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Digital Transformation using Iot in Smart Environment Applications

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Abstract*: With increasing usage of technologies and smart solutions smart cities are developed and enabled with many smart services. This paper has conducted a systematic literature review to find out IOT applications and its role in Traffic Control System. The review protocol is formulated to define some of the research questions, searching strategy, selection criteria of papers and how data is extracted. This paper contributed towards one main issue: The various research areas of Internet of Things and Role of IOT in the Traffic Control Services? All the papers were categorized by the application services of IOT and Traffic Control services they discussed. All the recent work were categorised under the application in various area like traffic and transport; Agriculture; Security; Healthcare; energy management; city infrastructure; and modes of transport. This paper reviews the various methods of traffic control system in different perspective of different IOT application areas.

Keywords* : Internet Of Things(IOT),Traffic Control, Core Applications.

I. INTRODUCTION

IOT is actually a system which consists of all the interrelated devices, objects and things. These devices or things are connected with each other so that they can send and receive information. Things can belong to physical world or virtual world which can be integrated with communication networks. With the use of IOT businesses and people can be more connected to the other world so that they can interact with them. With IOT user can achieve automation and integration with the system.IOT also utilizes the existing technology for sensing, networking and robotics. Digital transformation provides better understanding of market place thus helping the real world in developing a clear link with IOT dataset. It is impacting society on a more strategic way with the scope of present and future changes in mind. IOT is information and service driven revenue present in market with high degree of innovation. With the help of IOT object can make themselves recognizable and intelligent. Objects can also access the information that can be collected by other devices or things. With use the smart technologies to connect things/devices at any time and at any place.

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Thus to connect the things in more strategic way traffic control system must be implemented with good precision accuracy[1].
Embedded with software, sensors, microprocessors, software, sensors and connected to Internet and these IOT things can sense their environment, generate, collect, and exchange information. IOT applications like traffic monitoring, traffic services, environment monitoring, healthcare services and security also puts strain on the number of issues like data privacy, data security, data management, data governance and regulation[2].IOT helps in improving or reshaping the traditional city services into smart services, also provides other services in smart cities [3].

This paper helps to find out various smart city objectives being considered under role of IOT. To obtain proposed research work in IOT Role in traffic control system, literature review is conducted. The paper shows following steps. The next part describes the comparison among recent research work published on IOT and smart cities. The third section of this paper contains an overview and analysis of papers which are relevant to this topic. In Section Four some discussion on those relevant papers are presented. The last section of this paper concludes the topic.

A. IOT Devices

IOT devices are the sensors which manipulate the information according to the traffic given by the various nodes related to various application areas. Like in agriculture area sensors are used to measure the elements like humidity, pressure and ground water level[4][5]. In medical area wearable devices, ECG, like sensors are used to measure the health parameters, In traffic system sensors are used to avoid congestion problem during rush hours, manage the traffic during traffic lights, manage the traffic according to priorities, to Avoid the accidents, In Security areas sensors are to provide security. The desktop, tablet, and cell phone are important parts of IOT. Routers and switches are other connected devices used in IOT services.

B. IOT Applications

Applications of IOT are Medicine and health, Engineering, Industry, Government and Safety, Smart Cities, Traffic control, Home and office, Media marketing and advertising, Security[6][7]. Figure 1 gives taxonomy of different applications of IOT.

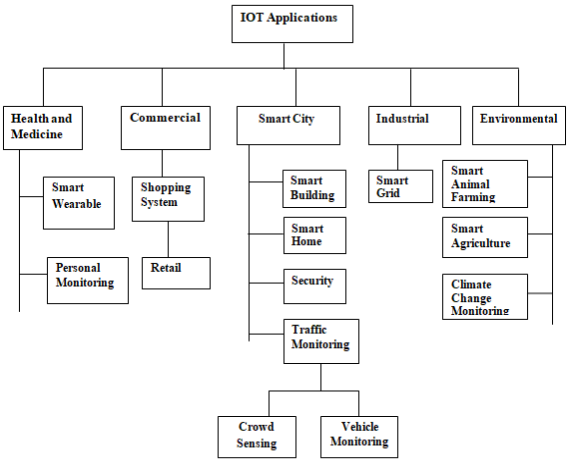

Fig. 1.IOT Apllication Areas

II. RESEARCH METHOD

This paper has conducted a systematic literature review to examine the IOT services and Traffic management [8][9]. Review protocol is formulated with aim to define and explain research questions, searching methodology, criteria for selection of papers, assessment of research work, and how results are manipulated.

A. Purpose of the work

This paper defines some of the research questions: The major issue is studying the benefits of Internet of Things and role in changing scenario of IOT in Traffic control system?

B. Search Strategy

To construct search query: "Internet of Things" and "Traffic control system", two keywords have been used. These scientific databases were opted for research purpose: Web of Science, IEEE Xplore, ACM Digital Library, Google Scholar. Query was done on paper titles and content of the paper to get some relevant papers.

C. Selection Criteria and Evolution Chart

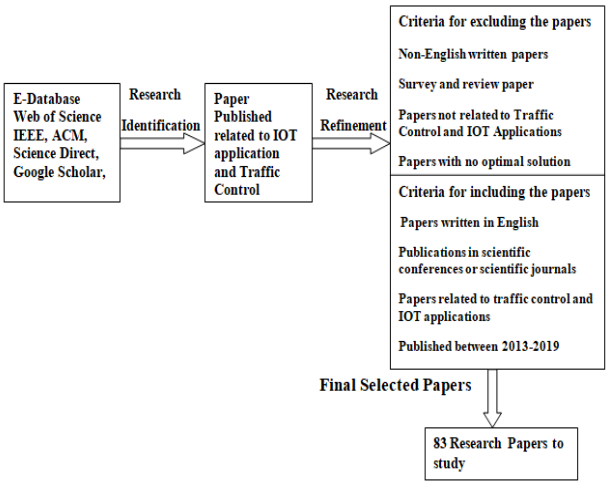

Fig. 2.Selection Criteria of Research Paper

III. OVERVIEW OF PAPER INCLUDED

A. Included Papers

As a result of query executed on E- databases extracted around 185 papers. After applying the criteria of selection, 83 relevant papers were obtained proposing IOT applications and IOT-based traffic control system.

B. Publication Per Year

Following figure 3 represents the published papers on IOT applications and traffic control enabled by IOT. From 2013 onwards there is major increase in number of published research work. By analysing the trend this fig shows that More than 50% of papers were published in 2018 and 2019. Hence this data shows that this is an emerging recent research area.

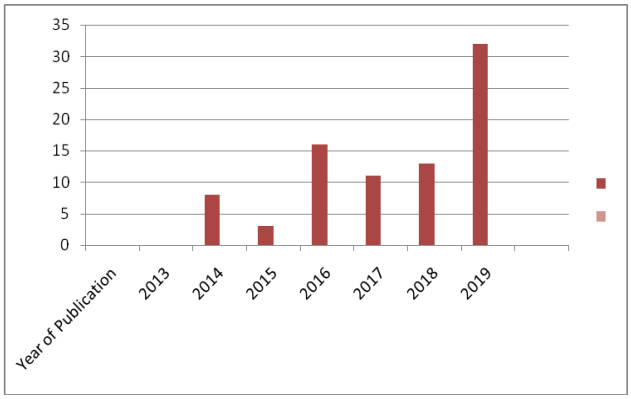

Fig. 3. Published rearch work in consecutive Year

C. Type of Publications

Out of 83 papers which are included for research, Many papers were published in various highly reputed conferences (around 60 research papers). Out of which 23 are journal research work. The papers which were presented in conference are from web of Science, IEEE and ACM databases and Google Scholar. Here, Figure 4 defines the number of research papers belongs to conference proceedings and journals. Also figure 5 gives idea about number of papers per database for research work.

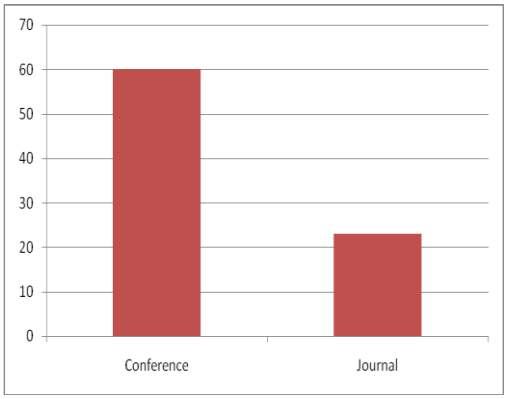

Fig. 4.No.of Papers per Type

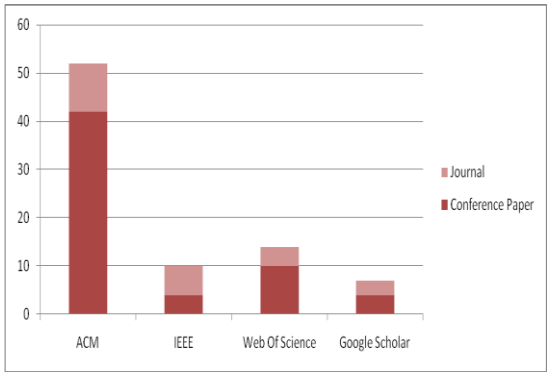

Fig. 5.No.of Papers per Database Type

IV. RESULT AND DISCUSSION

All the relevant papers were categorized according to field of IOT Applications and Traffic control system services they proposed and described. The papers appear of several categories and not restricted to the IOT Applications and Traffic control system. This paper recognized some of these categories: (1) Medicine and Healthcare, (2) Security (3) Traffic management (4) energy management, (5) Smart city infrastructure[10][11][12][13].

In Environment related Papers many solutions for monitoring environment are proposed. Some parameters (monitoring temperature, humidity and measuring pollution levels) have been proposed. Some papers related to medicine and healthcare defines the needs of elderly people and disabled people.

Table- I: No. of Paper considered per service Category

S. No	*Category*	*No. of Papers*
1	Traffic and Transport	24
2	Security	10
3	Agriculture	01
4	Energy Management	05
5	Smart City Infrastructure	10
6	Medicine and Healthcare	17
7	Others	16

Waste management and energy management are also major problems in the world, and it can be defined and solution for this problem from different fields and perspectives are also discussed. IOT offers service like optimized waste collection in smart city. Security has also become very important in cities. Cyber security is a primary concern in all phases of IOT life cycle whether it is on the user end or server end. The primary focus of the cyber security is to block all the unnecessary and threatening interventions in the form of virus, malware updates etc. IOT offers various solutions in prediction, identification, prevention and management of critical issues in Disaster management and surveillance systems. To give the answer research question here Table I which categorize the IOT services.

V. CONCLUSION

A Systematically review for IOT applications and analysing the role of IOT in traffic control system was the main goal of this paper. The increasing number of papers in recent years shows that this is relatively recent research area with some issues existing like data privacy, data security, data management, data governance and regulation. Future research should pay more attention to these issues while working on IOT applications areas.

This research paper showed that the IOT enables different smart city services. It also helps to transform the existing city services into smart services. IOT collaborates with big data Artificial Intelligence and cloud computing to provide the services in healthcare and smart cities.

Applications of IOT for providing smart city services are also in demand these days. Smart services of IOT and new ideas are rapidly increasing. Thus a smart city service has great possibilities of improvement by implementing technology to ensure more reliable solutions. Simulation environments and IOT devices interoperability are those areas which can be explored more in future.

This review paper represents the comprehensive research for IOT Application and its role in Traffic control system by reviewing many researchers and their studies. By considering this fact that in this field the number of studies is increasing day by day, so it is not possible to ensure that this paper have covered all the studies.

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