Internet of Things (IOT): An Overview and its Applications

Prof.Ms.P.V.Dudhe[1], Prof.Ms.N.V.Kadam[2], Prof. R. M. Hushangabade[3], Prof. M. S. Deshmukh[4]
Assistant Professor, Dept. of Information Technology, PRMIT&R, Badnera, Amravati-Maharastra
preeti.dudhe@rediffmail.com, niketak39@gmail.com, rmhushangabade@mitra.ac.in, msdeshmukh@mitra.ac.in

Abstract- We **are entering in a beginning of a new of computing technology i.e. Internet of Things (IOT). IOT is a sort of "universal global neural network" in the cloud which connects various devices. The IOT is an intelligently connected devices and systems which be made up of smart machines interacting and communicating with other machines, environments, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will go up to meet this new challenge. As a result, a very large in size data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things or devices to make our lives much easier and safer—and to reduce our influence on the environment. This paper gives an overview of Internet of Things (IOT) and brief information about IOT applications and challenges in various fields.**

Keywords: IOT application

I. INTRODUCTION

The phrase "Internet of Things" was invent by Kevin Ashton in 1999. He made at his place of employment, Proctor & Gamble. During his time there, Ashton came up with the idea of putting a RFID tag on each lipstick and having them communicate with a radio receiver. He put forward as fact that such data collection can be used to solve lots of problems in the real world. At the moment, a lot of connected devices can talk to internet and to our smart phones, and maybe even some similar products, but most of them can't talk to one another because of branded hardware and software with differing standards, languages and communication protocols. For most of the current smart household items, you'll need to use a different app or website to interface with the device. Unless they were especially designed by the manufacturer to work together. K. Rose in 2015 gave reasons that why IOT is possible. He said it is possible due to following reasons: Ubiquitous Connectivity, widespread adoption of IP–based networking, computing economics, advances in Data Analytics, rise of Cloud Computing so, the IOT is the conjunction of a variety of computing and connectivity trends that have been evolving for many decades.

II. Related Work of IOT

Gipsa Alex, Benitta Varghese, Jezna G Jose, AlbyMol Abraham proposed work on modern healthcare IOT platform with an intelligent medicine box along with sensors for health monitoring and diagnosis the disease. In their proposed work an intelligent home-based medicine box with wireless connectivity with an android application (Health-IOT) is developed that helps patients and doctors to be in a more close communication. They proposed work has an intelligent medicine box that gives alerts for patients to take their medicine at the night time. The box is wirelessly connected to internet to make timely updates about medicines which will be notified in the android application with in patient's smart phone. Their system automatically gives alarm so that the patient takes the right medicine at the right time. [1]

A.Arun Rajaa, R.Naveedhab, G.Niranjanadevic and V.Roobini proposed in their paper that a security alert system which records a video when a motion is detected and uploads it to the external server and notifies the user via text message is reported. Their application can be used to view the remote activities and notifications can be received whenever the motion is detected. Internet of Things basically deals with transferring of useable data without involving human interferences. In their proposed work they used Raspberry Pi camera module is used for detecting and capturing the motion. Raspberry Pi (Model B+), a credit card sized computer is used for processing the captured video. [2]

T. Balakrishna , r. Naga swetha proposed in their paper to describe the performance and functional characteristics of Arm based wireless sensor node in monitoring the parameters such as CO2, temperature, humidity and light around the pipeline structure. Their system is deployed to monitor any deviations in the system's parameters with the standard atmospheric values eventually alert the user even to a remote location. [3]

Ammar khaleel,salman yussof mention the problem in Iraq like many student abduction cases are reported due to the lack of safety mechanisms and the lack of law enforcement. In Iraq many Educational institutions such as primary schools are

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looking for a better mechanism to monitor the student attendance so that the safety of the students can be better monitored. In Iraq Currently, student attendance in schools is done in a traditional manner where the teachers will manually check and record the attendance of students in their class. However, this traditional method has many a disadvantage such as it can only be taken at certain time interval and therefore cannot monitor students in real time. The main aim of their study is to investigate the attainable of using Internet of Things (IOT) approach to monitor student attendance and their presence in the school compound in real time in order to ensure their safety. [4]

Haesung Lee, Kwangyoung Kim and Joonhee Kwon proposed in their research work that a new interconnection technique for efficient information sharing in IOT environment considering social network. They present a method and algorithm which is based on not only the analysis of the human's social network but also the consideration of the device's sociality. Then they describe some scenarios and implement original system using the scenarios. Some experiments are conducted. From the experimental evaluation, they verified that their proposed technique is helpful in the efficient interaction between devices without any intervention of humans. [5]

S. Nazeem Basha1, Dr. S.A.K. Jilani, Mr.S. Arun they are demonstrating an intelligent door system using Internet of Things, which notifies intrusion by sending out email notification to the owner. They used ADXL345 and raspberry pi, ADXL345accelerometer detects the change in motion of the door and raspberry pi to read sensor intrusion data and to communicate to the Amazon Web Services Internet of Things (AWS IOT) console. Their system based on the messages from the AWS IOT console, AWS Simple Notification Service (SNS) will send out email notification to the concerned owner based on the AWS IOT console message. At the same time all the intrusion logs are stored into Google spreadsheet by OAuth2.0 protocol to access related Google Application program interface (APIs). Obtaining the accelerometer sensor data is done by using python programming language and interfaces obtained data on IOT. They done this work successfully and performing this system, it can be used as a prototype in strengthening door security in many applications such as bank burglary, home invasions, Ram-raiding, office door breaching and lock picking.[6]

III. Application of IOT in different fields

A. IOT in industry:

Indoor Air Quality: Monitoring of oxygen levels and toxic gas inside chemical plants to ensure workers and goods safety. Monitor the temperature inside the industry. In food factories monitoring of ozone levels during the drying meat process. Information collection from Can Bus to send real time alarms to emergencies or provide advice to drivers.

B. IOT for Smart Home:

IOT that turns the automated home into the smart home. With a combination of sensors, smart systems, IOT connects everyday objects to a network, enabling those objects to complete tasks and communicate with each other, with no human input. This in turn the home automation, connected devices and IOT you get a Smart Home. And a modern smart home can be easily controlled through a smart phone, tablet or computer.

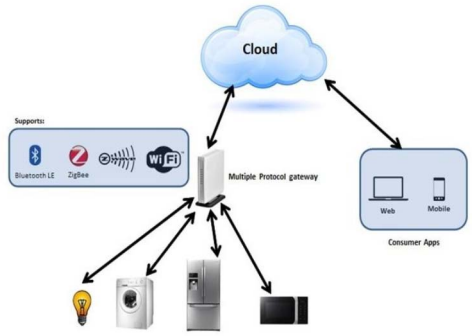

Fig 1: IOT for smart home

C. IOT for Agricultural Production:

Implementing IOT in agricultural field for developing the supply and growth of the crop by collecting the information from the environment sensor. The need of agricultural products could be predicted measurably**,** but due to the slight difference in condition of harvest and weather change, disease and insect damage etc. could not be predicted, so that the supply and need of agricultural products has not been controlled properly. To overcome it, the IOT-based monitoring system to analyze crop environment and the method to improve the efficiency of decision making by analyzing harvest statistics.

D. IOT for Health Care:

IOT in the healthcare application is used to observe and check the progress the health condition of patient in one end from other end of the spectrum; especially it is more useful for patient in the remote location. IOT Healthcare solutions can remotely monitor patients be affected from various disorders like diabetes, dementia, Alzheimer etc., These applications will not only improve the access to care while increasing the quality of care but also reduce the cost of care.

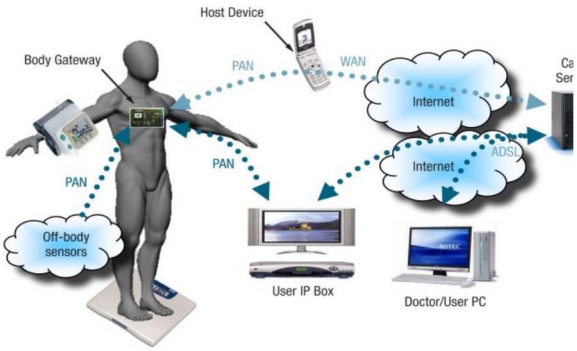

Fig 2: IOT in Healthcare

E. IOT in Transportation:

IOT less in amount traffic congestion in the city. GPS and time information from city buses is displaying a city-wide view of the public transport system, with the action of predicting something of bus arrivals, transit times and route congestion on a digital map of the city. Based on this information, the city can take designed to correct the action to reduce traffic congestion and keep city buses running smoothly. [7]

IV. FIVE KEY CHALLENGE AREAS

A. Security:

There is a lot of chances of malware entering into the IOT network because it connects a lot of devices in the network. In case of less intended to protect someone where the devices are also less expensive are a subject to make unauthorized alterations. The integration of middleware, APIs, machine-to-machine communication, etc. produce a lot of complexity and new security risks.

B. Trust and Privacy:

With remote sensors and the action of watching a core use case for the IOT, there'll be heightened sensitivity to dominant access and possession of knowledge. The action can still be a significant issue in medical and assisted-living applications, which might have life and death unwelcome consequence of an action. New compliance frameworks to deal with the IOT's serving to distinguish it from others problems can evolve. Social and political issues during this space may make it difficult IOT adoption.

C. Complexity, confusion and integration problems:

With multiple platforms, various protocols and huge numbers of arthropod genus, IOT systems integration and testing are challenges refer to briefly the smallest amount. The uncertainty about what is happening around evolving standards is nearly bound to slow adoption. The fast evolution of arthropod genus can probably consume out of the blue development resources that may diminish project teams' talents to feature core new practicability.

D. Evolving architectures, protocol wars and competitive standards:

With such a large amount of players attached the IOT, there are sure to be in progress an area wars as a legacy corporations ask for to shield their proprietary systems blessings and open systems proponents try and set new standards.

E. Concrete use cases and compelling worth propositions:

Lack of clear use cases can cut down adoption of the IOT through technical specifications, theoretical uses and future ideas might serve for a few early adopters, thought adoption of IOT would force reasoned, customer-oriented communications and electronic communication around "what's in it on behalf of me." [8]

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