A REVIEW PAPER ON INTERNET OF THINGS AND ROBOTICS AN INTEGRATIVE APPROACH

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Abstract: *Internet of Things is the interconnection i.e connection between each other through the Internet to send and receive data via different devices entrenched in everyday objects. IoT helps everyone to reorganize the ways they approach their businesses, industries and markets and gives them the tools to improve their business strategies for achieving new level of goals. One of the most important application of IoT is internet of robotic things which combined concept of Internet of things (IoT) with Robotics gives the most efficient strategy helpful for digitizing environment.*

Keywords: *Internet of things (IoT), internet of robotic things (IoRT), Humanoid robot.*

I.INTRODUCTION

What is IoT?

Internet of Things definition: A network of different types of devices connected with each other which include devices like smart phones, television, tablets, Air Conditioner (AC), vehicles, home appliances, toys, cameras, medical instruments and industrial systems or any machines with internet. These devices interactwith each other which is called internet of things. Internet of things is device to device interaction system. For example we can handle our television system or AC by our smart phone but for to complete this connection we need the help of internet.IoT concept acts as the link between the data networks and the devices sensors.

IoT sevice serve as the bridge connecting the devices sensors with the data networks. The IoT is a big network of different connections and that connection can be between people to people, people to things or it can be between things to things. With the help of internet anything can be connected to anything at anytime atanyplace [1].For connecting IoT appliances with each other providing extension of accessibility can be achieved with the help of IoT clouds. It also provides facilities like storing, processing and analyzing data. It is acts as a connector between different sensors and networks.
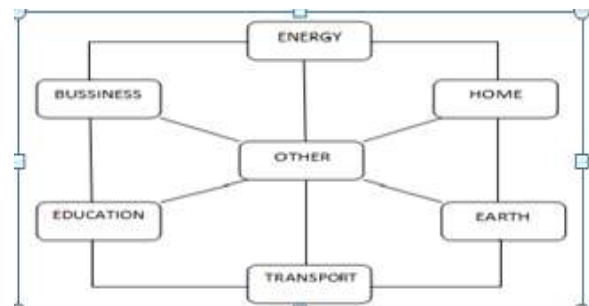

Fig. 1: Internet of things(connected networks)

Internet of things is considered as network of networks shown in fig1. Business, energy , transport, earth, energy, home are all individual networks and they are connected together to form a network which is network of networks. IoT is helpful for community, policy maker, transport, home, personal use, industry use.The proliferation of devices which are used in communicating different networks creates the Internet of Things (IoT). When in the information technology, we want to access,retrieve,save and process any kind of data, there can be different communication system which will help for communicating various groups which is actually IOT. there are some layer involved for the information technology and the communication technology are cloud ,data and the communication devices.[4]

II. HISTROY

The term Internet of Things was first coined by Kevin Ashton in 1999 in the context of supply chain management [2]. However, in the past decade, the definition has been more inclusive covering wide range of applications like healthcare, utilities, transport. Although the definition of internet of Things has changed as technology evolved, the main goal of making computer sense information without the aid of human intervention remains the same. A radical evolution of the current Internet into a Network of interconnected *objects* that not only harvests information from the environment (sensing) and interacts with the physical world, but also uses existing Internet standards to provide services for information transfer, applications, and communications.

The goal of the Internet of Things is to enable things to be connected anytime, anyplace, with anything and anyone ideally using any path/network and any service. Internet of Things is a new revolution of the Internet. Objects make themselves recognizable and they obtain intelligence by making or enabling context related decisions thanks to the fact that they can communicate information about themselves. They can access information that has been aggregated by other things, or they can be components of complex services. [3]

IoT framework provides hierarchical connection of different layers as it starts from first layer devices like consumer, industrial which uses second layer gateways like wireless, WPAN, Ethernet provides device security like connection, authority, identity, encryption as third layer with integration and computing like event streaming, alert engines, rules as next layer also provides data stores like raw steaming, operational data, analytical data as its next layer contribution with different service layer as next layer like analytical APIs, semantic layer providing number of applications like device analytical applications, device operational KPIs and they are finally connected to the last layer consumption like data analysis, search & query, devices. this is how different layers provides the connection between different devices. [5]

III. APPLICATIONS

3.1 IoRT- internet of robotic things

Robots are technology that exhibits an intellectual performance as they sense and interact with their surroundings. robotics and Internet connection can be combine together which can provide collection of information for robots to take decisions and can interact with world. The Internet of Things plays an important role in developing the principles for Robotic like their manipulation, their movement, mobility. The IOT technology provides the machine to machine concept which is use to connect different machines with each other, after m2m technology the robotic concept is used which provides robot to robot communication which is expected to provide the way which will perform jobs in a more effective, accurate and reliable way. [6]

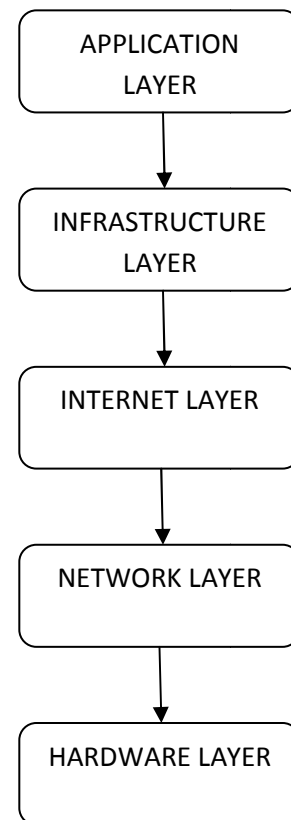*3.2 Layers of Internet of Robotic Things*

Fig. 2 : Layers of Internet of Robotics.

The Internet of Robotic Things is divided into 5 layers in architecture. These layers are

a) THE APPLICATION LAYER

In IoRT architecture the top layer is application layer and this layer support users by providing the applications of using robotics and internet of things giving the way of information about the robotics as a application. Combining the concept of robotics and internet of things will provide numerous applications in various fields.

b) THE INFRASTRUCTURE LAYER

This is the next top layer of robotics architecture which is the combination of some components like robotic cloud platform which provides the technologies and services used in robotics, Machine-to-Machine-to-Actuator is the system which is used for leveraging practical solutions, where various sensors and robotic technologies shall becombined to combine the real and virtual world together, cloud platform support, Big Data, IoT business cloudServices, and IoT cloud robotics infrastructure.

c) INTERNET LAYER

This is next layer of internet of robotics which is Internet layer. This layer focuses on internet things.

d) NETWORK LAYER

Very next layer of internet of robotics is network layer which takes care of all the connections within the network of networks.

e) HARDWARE LAYER

Most bottom layer of internet of robotics is hardware layer. Different hardware used in application of robotics is covered here. Selection of the proper IoT hardware is very important so match the processing speeds and communication bandwidths for proper application.

IV. APPLICATIONS

Internet of Things can be used in developing robots with the Humanoid application, but for applying this, first task is to find of what will be different actions can be taken by humanoid robot and accordingly the methods will be applied.Humanoid robots are very sophisticated in terms of number of sensors and actuators used. Selection of the proper IoT hardware is very important so that it should withstand the processing speeds and communication bandwidths.[7] So many applications of IoT technology can be seen in many industries like in precision agriculture, building management, healthcare, energy and transportation [9].

Now-a-days robot application is needed trend and is mostly applied everywhere possible. And for that application Internet of things is the strategy used. IoT concept enables connections between different entities like living or non-living together, using different communication protocols. Therefore with the help of IoT, a robot can be connected and establish connections with other things using Internet, that can be either as a source of information or as a consumer.[8]

V. BENEFITS OF IOT

IoT encourages companies to rethink the ways they approach their businesses, industries and markets and gives them the tools to improve their business strategies. The internet of things offers a number of benefits are as follows:

- Provide alternative and more effective methods for overall business processes;

- Provide advanced products by saving time and money;

- Produce more revenue.

- improve employee productivity;

- Make better business decisions to increase productivity.

- Improve the various experiences for customers;

VI. CONCLUSION

Internet of Things is a new revolution of the Internet. Internet of Things is latest trend used in almost every application. In this paper we have covered what is Internet of Things and how it is used in Internet of Robotics. Internet of Robotics is the application of Internet of Things where with the help of Internet of Things, robotics is developed.

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