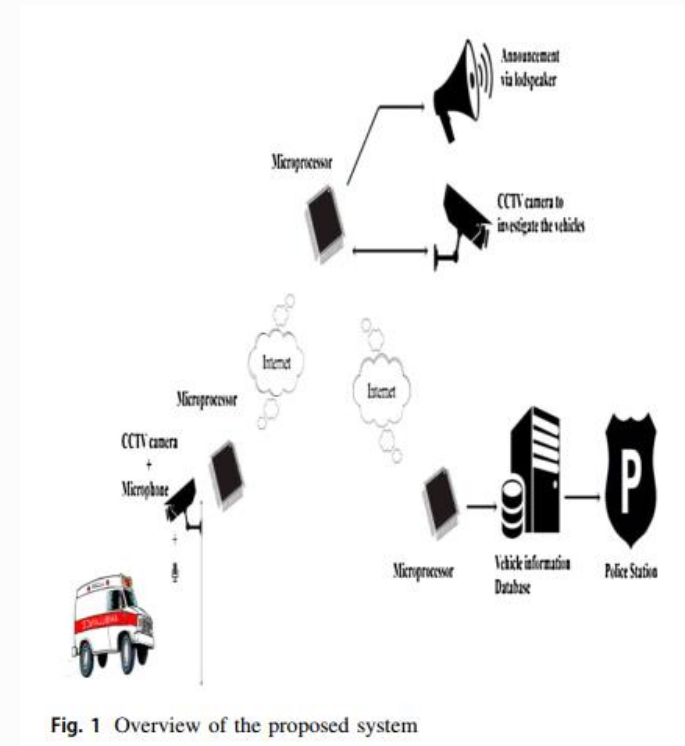


Fig. 1 Overview of the proposed system

IoT based real time traffic control using cloud computing (2018) [2] (Cont'd)

Proposed Methodology:

4. A camera is installed to keep track of a vehicle which does not follow the announcement and image is captured and number plate is extracted and owner information is passed on the nearest police station through internet to take further actions.
5. Minimum of one parameter is sufficient to identify the vehicle, that is the image of the vehicle. By this we can differentiate between the ambulance and other vehicles.

Implementation:

1. Open source Matlab code is modified to use for image processing & audio processing to detect Ambulances & number plates and other vehicles.
2. The data transfer between the two stations is demonstrated by using two computers which communicate through internet using TCP/IP.
3. Cloud computing is used to store and control the information data and for further processing.

IoT based real time traffic control using cloud computing (2018) [2] (Cont'd)

Detection:



Fig: Ambulance detection

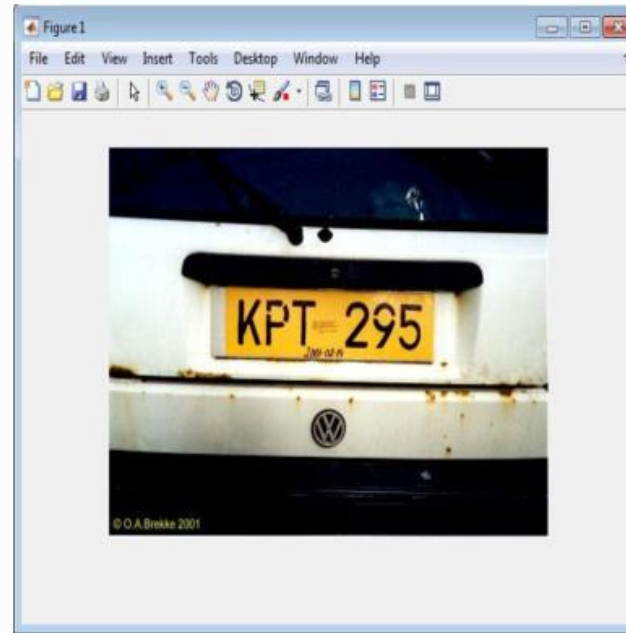


Fig: Capture number plate

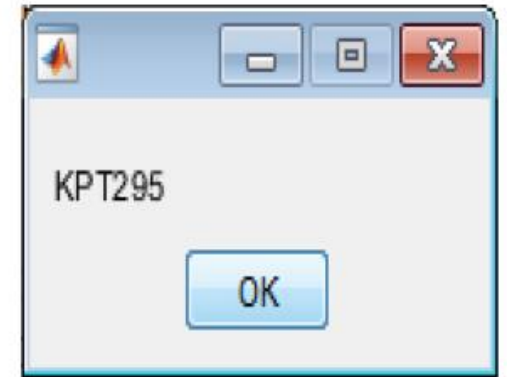


Fig. 13 Detected number of the vehicle

Fig: Detect vehicle number

IoT based real time traffic control using cloud computing (2018) [2] (Cont'd)

Conclusion:

In this paper they showed a model to provide a path for ambulance in a emergency situation and identify the vehicles that violates the announcement thus, it is possible to control the traffic system automatically and efficiently.

Future scope include implementing the verified scripts on to the digital signal processors and deploy in the real traffic environment.

Findings

1. Sensors along with Cloud-Computing can be used to detect and response to an vehicle collision. [1]

Thus, we can solve the situation

- a) Reckless driving
- b) Over speeding
- c) Illegal & dangerous competition
- d) Overloading
- e) Frequent change of lane
- f) Bad weather condition
- g) Collision detection and response accordingly



Findings

2. CCTV camera monitoring system, image processing, audio processing with Cloud-Computing can be used to solve [2]---

- a) Violation of Traffic Rules
- b) Illegal & dangerous competition
- c) Overtaking recklessly
- d) Long time driving without break



Conclusion

Thus, we can conclude that to ensure Road Safety we need to deploy a system that uses **Cloud Computing** along with various **sensors, image processing, audio processing & image acquisition technique**.

Here, Cloud Computing can be used to enable and connect the devices to respond in real-time for the required action and image & the audio processing part also can be done in a cloud model easily where the cloud computing model could provide us---

1. Unlimited storage for images & audios to store
2. Deep learning & Machine learning tools, API's for the processing purpose
3. Database to keep tracking the devices information and actions if anything happens

Thank you