



# Wall For All

Department of Computer Applications  
Chitkara University Institute of Engineering & Technology  
Chitkara University, Punjab

# Contents

A Survey on Software Defined Networking: Open Flow Protocol & Controllers...	1
WBAN: Solution to Battery Life.....	3
If winter comes, can spring be far behind.....	6
An IoT System for Discarded material.....	8
Empire of IoT: Internet of Things.....	10
Cloud Computing- The Civilization of Art and Sciences.....	13
A Growing Reality: The Augmentation Reality.....	16

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Dear Readers,

The nostalgic feeling that one experiences while sifting through the dusty old pages of the college magazine cannot be expressed in words. However, very few of us have retained those copies, and most of those precious articles that we wrote during those golden days with enthusiasm are lost forever. With the advent of e-books and other online media, the days of paper-bound college magazines are gone, and the digital platform has paved way to allow retention of such publications without much effort.

*Wall-for-All*, the e-Magazine published by the Department of Computer Applications, is one such effort that was started with an intent to provide a chance to all students and faculty members to share their thoughts and knowledge, and hone their skills in creative writing.

I am happy to see the enthusiasm of eminent members of the department to contribute to *Wall for All*. This shows the positive and creative energy of the contributors. However, it would be really wonderful if we can see the articles contributed by more students in the next editions, for this e-Magazine is intended to be a writing pad for each member of the department.

I proudly present the current edition of *Wall for All*.

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# A Survey on Software Defined Networking: Open Flow Protocol and Controllers

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**Abstract:** Nowadays Internet is leading to the development of the society, where everything is connected and is accessible from everywhere. The concept of SDN (Software Defined Networking) has become the promising solutions for the internet's future by the huge change to the traditional networks with the separation of control plane from the data plane. SDN has been considered as the latest technology that came to overcome the drawbacks of traditional networks. After surveying through the papers of SDN, we have highlighted the various latest research aspects. Open Flow facilitates the network control by the means of pluggable networks and then it becomes easier to create new control functions. In this paper, we dwelled on the building blocks (three layers of SDN) which comprises of Infrastructure Layer, Control Layer and Application Layer, and stepped forward towards the Controllers in SDN that includes POX, Trema, RYU, Open Daylight and Floodlight and also discussed the overview of Open flow Protocol, and lastly, we focused on the tools required in SDN.

**Keywords:** Software Defined Networking (SDN), Traditional networks, Data Plane, Northbound API, Control Plane, Southbound API, Application Plane, SDN Controllers, Open Flow, Mininet.

## Introduction and Background

With the increasing services of cloud have undertaken the researchers to think again on the today's architecture of network [1,2]. In traditional networks, many devices of the network have the routers and switches that comprises of forwarding plane, control plane and application plane and these are embedded into the network device [3]. In SDN, control plane (how the packets are forwarded and where to forward the packets) and data plane (handles the packet with respect to the rules that are defined in the control plane) are decoupled from each other, by decoupling it has changed the resources of the network into programmable, automation and network control to make it more scalable and flexible enough.

## Architecture of Software Defined Networking

The main component of SDN layer is Control Layer as controller is embedded into it. It works like a brain of the network as it coordinates and controls the flow of traffic by the use of flow tables.

In SDN Architecture we have defined the terms Data (Infrastructure), Control and Application Planes. The lower most layer is known as Data Plane which consists of many network elements, which has Datapath's of SDN

that have explored the capabilities of Control Data Plane Interface (CDPI) Agent. The middle most layer is known as Control Plane which is also coined as SDN Controller, this converts the requirements and explores the lower level control over the data paths when giving the information to the applications of SDN [1]. The top most layer is known as Application Plane which interacts for their requirements with Northbound Interface (NBI) Drivers.

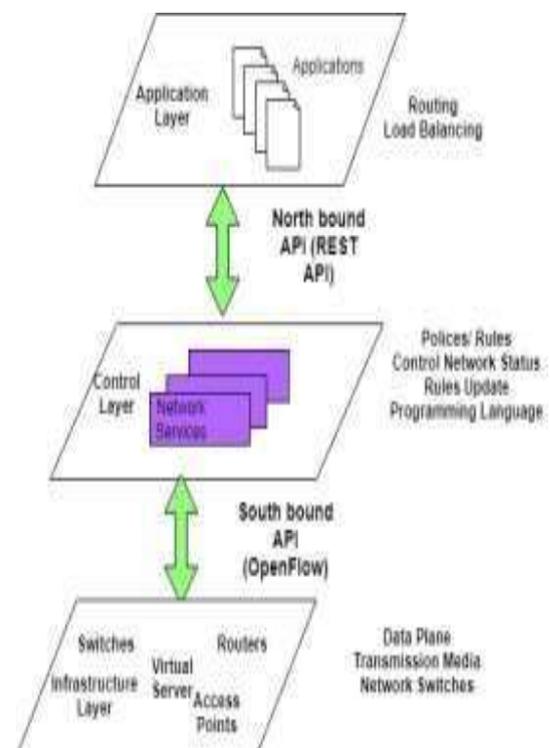


Figure 1: Architecture of software defined networking

## SDN Controllers

Controllers in SDN is coined as the "brain" of the controller network and it is considered as the NOS (Network Operating System). It coordinates and manages the flow of control to the routers or switches below (via South bound Interfaces) and the business logic applications above (via North bound Interface) to under vent the intelligent networks [8]. There are various variety of controllers available in SDN: POX, Ryu, Trema, Open Daylight, Floodlight and there are various other controllers other than the listed above includes Beacon, NOX, Maestro, Flow Visor, RouteFlow and many others.

Table 1: SDN controller

BASICS	POX	RYU	OPENFLOW	Openflow also	Flowbased
Language Supported	Python	Python and Message passing reference	Ruby and C	Java	Java and any language that uses REST API
Platform Supported	Linux, Mac OS, Windows	Linux	Linux only	Linux	Linux, Mac OS, Windows
Productivity	Medium	Medium	High	Medium	Medium
Developer	Nicira	NTT, OSRG group	NEC	Multiple Contributors	Big Switch
OpenFlow Version	1.0	1.0, 1.2, 1.3, 1.4		1.0, 1.3	1.0
Used for	Open source platform SDN controller	Used to give logically centralized control and API's of this develops new control	Used to create open flow controllers using C and Ruby programming		It is based on the implementation of Beacon that works with OVSDB.

### Protocol used in Software Defined Networking Open Flow

Open flow is the most famous and popular protocol of SDN and it separates the control logic from forwarding data. It was developed by the Stanford University and it is now transformed by the Open Network Foundation (ONF). It is most widely used in larger networks like GENI and JGN-X. It is the intermediate between dumb device and controllers in SDN, and these dumb devices are known as forwarding data and controllers are known as control logic [5].

Table 2: Open flow versions

Version	Year	Features	Cause	Cases
1.0-1.1	1.0 released in December 2009	Multiple tables, Group tables, Full VLAN support.	Avoid explosion in the flow entries, enables the actions applying to the group of flows.	Load Balancing, Link failure etc.
1.1-1.2	1.1 released in February 2011	Multiple Controllers	Load Balancing and scalability.	Controller Load Balancing.
1.2-1.3	1.2 released in December 2011	Table miss entry, meter table.	Provides the flexibility and add Quality of Service (QoS).	
1.3-1.4	1.3 is the most deployed version	Synchronization of table.	Increase the scalability, increases the synchronization of switch.	Configuration of various switches.
1.4-1.5	1.4 released in October 2013	Egress table.	Increases the synchronization of switches, processing should be completed on the output port.	

### Software Defined Networking using Mininet

Mininet is an emulator that works over many networks having limited number of resources. It is an emulator in which we can create the topologies of very small size to large. This emulator is used to run the gathering of end-hosts, switches, routers and maintain a link by using the Linux kernel. To work with mininet, we require hosts, switches and wires/cables to have a connection between controllers and switches [7, 8].

### Conclusion

Traditional networks are quite difficult, and they are vendor-specific. The main reason for vendor-specific is their combination of control logic and forwarding data, networking devices are tightly coupled to line products and versions. Every product line has its own configuration and interfaces. This latest and most enhancing technology is SDN and it is to be considered as one of the most promising solutions to meet and cater the demands.

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## WBAN: Solution to Battery Life

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### Introduction

The Body Area Network is a wireless network of miniature wearable devices which may be embedded inside the body, implanted or may be carried in pockets. Its development started around 1995 around the idea of wireless personal area network for communication near the human body but later on it was referred as BAN (Body Area Network). BAN is represented by IEEE 802.15.6 standard. These networks around the human body aim to augment the power to monitor and to react to problems discovered with these observations. The technology revolves around wireless communication protocols that allow for low powered sensors to communicate with one another and transmit data to local base station or remote places like hospitals. BANs are useful in the medical industry. BAN technology is still in its infancy and its adoption is still not completely possible as researchers are still working on some problems related to sensor design, constraints, security, interoperability, battery life etc. In this paper we are presenting possible solutions to the problem of battery life which may revolutionize the whole idea. We first give an introduction to what Body Area Network is and its history. BAN is first introduced in this paper and then the research issue of battery life is discussed.

Constant evolution is taking place in the field of computer science to process larger data sets and maintain higher levels of connectivity. The catalyst to innovation in healthcare is the increase in average lifespan and health cost in many developed nations. These factors along with the advances in miniaturization of electronic devices and wireless communication technologies have led to the development of Wireless Body Area Networks (WBANs). This biosensor based network is defined formally as a system of sensors in close proximity that forms a network around a person's body for the benefit of the user. An informal definition was also given by Jo Twist from BBC in her article, where she has endeavored to define technology personally as follows:

*Inanimate objects will start to interact with us: we will be surrounded - on.*

*streets, in homes, in appliances, on our bodies and possibly in our heads -*

*by things that "think".*

*Forget local area networks - these will be body area networks. [3]*

These are created so that they can be carried around in pockets, worn or implanted.

### WBAN Architecture

A WBAN comprises of in and on-body nodes. These nodes are also known by the name inside and outside the body nodes. These nodes are used to detect the sensitivity of a human body with the help of medical sensors. Basically, it is a special purpose network of sensors designed to detect and diagnose the human body with the help of various sensors for medical reasons and disease detection. These nodes are responsible for continuously monitoring a patient's necessary bio-medical information for detection, diagnosis and prescription. A common application of on-body nodes is witnessed in the field of multimedia, gaming and many more.

The topology majorly used for the implementation of this technique of sensor based network is star topology where the nodes are connected to a central coordinator which is also called central node. Depending on the application for this technique is applied, several nodes are sometimes combined to process and transfer data to a central node. Apart from medical and health diagnosis, this emerging technology has many applications in distinct areas like sports, multimedia, and has contributed sufficiently to the trends in wearable technology. Its myriad applications are contributing to build a new line of growth in the graph depicting revolutionary technologies and trends.

Moreover, the type of privileges and facilities it is offering to the patients in medical/health care centers is really interesting and appreciable. For instance, there is a patient who is equipped with this wireless BAN. WBAN will be consisting of several sensors that will constantly measure the biological functions of the patient's body. These biological checks may be simple measurable factors like temperature, blood pressure to complex body diagnosis functions like electrocardiogram, popularly known as ECG, respiration, and many more. The highlight of this technology is that the patient to be diagnosed is not bound to stay in bed till the complete diagnosis is completed. He/she is allowed to move freely in the room where the diagnosis is conducted. Eventually he/she can also be allowed to leave the hospital for a while, thus, contributing to the quality of life of the patients and also helps in deducting the hospitals costs and expense. One of the unexplored dimension involved in this entire process is that the data will be collected over a longer period of time and this collected data can be utilized well for a predictive purposes using several machine learning algorithms to predict the future diseases that are likely to affect the patient or his/her offsprings. The information collected about the medical history of any patient can be a great boon to the research and medical area. Also, it can be helpful for more accurate and faster diagnosis.

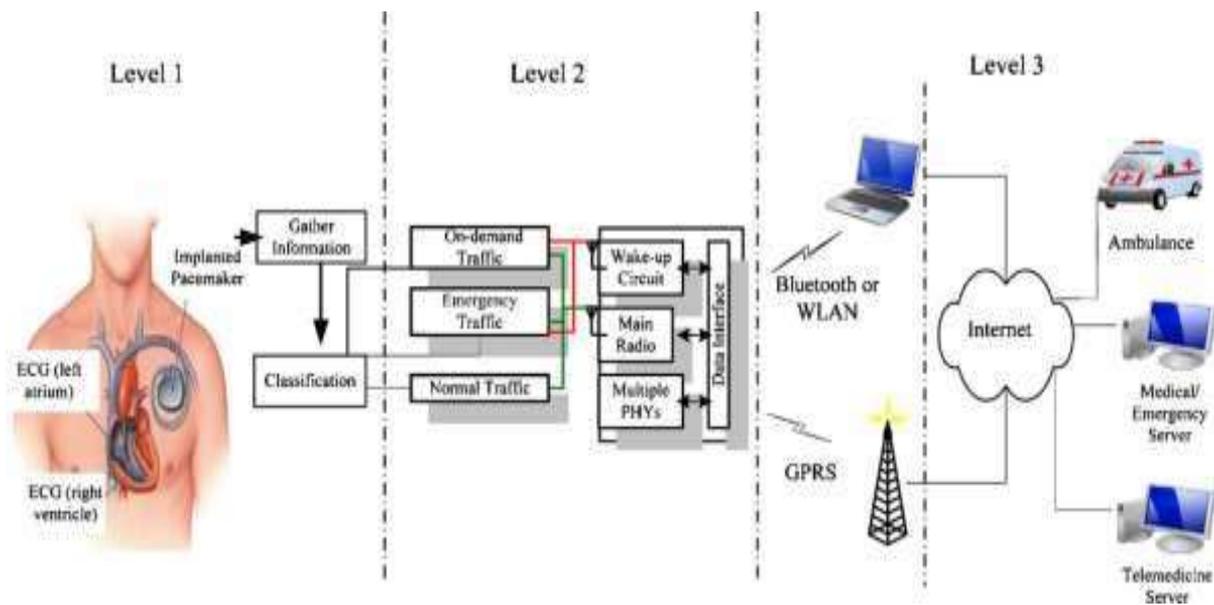


Figure 1: WBAN architecture for its several applications [4]

### Problems in WBAN

Development of WBAN devices is facing various problems in terms of energy efficiency, scalability, privacy issues, security issues, sensor deployment. Since features of wireless network are open the data can be manipulated. The radio communication can be intercepted by attackers. These devices have little battery capacity thus leading to constant need of charging. Some WBAN devices are implanted in our body thus are inaccessible to replace thus providing fewer sources for power. There is a chance of data loss which may require additional measures to ensure quality of service and real time data delivery. Also data rate is heterogeneous. There is no existing communication standard which fully meets requirements of WBAN. The coverage range of sensors in WBAN devices is designed to be within the human body with a small number of nodes used to monitor the vital signs of the patient therefore WBANs are facing research problems like power consumption. Also such devices are designed for event based monitoring; therefore, they are idle for most of the time leading to power consumption without much work being done.

### Proposed Solution to the Problem of Battery Life

#### Harnessing kinetic energy from the involuntary actions of our body

WBAN device can be fitted with a mechanism which can convert kinetic energy of blood flowing in our veins into electrical energy. We can fit two needles piercing into the veins, in the device, one for letting the blood in the casing which consists of a small rotor and other for letting the blood out and back into the veins. The flow of blood in case will make the wheel of the rotor rotate thus producing electric current. We can also make a device which can be placed on the nose bridge between the eyebrows which converts the blinking of eyes into electrical energy using a micro energy cell.

#### Working-To convert kinetic energy to electrical energy.

The amount of kinetic energy that passes through the rotor can be calculated using the formula

$$K.E. = \frac{1}{2}(m.v)^2$$

Where  $m$ =mass and  $v$ =velocity.

The mass is the weight of the blood that passes through the rotor per second. This can be obtained by calculating the blade's sweep area and multiplying that quantity by the distance the blood travelled in one second. The volume is then multiplied by the weight of the blood per cubic unit to get the mass. The equation for the kinetic energy passing through the rotor can be written:

$$K.E. = \frac{1}{2}ar \cdot d \cdot vel^3 \quad (ar = \text{area swept, } d = \text{density/cu.m., } vel = \text{velocity}).$$

Take everything in kilograms and meters and the kinetic energy produced is in joules/second, which is the same as watts.

### Fully Transparent Solar Cell

Glass of WBAN device can be replaced by a fully transparent solar cell. This device is basically a miniature version of a Solar panel, which consists of salts which are organic in nature. These organic salts on reaction with infrared light is capable of producing electricity. Note that this infrared light is not visible to human eyes. This device is certainly different when compared with the rest of the solar cells, as these cells have the capability and power that can be layered on the top of clear and transparent glass. Moreover, it performs this without weakening the sunlight power to pass through it. Also the energy obtained from Sun is virtually free. It consists of a material known as transparent luminescent solar concentrator (TLSC). It consists of a salt which absorbs certain wavelengths of ultraviolet and infrared light and emit them in form of some another infrared light to edges where thin films of photovoltaic cells convert them in to electrical energy hence providing one more source of energy to the device.

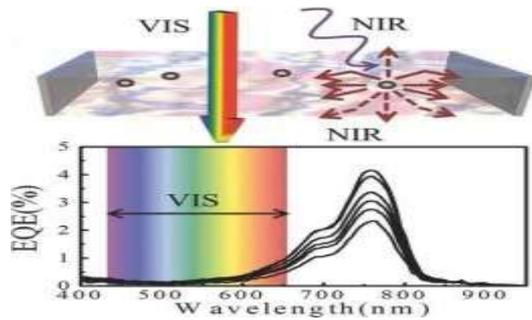


Figure 2: Transparent solar panel

Our future work would be a continuation to the work we have represented in this paper. We have planned to represent few more solutions to the problem of battery life. As we have stated the natural means, like solar energy and shown how to utilize them. Likewise, we plan to use other means like air, sound etc. to generate electricity or solution to the battery life of device

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### Call for Articles

At Chitkara University, the endeavor has always been to hone the skills of learners. Keeping in line with this tradition, the Department of Computer Applications, Chitkara University, Punjab had come up with an online magazine titled **Wall for All**. This magazine was proposed to provide a platform to the budding learners to share their knowledge and general information pertaining to the computing field. **Wall for All** is available for free download in PDF format from CA departmental website: [ca.chitkara.edu.in](http://ca.chitkara.edu.in).

The students and faculty members are invited to be a part of this venture and contribute their articles to the magazine. The students may forward the articles through their respective mentors while faculty members may send the same directly to the editors of **Wall for All**.

## If Winter Comes, Can Spring be far behind?

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This is the last line of the poem "Ode to the West Wind" by famous English Romantic poet P.B. Shelley. In this line the poet depicts the terrible impact of the west wind on various spheres. Being a literature lover this has been a very powerful line on my mind especially when I am in a difficult situation and I feel helpless about the situation, it always encouraged me to get up again and face the situation as it is not permanent, in fact no situation is permanent. There is always happiness after sorrow and after happiness a sad situation, because life is a cycle of sorrows and happiness, it is just like day is followed by night and night by day. A night can be longer sometimes but there is definite an end to it

The line, "If winter comes, can spring be far behind" is an epitome of optimism. The present situation, the curse of the disease COVID-19 or NOVEL CORONA VIRUS, in which we all feel helpless and bound, is also temporary for sure. It will definitely pass too, all we need to have is Patience and Hope. Like the cruel winter this situation must come to an end and the spring must arrive with its full blossom, colours, sweet fragrances and chirps of birds with a relief in their voice. As the sun definitely rises even if the night of pain is longer. In the same manner sorrows in life must come to an end and there comes a life of peace, happiness and joy. After that we human beings can see the life through a new perspective and we feel the value of good and happy times much more than ever before. This is human nature. It is important too, as one can never know the value of peace if there is no chaos ever and similarly the value of happiness is measured by the sufferings we go through to get it.

It is not for the first time that world is going through this kind of angst, it has happened earlier also **like in mid - 19<sup>th</sup> French Fever, Plague of Justinian 541CE, The Great Plague of London 1665, Smallpox 1796 and Cholera early century** but these all epidemics finally had to have an end. No doubt humanity had to suffer a lot of physical and mental pain and our scientists and doctors gone through a lot of struggles, experiments, failures and disappointments but never gave up and they had finally got victorious and successful to bring stability in human

life again and again. So we should never give up on making efforts to tackle the present difficult situation. That is possible by simply following instructions given by WHO, the government and doctors.

The struggle between human and nature has been occurring on earth time and again, whenever human being crossed the limit by harming the nature, he definitely suffer similarly. There is a dire need of balancing the nature and materialistic development. Just like the other pandemic diseases, this COVID-19 will also definitely come to an end as our doctors and scientists are working hard to treat the sufferers around the world and at the same time struggling to find a permanent solution to it, there is no doubt in this fact, but for now we as literate citizens, are supposed to stay at home and support the government rules and to follow all the instructions religiously.

We must stay home, wash our hands frequently, maintain social distance, stay away from the person with cough and sneezing, consult a doctor for the curable minor health issues, asap. That only can stop the disease from further spread for now, when there is no available vaccine for it. We should not blindly trust the social media rumours but must follow some reliable sources like WHO home page, Health and Family Welfare site. We need to show support to the government and to our unappreciated warriors like doctors, nurses, police persons and the social servants, as without their sacrifices it is impossible to stay calm and safe at our homes.

One should not only look at the negative side of the situation but to stay hopeful, we must consider the positive impacts of the situation. We must utilize this time to do something creative, we can spend quality time with family and can pursue our dreams while sharpening our hidden skills and talents so that the situation, when it passes reminds us of positive aspects also along with the pains and sufferings we are going through right now. Once again all religions and nations have come together for the sake of humanity and giving all kind of support physical, financial and moral; in this time of dismay, that is crucial too to come up with the situation.

No matter what, our attitude in life should always be of an optimistic stoic, and it's the need of this cruel situation as well. We know that the situation is difficult and our patience is being examined by it. But we don't have any other choice but to stay calm and hopeful. **Rule of survival is that joys and sorrows should be treated in their own strides. They should be given equal treatment. Only then human being can be considered to be the real hero and victorious of any kind of tough situation. Ultimately humans win over all the apparently**



difficult situations and our past is the proof of it. And thus, we must rest assured that our sorrows are short lived and period of joy awaits us, sun will rise again, birds will sing the songs of victory and this winter will come to an end, sooner rather than later. This thinking will always maintain our equipoise and peace of mind. And that will definitely bring us closer to a beautiful and colourful spring again and very soon.

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## An IoT System for Discarded Material

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### Introduction

In this age as a population is increasing day by day, in many towns, to upgrade the standard of living, one of the main issues in the urban cities is waste management. So, Implementation of the smart dustbin is therefore a major requirement for eliminating this problem or at least to bring this issue to minimum level. Recently, program of the implementation of smart cities has been announced by our Prime Minister. Also, "Swachh Bharat Abhiyan" is one of the key initiatives which is helping to guarantee clean and healthy environment. The proposed model is a smart garbage system based on IOT for urban areas. It acts as one of the innovative systems to keep the cities clean.



Figure 1: Environmental monitoring

### IoT Requirement Analysis

The analysis involves conditions required to be fulfilled in order to complete the project. Functional Requirements define a function of the software and how the system must behave when presented with specific inputs or outputs. To manage the system: - the system gets the notification whenever the dustbin is full and the authorities are required to be contacted to empty the bin. These are basically the quality constraints a system must satisfy according to the project requirements.

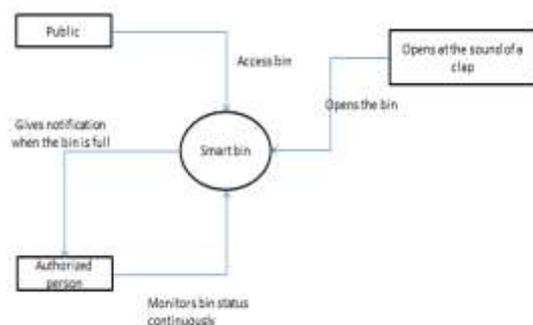


Figure 2: Context diagram

The context diagram is a diagram that shows the system under consideration as a single high-level process and defines the relationship between entities in it. The above diagram shows the relationship between authorized person, smart bin and public. The public access the bin and the bin sends the notification to authorized person when the bin is full.

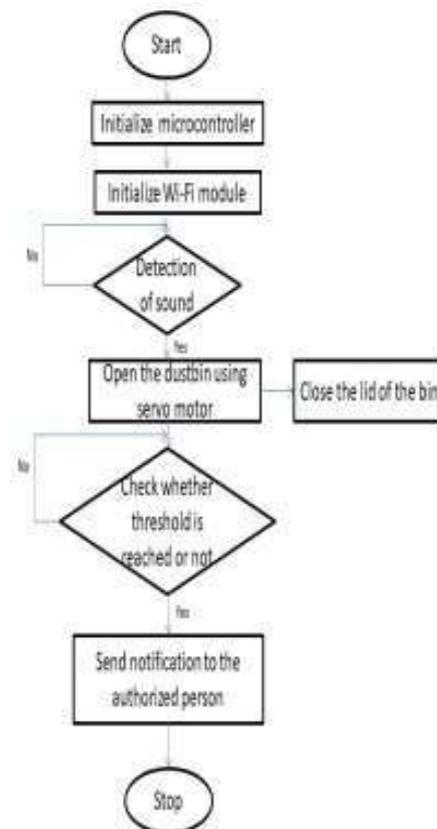


Figure 3: Flow chart of the proposed system

Flow chart describes the flow of various processes in the project. At the detection of the sound the dustbin opens with help of servo motor and whenever the bin is full above its limit the notification is sent to the authorized person.

### Object Oriented Modeling

The modeling visualizes functional requirements of the system. Each use case provides some observable and valuable results to the actors of the system.

Client:-A client or a user is the one who throws garbage in the bin by using its clap facility. System:-System is the physical dustbin or IoT system. It opens the on hearing the clap sound by any user and informs the higher authority when bin is full.

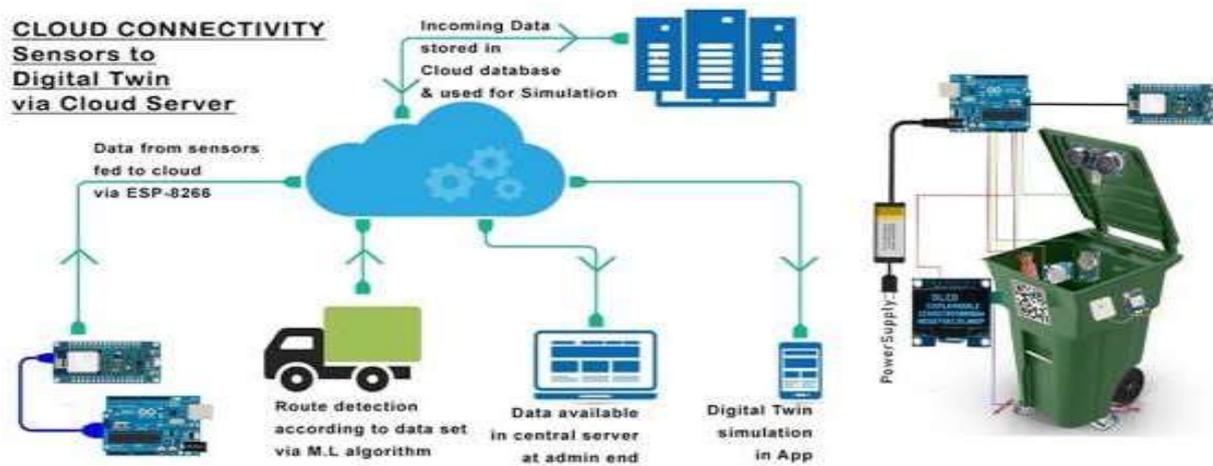


Figure 4: Cloud connectivity (Sensors to digital twin via cloud server)

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## Empire of IoT: Internet of Things

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### Acknowledgement

IoT is one of the topics that is developing with a drastic speed and occupying a big place in our daily life. IOT has gain an important lace in consumer products, durable goods, cars, trucks and industry, and many other fields, when combined with internet connectivity and powerful data analysis capabilities that promise our working style, live, play. It is being estimated that by 2025 there will be more than 100 billion and will have an impact on \$11 trillion on economy.



Figure 1: IoT

### Introduction of IoT

IoT extends to Internet of Things, It generally refers to situation where network Connectivity and computing capability extend to objects, sensors, and day-today items do not consist of computers, but allowing these devices to generate, exchange, and consume data with minimum human disturbance.

How-ever there are many definitions available for the question "What is IoT?" and the above written definition is one of them.



Figure 2: IoT cloud

### Importance of IoT

Because of low cost computing the cloud, big data analysis, and mobile technologies, physical things can share and collect data with minimum human disturbance. In this hyper-connected world, digital system can record, monitor and adjust each interaction- between connected things. And because of this the physical world and digital world co-prate and becomes IOT as shown in Figure 3.



Figure 3: Importance of IoT

### Working of IoT

It generally consists of sensors, an IoT platform, and Internet as shown in Figure 4. What happens is that the sensor collects data and sends to IoT platform, and IOT platform analyses the received data from sensor and compiles it into useful information. Like if we implement the system in a field of a farmer, where the sensor will collect moisture level of soil after a span of time if the moisture level decrease bellow a point than the IoT platform will give a message to farmer to water the fields and now because of this system the farmer will always be aware of moisture level of soil of fields as shown in Figure 5, which will help him to plant crops on time.



Figure 4: Structure of IoT

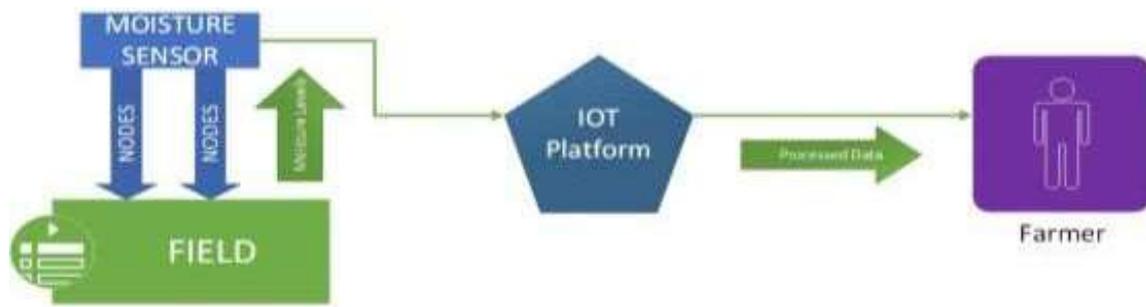


Figure 5: Working of moisture level sensor at a farm

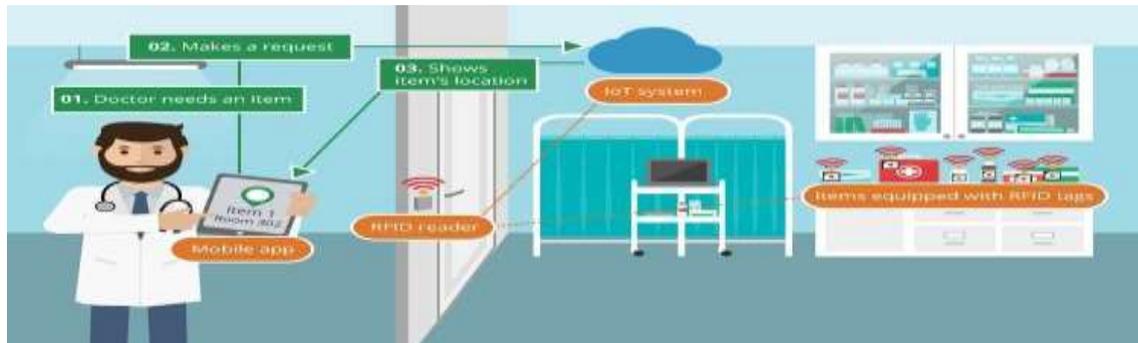


Figure 6: IoT in health care

## Examples of IoT

### IoT in Health Care

The most common example of IoT can be seen while production of medicines. IoT ensures accuracy while mixing ingredients for a particular medicine, and it also ensures quality of medicine. Due to use of IoT while manufacturing a medicine makes the medicines safe and more reliable as all the ingredients are mixed with accuracy like shown in Figure 6.

### IoT in Manufacturing

IoT helps a-lot in today manufacturing industries, in mobile phone industries whenever a new mobile is launched, lots of manufacturers start building different type of back covers for them, but how they know that where to give a curve while production? for that they use high precision IoT tools as shown in Figure 7. These tools measure each corner, each curve with very accuracy and precision and later those measurements are used to produce back covers.



Figure 7: High precision measurement machine

### IoT in Home Automation

In this world as the influence of IoT has grown, Home Automation has become a great example of IoT. IoT allows to control your home from other country or if you are far from your home. Some basic home automation task could be switching on/off the lights, turning on washing machine, it also increases home security with use of some extra components, and many other ways are there which uses IoT as base home automation as shown in Figure 8.

### IoT in Active Aerodynamics

Aerodynamics is a term which means a body which cuts air. It is a term widely used in automotive car industry. In car industry good aerodynamics means that the car can cut more air easily and reduce the drag produced by air, these types of aerodynamics are known as passive aerodynamics. But Active aerodynamics are aerodynamics which can change themselves increase drag (For Quick Breaking) or decrease drag (For Increasing speed), Active aerodynamics works because of IoT, because when the sensors read a command from user of breaking the drag is increased as shown in Figure 9, and when the sensor records acceleration it decreases the drag as shown in Figure 10. Some of the super cars like BUGATTI VERYON, The spoiler (Rear Wing Of a car) on it is hydraulic controlled and the hydraulic systems work on commands from IoT based system present in the car.



Figure 8: Home automation through IoT



Figure 9: Wing increasing DRAG

## Conclusion

IoT is the upcoming future of human which has started to take shape, the day will arrive when everything will be done on one command of human and the work will be done precisely and accurately. No doubt sometimes implementation of IoT machinery becomes confusing, but after the implementation it makes the work easy and in some scenarios it provides more flexibility

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# Cloud Computing- The Civilization of Art and Sciences

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## Introduction

Cloud computing also known as virtualisation, is one of the most the most trending topic in the market. It has been increasing at very fast rate because of its internet based development which provides virtual environment to the users with the help of engineering tools.



Figure 1: The Past, present and future of cloud

## Cloud Computing- The Data Processing

Cloud computing is a virtualized unite of resources in which customers are allowed to acquire the resources in such a way that is flexible, fruitful and in demand. When the word cloud is combined with computing the meaning gets wider.

**“Technology is a gift of god, perhaps the god’s greatest gift after life.”**



Figure 2: Meaning of cloud computing

## Architecture of Cloud Computing

Cloud computing architecture consists of numerous cloud elements, which are coupled flexibly. We are able to widely split the cloud architecture into two fragments:

- 1) Front end
  - 2) Back end
- Each of the ends are linked through web, generally internet.

- 1) **Front end**-The forepart alludes the client part of cloud system. It comprises of interfaces and applications that are in need to gain cloud computing platforms. Example Web Browser.
- 2) **Back end**-The rare alludes the cloud itself. It comprises of all the resources which are required to produce cloud computing services. It comprises of giant data storage, virtual machines, security mechanism, services, deployment models, servers, etc.

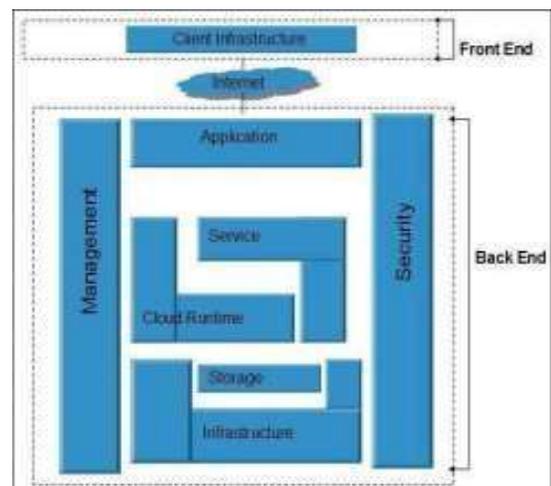


Figure 3: Architecture of cloud computing

## Importance of Virtualised Technology

Cloud computing is possibly the exuberant high tech change within the 21<sup>st</sup> century. It is because it has shown the short acquisition onto the mainstream then the other tech within the domain. This adoption has been fueled mainly by the expanding number of smartphones and electronic gadgets which are able to access the web. Cloud computing isn't only for organizations and business cooperations; it's also useful for the conventional person likewise. It enables us to run software programs without installing them on our computers; it enables us to store and access our multimedia content via web, it enables us to develop and test programs without necessarily having servers so on. Cloud computing could be a 21<sup>st</sup> century marvel that holds its importance in almost every field you are going to be able to consider.

### Features of Cloud Computing

- 1) **24/7 support**-This is one of the most significant and the best feature of cloud computing. As it provides the users to access their data anytime and from anywhere with the help of just an internet connection.
- 2) **Broad Access Network**-In the world of virtualisation, the users can acquire or upload the data to the cloud from any part of the world just with the help of an internet connection.
- 3) **Availability of services**-The abilities of cloud can be altered as per the usage of clients and can also be extended according to the requirements. It also helps in analysing the usage of the storage and allows the clients to buy extra storage if needed.
- 4) **Automated systems**-Cloud computing analyses the data we needed in a self-activating way and supports metring capabilities at some level of services.



Figure 4: Features of cloud

### Examples of Cloud

- 1) Amazon web services
- 2) Drop box
- 3) Amazon drive
- 4) Google drive
- 5) Microsoft azure-Super Cloud
- 6) Windows sky drive
- 7) Apple iCloud-Super cloud

Super clouds are explained as below-

**Microsoft Azure**-Azure is a virtualised platform which was launched by Microsoft in February 2010. It is an open source and adaptable cloud platform which helps in development, data storage, service hosting, and service management. The Azure tool hosts web applications over the net with the help of Microsoft data centres

**Apple iCloud**-As we all know apple is great with it's hardware and software but it tripped a bit in the past. But anyways, icloud is a company that provides a platform to manage all the user's files. With icloud drive we can store our files either it's an iWork file or pic taken with the iphone. We can even access iCloud drive on window's computer.



Figure 5: Some examples of cloud

### Types of Cloud Computing

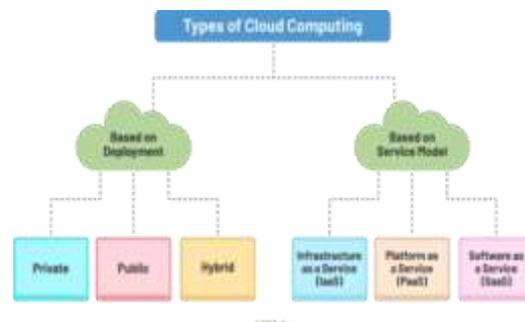


Figure 6: Various types of cloud

#### Based on deployment

**Private cloud**-It is configured in private data center. They are guaranteed resources. One can have secure front end and backend networks.

**Public Cloud**-It is configured in public data center. They are non-guaranteed resources. There is an insecure shared network.

**Hybrid Cloud**-It is the combination of both the above clouds mentioned. This is more cost effective than private cloud.

#### Based on service model

**IaaS**- IaaS stands for Infrastructure as a service in which it states that clients can use storage services and these are the virtual provision of computing resources over the cloud.

**PaaS**- PaaS stands for Platform as a service where one can develop, test and organise the different applications for the business. It's the virtual runtime environment provided by the PaaS which gives a favourable space for developing and testing applications.

**SaaS**- SaaS stands for Software as a Service in which provides clients the quick access to cloud based web applications

### Cloud Computing as a Security

As the demand of cloud computing for data storage is rapidly rising, the need for security is also becoming an important and essential part. The data stored in the cloud is not secure, it can be easily hacked due to the following reasons that are as follows-

- 1) Lack of testing
- 2) Backups
- 3) Improper access permissions

### Cloud Computing as a Protection

Cloud data storage is one among the most effective possible ways to stay the important data of companies safe and secure. All business companies are using cloud services to stay data available from all style of internet-connected devices. However, using cloud storage platform will preserve the important data but when it involves cyber security like on-premises infrastructure and a cloud-based, all users must be alert always. Because if there's a weak defense or slow response to the cyber-attacks, then it'd leave your company during a very big trouble. Thus, it's always important to the unique feature set within the array of cloud computing services. As everybody knows employing a strong Cloud Security feature is really expensive for the corporate, so it's advised to use cloud service provider because it eliminates the big capital expenses.



Figure 7: Security in cloud

### Applications of Virtualization in Various Sectors

- 1) **Educational institutes-** Institutes has truly revolutionized the education sector. The standard methods of teaching are being replaced by newest smart techniques like smart classes using pictorials and graphs so students can easily understand and revel in their learning. This also helps students make their interest. Students being more active within the smart classes thanks to pictorial representation.
- 2) **Medical fields-**Cloud helps in procuring the patients information easily as the doctors needn't to access the computers of hospitals. They can acquire the info remotely from the cloud.
- 3) **Banking sectors-** Cloud computing has fully benefitted the banking sectors. The info of the purchasers are stored on the cloud. The bankers needn't to go looking manually the info of their clients. All the banking companies across the globe became automated and are now increasingly availing cloud services.
- 4) **Industries and Cooperate sectors-**Cloud computing has

empowered the industries to stop varied technical and business problems which will occur while executing their own data centres and economize by incorporating a pay-per-use facility. It also allows them to extend their resources. Its management of knowledge and therefore the records very easy for the businesses like never before. They now have access to a plethora of software and hardware services without having the requirement to shop for all thus improving the standard of services.

### Backdrops of Cloud Computing

**Restrictions-**There are restrictions on programming applications that can be run using cloud methods.

**Service unavailability-**It completely depends on an internet connection. It is useless in case of absence of an internet connection or a server breakdown and thus may affect work productivity.

**Inconsistency-**A cloud suffers from issues of data and code redundancy which makes it inconsistent.

**Slowness-**The rapidity of action is a major concern for cloud computing, lack of high speed can affect the performance. For example: to carry out a talk with the help of video conferencing using cloud, a high and a consistent speed is necessary.

**Need for Understanding-**A trained person is required for taking care of the contract with the service provider with a cloud service provider, Since the hardware, software, virtualization, deployment of the cloud solely relies at the provider inexperience in this part can make it hard to keep hold of it.

**Reduced adaptability-**Lack of flexibility. Difficulty in upgrading the software without any loss of information.

### Conclusion

With the plethora of services that cloud computing provides still has large number of opportunities in the IT market. With its increased adoption in various sectors of cloud computing is culminating. The security issues are being put forward and are continuously being worked upon to make the cloud services safe and secure. Researches are being carried out in the field of parallel computing which an extended part of cloud are computing. Several other researches are also being doing research in various other sectors to explore the cloud further. Very soon cloud computing is going to replace the traditional methods of computing.

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# A Growing Reality: The Augmentation Reality

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## Introduction to AR

AR extends to Augmented Reality, It is a type of technology which combines real and virtual, real time interaction, and registers in 3D. It adds digital components to the real world. It's an image of real world to which digital components like audio, animation, GPS, etc. are added, like in Figure 1.



Figure 1: AR

## Evolutions of AR

### Gen 1[STEVE MANN]



Figure 2: Evolution of Gen 1 AR

### Gen 2[KIT BAG]



Figure 3: The Bag Pack Gen

### Gen 3[HAND BAG]



Figure 4: Sony XPERIA as an example of Gen 3 AR

### Gen 4 KEY HOLE



Figure 5: The Key Hole AR

### Gen 5 [NO BAG]



Figure 6: A Gen 5 product by VUZIX

### Gen 6-PROJECT GLASS



Figure 7: A person wearing Gen 6 AR Glasses

**Mechanism of AR**

- 1) **AR Devices:** This is the hardware which due to which make AR possible.
  - a) **Display:** It is a hardware part which shows the data from computer
    - 1) Video See-Through [Figure 8]
    - 2) Optical See-Through [Figure 9]
    - 3) Projection-Based Display [Figure 10]
    - 4) Omni Touch [Figure 11]
  - b) **Input Device:** These can be wristbands [Reach Media], mobile phone [Pointing Device], gestures, voice, gaze interaction.
  - c) **Tracking:** The act through which the content is aligned in real world is done by tracking. It can be sensor based, vision based, or hybrid.
- 2) **AR Interaction**
  - a) **Tangible AR:** In this technique the user can manipulate the visual information through physical objects [Figure 12]
  - b) **Collaborative AR:** It allows multiple-user to share a real world around them and virtual world, [Figure 13].
  - c) **Hybrid AR** [Figure 14]
  - d) **Multimodal AR:** It is of four types which are gestures, speech, touch and gaze



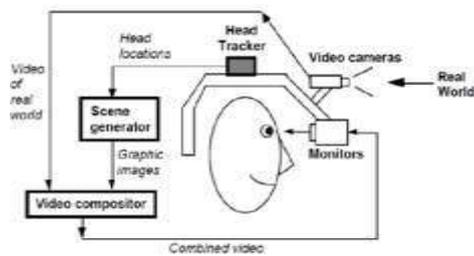
Figure 11: Omni Touch



Figure 12: Tangible AR



Figure 13: Collaborative AR



Video see-through

Figure 8: Video See Through



Figure 9: Optical See Through



Figure 10: Projector Based



Figure 14: Hybrid AR

**Application Areas of AR**

**Medical Training**

From performing complex surgeries using MRI, AR tech has the power to push the limits and efficiency of medical training in many sectors. Scholars at the Cleveland Clinic at Case Western Reserve University, for example, will now learn anatomy using an AR headset which will allow them to dig into the human body in an interactive 3-Dimensional format



**Figure 15: Medical training through AR**

### Design and Modelling

From infrastructure design to art effects and construction, AR is professionally helping to visualize the final outcome during the creative process. Using a headset enables the architects, engineers, and design professionals to step directly in the buildings and spaces to examine how their designs will look, and even make virtual changes on the spot. Urban planners can even model how a city might look, with the use of AR visualization. Any design or modeling job involve perfect use case for AR tech.



**Figure 16: Designing using AR**

### Business Logistics

AR provides a species of opportunities to increase efficiency and cost savings throughout areas of business logistics. It includes transportation, storage house, and route-optimization. Shipping company DHL has implemented smart AR glasses in some of its storage house, where glasses display the shortest route to a worker within a storage house to find and pick a certain item which will be shipped. Providing a workers with`

more efficient ways to go about their job is one of the best ROI use cases in today's business surrounding.



**Figure 17: Business logistics using AR**

### Field Service

Whether it's something small as an air conditioner, or large as a wind turbine, day today field service technicians are sent to repair a piece of critical equipment that needs to get up and running as soon as possible. Today, these technicians reach on-site with AR headsets and view whatever they're repairing to more quickly diagnose - and fix - the problem. And instead of having a repair manual, technicians can [go about their business hands-free](#) to get in and out faster than ever.



**Figure 18: Field Work using AR**

### Conclusion

The AR tech can make some new tech possible which can work in combination with IOT, and make the new discoveries

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## EDITORIAL SECTION

*At Chitkara University, the endeavour has always been to hone the skills of the learners. Keeping in line with this tradition, the Department of Computer Applications, Chitkara University, Punjab, has come up with an online magazine titled Wall for All. This e-magazine is proposed to provide a platform to the budding learners where they can share their knowledge and also the general information pertaining to the computing field. This e- magazine also provides an opportunity to the faculty members to share their ideas and views on topics of general interest. Wall for All is available for free download in PDF format from departmental website [ca.chitkara.edu.in](http://ca.chitkara.edu.in).*

*We hope to get due feedback from our readers which can help us in improving our further issues.*

*“HAPPY READING”*

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