

IoT Framework Applications: A Review

Miss. Komal Gophane¹ Dr. Pradip Bhaskar²

^{1,2}Department of Electronics Technology

^{1,2}Shivaji University, Kolhapur, Maharashtra, India

Abstract—IoT is the evolution of Internet. With the evolution of IoT, it is expected to create large impact on human lives. IoT is a region where digital world convergences with physical world. The IoT is an intelligent network which connects all things to the Internet for the purpose of exchanging information and communicating through the information sensing devices. It achieves the goal of intelligent identifying, locating, tracking, monitoring, and managing things. In this paper, applications of Internet of Things (IoT) have been discussed.

Key words: IoT (Internwt of thing), IoT applications, waste management, Health care, Agriculture, Smart City, Greenhouse, Environment monitoring, Smart Industry

I. INTRODUCTION

The keyword Internet of Things was first introduced in 1999 by Kevin Ashton for Supply Chain Management.

A. Definition of Internet of Things:

“The Internet of Things (IoT) is the network of physical devices, vehicles, buildings and other items- embedded with electronics, software, sensors and network connectivity that enables these objects to collect and exchange”

B. Need of Internet of Things:

- IoT becomes more and more popular day by day to maximum use of Broadband Internet as the internet users increases.
- Using IoT, connection cost can be decreased by Wi-Fi connections, built-in sensors in devices and maximum number of devices connects together by a common medium.[15]

IoT network can be categorized as Personal Area Network (PAN), Local Area Network (LAN) and Wide Area Network (WAN) where different smart objects interact with each other for their intended operation. The concept of IoT is to meet human needs by adjust the sensors or devices placed within a network, so that they can automatically send important notifications on existence of an event. [4]



Fig. 1: Network range of IoT

In the new era of technology and wireless communication, the tremendous rise in electronic devices made smart phones and tablets has become the most popular and fundamental tool of day to day life. Advancements in Internet of Things (IoT) are mostly used for connecting the different devices like as sensors, appliances, vehicles and other objects. All these devices may equip with radio-frequency identification (RFID) tag, sensors, actuators, mobile phones and many others.[2]

The IoT enclose several technologies such as information technology, cognitive sciences, communication technology, and low-power electronics. The development of the IoT defined many new challenges including the lack of fundamental theory supporting, unclear architecture, and immature standards. Recent years, Chinese government is pushing the development of the IoT. Following the Chinese 12th Five-Year Plan for IoT Development, China has adept a number of demonstration application projects such as the smart city and the intelligent transportation system in public IoT applications, intelligent coal mine, and the IOFs in industry applications.[17]

Related to applications, the survey remarks the idea base of the IoT paradigm, but other technologies are expected to emerge in order to bring the paradigm to real-life applications, identifying six ones which they believe can play a leading role in the adoption of IoT technologies: environmental monitoring, smart cities, smart business/ inventory and product management, smart homes/ smart building management, healthcare, and security and surveillance. Figure shows the application sectors of IoT.[4]



Fig. 2: IoT Applications

II. LITERATURE SURVEY

Gopal Krishna Shyam, Sunilkumar S. Manvi, Priyanka Bharathi[2017][1] presents a waste collection management solution based on providing intelligence wastebins using an IoT. The proposed system based on the foundation of geographic information system(GIS) and optimization algorithms. It consists of an IoT based model with sensors to measure the waste volume in containers or wastebins, with facility to transmit information over the internet. This data helps to compute the optimized collection routes for the workers. As a result, it can be call before the overflow of

wastes occurs in the wastebins that are placed in a specification location.

Sarfraz Fayaz Khan[2017][2] proposed a complete continuous monitoring and smart healthcare monitoring system designed by using the IoT and RFID. In this system, the different sensors are fixed in the patient body and according to the signals from sensors, RFID and IoT the patient can be monitor. The signals generated from these sensors transmitted to the microcontroller. Then microcontroller forwards this sensor data to RFID/Bluetooth devices. RFID/Bluetooth devices wirelessly transmit these signals to the mobile phone for the transmission of data through internet to the specific destination. All these operations can be done into four different layers- sensor layer, Network layer, Internet layer, Service layer.

Yongbin Zhao, Ning Cao[2017][3] the rapid development of science and technology, agriculture has made great process. This paper proposed the agricultural traceability system of agricultural products based on Internet of Things through the IoT and information security technology. this system uses the traceability code as the retroactive mark, collects data from the internet of things, and encrypts data through the RSA and SHA-3 algorithm to ensure the security and non-repudiation of data. This system solve the problem of traceability of agricultural products and consumers can quickly, easily to buy to rest assured that the agricultural products.

Feng Zhang, Min Liu, Zhuo Zhou, Weiming Shen[2016][5] This proposed system presents an online monitoring system based on an IoT system architecture. It combines various data processing techniques including protocol conversion, data filtering, and data conversion. The system implemented and established through a real continuous steel casting production line, and integrated with the Team Center platform. This proposed solution well addresses the challenge of heterogeneous data and multiple communication protocols in real world industrial environment.

Vikas Vippalapalli[2016][6] has explain the design and implementation of a smart health monitoring system using Internet of Thing. A patient monitored using lightweight wearable sensors nodes for real time sensing and analysis of various basic parameters of patients. The sensors connected to the Arduino fio transmitter board. The Xbee module is connected to the arduino board for wireless transmission. The sensed data wirelessly transmitted to the arduino receiver which is connected to the patient side computer and the data read in labView which is connected to the internet. An URL is generated by labView which can be accessed from any computer. This system helps to doctor, to view the patient's basic parameters remotely and in real time.

Mohammad Reza Jabbarpour*, Armin Nabaei and Houman Zarrabi[2016][7] proposed a Vehicle Traffic congestion Reduction System using IoT(Internet of Things). Traffic jam conditions at pick hours in large cities causes one direction of highway is congested while there are a few vehicles on the other direction.

This congestion condition can be reduce using Intelligent Guardrails (IGs). An IoT applications 'Intelligent Guardrails'(IG) is presented which apply vehicular networks to detect traffic condition of the roads and uses electronic and mechanical techniques for increasing the capacity(number of

lanes) of congested side of highway by decreasing the non-congested side of it.

Ayush Kapoor, Suchetha I Bhat, Sushila Shidnal , Akshay Mehra[2016][8] proposed an approach to combine IoT and image processing in order to determine the environmental factor or man-made factor (pesticides/fertilizers) which are block the growth of the plant. IoT sensing network takes the reading of environmental factors and the image of the leaf, it is processed under MATLAB software by the help of histogram analysis to show results.

Nyoman Putra Sastra, Dewa Made Wiharta[2016][10] proposed a wireless sensor network in Internet of Things(IoT) for environment monitoring application. Smart campus required an infrastructure contains communication network, sensor nodes, and gateways to connect to the internet. Environmental monitoring application uses different sensors for monitor the quality of air, water and soil. This system allows users to monitor environment measurements in remote location from anywhere in real time.

Francisco Javier Ferrández-Pastor , Juan Manuel García-Chamizo, Mario Nieto-Hidalgo, Jerónimo Mora-Pascual and José Mora-Martínez [2016][11] proposed an ubiquitous sensor network platform using IoT for precision Agriculture. The combination of information and control technologies in agriculture process is known as Precision Agriculture (PA). Precision Agriculture improves production efficiency, increases quality, minimizes environmental impact and reduces the use of resources (energy, water). This work develop and test a low-cost sensor/actuator network platform, based on IoT, combines machine-to-machine and human-machine interface protocol. This system used internet prototype(web services) and some WSN protocol (zigbee, Bluetooth, Z-wave, etc) to build new services and platforms. Monitoring applications and cloud services are the main advantages.

Sylvain Kubler, Je'rémy Robert, Ahmed Hefnawy, Kary Fra'mling, Chantal Cherifi, and Abdelaziz Bouras[2016][12] proposes an open IoT Ecosystem for sporting event management in which they build IoT based smart parking system. This system used following standards: (i) IoT services marketplace enabling the publication and discovery if IoT data and/or services in the ecosystem. (ii) O-MI providing a generic open API for implementing RESTful IoT information system. (iii) O-DF providing a generic content description model for Things in the IoT. Parking spots are booked in-advance through an online booking system that optimizes the spot allocation. There are many sensors in the parking which are helps to get fast track access to the stadium on sport event.

T. Gomes, J. Brito, H. Abreu, H. Gomes and J. Cabral[2015][13] presents an efficient Wireless Sensor Network Monitoring solution for Greenhouse using IoT. This system consist of- WSN, Network Gateway & online web server. Ti'S Z-stack and SDK support all the network nodes' firmware development. The gateway application software was developed in C++ and sencha Ext Js framework was selected to implement the web services and the web user interface. The main advantage of proposed monitoring solution depends on system's modularity, where each component is considered as an independent module that can

be easily plugged into the system on a plug-and-play approach. Also Energy efficiency is considered. Using this system, end user can access and control all the desires WSNs, wherever and whenever needed.

Muhammad Usman, Nazar Abbas[2014][14] proposed the Industrial Treats securing using IoT. This security based on IoT and on any doubtful act alert the authorized person of a corporate center by calling or messaging at his/her cell phone and the surrounding's by alarm simultaneously. The nine sensors are connected to the arduino microcontroller. A cell phone is also connected to the system. Arduino microcontroller takes input from these nine sensors and if doubtful is detected by the sensors, the arduino give alert on cell phone. This system can helps people to protect their homes, offices, banks or any corporate center at less cost.

Sean Dieter Tebje Kelly, Nagender Kumar Suryadevara, and Subhas Chandra Mukhopadhyay [2013][16] proposes use of IoT for Environment Condition Monitoring in homes. The description about the integrated network architecture and the interconnecting mechanisms for the reliable measurement of parameters by smart sensors and transmission of data via internet is being presented.

The structure of the monitoring system is based on a combination of pervasive distributed sensing units, information system for data aggregation, internet gateway, internet server, and reasoning and context awareness. The implementation details shows- Address Transformation, Packet Translation, Transmission over IP, Storage of Data, and Network Monitoring. In this paper, we proposed an efficient method for internetworking of 802.15.4 with IP network.

III. CONCLUSION

This review paper proposes a review on applications of IoT in the field of: Health care, Agriculture, smart city, Greenhouse. Internet of Things connects heterogeneous devices together through the medium of internet in order to exchange important information. IoT has made human life simpler and comfortable by gradually changing technologies and applications as per peoples' standards. IoT is the future of Internet where business, government and consumer will not only interact with each other but with the physical world as well.

The Internet of Things is still in its inception, and it will take time before it becomes a part of our daily lives. There are several areas in which further research is needed for making deployment of the concept of IoT reliable, robust and efficient.

REFERENCES

- [1] Gopal Krishna Shyam, Sunilkumar S. Manvi, Priyanka Bharathi "Smart Waste Management using Internet-of-Things" 2017 second International Conference on Computing and Communication Technology (ICCCCT'17) 2017 IEEE, pp.199-203
- [2] Sarfraz Fayaz Khan "Health Care Monitoring System in Internet of Things (IoT) by Using RFID" 2017 the 6th International Conference on Industrial Technology and Management (ICITM) 2017 IEEE, pp.198-204
- [3] Yongbin Zhao, Ning Cao "Research on Traceability of Agricultural Products Based on Internet of Things" 2017 IEEE International Conference on Computational Science and Engineering (CSE) and IEEE International Conference on Embedded and Ubiquitous Computing (EUC) 2017 IEEE, Vol.4, pp.414-417.
- [4] Bilal Javed, Mian Waseem Iqbal & Haider Abbas "Internet of Things (IoT) Design Considerations for Developers and Manufacturers" 5th IEEE International Workshop on Smart Communication Protocols and Algorithms (SCPA 2017) 2017 IEEE, pp.834-839.
- [5] Feng Zhang, Min Liu, Zhuo Zhou, Weiming Shen "An IoT Based Online Monitoring System for Continuous Steel Casting" IEEE INTERNET OF THINGS JOURNAL, 2016 IEEE, Vol.3, Iss.6, pp.1355-1363.
- [6] Vikas Vippalapalli "Internet of things (IoT) based smart health care system" 2016 International conference on Signal Processing, Communication, Power and Embedded System (SCOPEs) 2016 IEEE, pp.1229-1233.
- [7] Mohammad Reza Jabbarpour*, Armin Nabaei and Houman Zarrabi "Intelligent Guardrails: An IoT Application for Vehicle Traffic Congestion Reduction in Smart City" 2016 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData) 2016 IEEE, pp.7-13.
- [8] Ayush Kapoor, Suchetha I Bhat, Sushila Shidnal, Akshay Mehra "IMPLEMENTATION OF IoT (INTERNET OF THINGS) AND IMAGE PROCESSING IN SMART AGRICULTURE" 2016 International Conference on Computational Systems and Information Systems for Sustainable Solutions (CSITSS), 2016 IEEE, pp.21-26.
- [9] Aarti, Pooja Mittal "REVIEW PAPER ON HOME AUTOMATION USING INTERNET OF THINGS" International Journal of Emerging Trends & Technology in Computer Science (IJETTCS) Volume 5, Issue 4, July - August 2016
- [10] Nyoman Putra Sastra, Dewa Made Wiharta "Environmental Monitoring as an IoT Application in Building Smart Campus of Universitas Udayana" 2016 International Conference on Smart Green Technology in Electrical and Information system (ICSGTEIS), 2016 IEEE, pp.85-88.
- [11] Francisco Javier Ferrández-Pastor, Juan Manuel García-Chamizo, Mario Nieto-Hidalgo, Jerónimo Mora-Pascual and José Mora-Martínez "Developing Ubiquitous Sensor Network Platform Using Internet of Things: Application in Precision Agriculture" Article, Sensors 2016.
- [12] Sylvain Kubler, Jérémy Robert, Ahmed Hefnawy, Kary Fraïmling, Chantal Cherifi, and Abdelaziz Bouras "Open IoT Ecosystem for Sporting Event Management" JOURNAL OF LATEX CLASS FILES, VOL. 14, NO. 8, AUGUST 2015. IEEE Access, Vol.5, pp.7064-7079.
- [13] T. Gomes, J. Brito, H. Abreu, H. Gomes and J. Cabral "GreenMon: An Efficient Wireless Sensor Network Monitoring Solution for Greenhouses" 2015 IEEE International Conference on Industrial Technology (ICIT) 2015 IEEE, pp.2192-2197.

- [14] Muhammad Usman, Nazar Abbas “On the Application of IOT (Internet of Things) for Securing Industrial Threats” 2014 12th International Conference on Frontiers of Information Technology, 2014 IEEE, pp.37-40.
- [15] Talwana Jonathan Charity, Huang Jian Hua “Smart World of Internet of Things (IoT) and It's Security Concerns” 2016 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData) 2016 IEEE, pp.240-245.
- [16] Sean Dieter Tebje Kelly, Nagender Kumar Suryadevara, and Subhas Chandra Mukhopadhyay “Towards the Implementation of IoT for Environment Condition Monitoring in homes” IEEE SENSORS JOURNAL, 2013 IEEE, VOL. 13, Iss. 10, pp.3846-3853.
- [17] Shanzhi Chen, Dake Liu, Bo Hu, Hucheng Wang “A Vision of IoT: Application, challenges and opportunities with China perspective” IEEE INTERNET OF THINGS JOURNAL, 2014 IEEE, Vol.1, Iss.4, pp.349-359

