International Journal of Innovative Research in Computer Science & Technology (IJIRCST)
ISSN: 2347-5552, Volume-10, Issue-1, January 2022
https://doi.org/10.55524/ijircst.2022.10.1.15
Article ID IRP221011, Pages 88-91
www.ijircst.org

A Review on Smart City Using IOT

Laxmi Goswami [1], and Deepak Singh [2]

[1, 2] Assistant Professor, Department of Electrical Engineering, Sanskriti University, Mathura, Uttar Pradesh

Correspondence should be addressed to Laxmi Goswami**;** laxmigoswami.ee@sanskriti.edu.in,

ABSTRACT: The Internet of the Things is a network that connects various gadgets and technologies without requiring human interaction. As a consequence, cities that are wiser (or more intelligent) may be constructed all over the globe. The iot technology has accelerated the development of intelligent city systems enabling sustainable living, greater comfort, including effectiveness for people by hosting multiple technologies and allowing interactions among them. Smarter Cities' Internet of Things covers a broad range of issues but is driven by a variety of technologies. The above article provides a detailed review of the Web of Things in the Smart Cities. The major elements of something like the IoT-based Sustainable Urban landscape are first investigated, following by the technology that allows these domains to emerge in term of machine learning, algorithms, architectures, including network technology used in IoT-based Smart City platforms. Following that, a look at the most frequent methodologies or applications in several Smart City industries is presented. Finally, the challenges that IoT networks for smart - city confront, as well as ideas for overcoming them.

KEYWORDS: Artificial Intelligence, Smart Cities, Internet of Things, Sensing Technologies, Smart City Challenges, Privacy, Security.

I. INTRODUCTION

With rising global populations or increasing urbanisation, which is expected to increase by more than 10% within next thirty years, resulting in 70 percent of the world's population living in urban areas by 2050, countries would then look to equip their cities to handle this same increase of migrants as well as the stress it will put on existing urban systems, nations will look to equip their cities to manage the influx of people and also the stress it will put on existing urban systems. This will be done in accordance the with United Nations' 2030 Agenda For sustainable development for 2030. As seen by the multiple public and private sector activities now underway, Smart Cities have evolved as a significant endeavour by different governments to make cities more accessible and hospitable to the planned population increase and provide city residents with a better living experience. In this study, we examine how the Internet of Things (IoT) is utilised in Smart Cities or how it contributes to these efforts. Nonetheless, since academics are interested in this topic, several surveys linked to it were uncovered throughout the literature search. The authors look at the challenges of IoT adoption in Smart Cities, as well as their interrelationships as well as rankings based on the knowledge they have. Our work differs from others in that researchers address the issues without regard for expert opinion, and thus are not limited in scope to their application area alone; instead, humans present a thorough examination of the important considerations that IoT designers in Smart Cities should consider, as well as best practises for dealing with each of those features. The authors concentrate on IoT architecture but also applications in Smart Cities, and often a quick overview of the technologies used. Case studies of municipalities with active smart city initiatives follow up on surveys, which give an application-oriented analysis of particular systems built for different smart city components. The authors address data collecting, storage, analytics, as well as safety in cyber-physical systems, but also techniques for making such devices more environmentally sustainable. They also go through the many applications for which such systems might well be employed. We provide a complete review of the many core devices and systems used in smart city implementations, as well as an analysis of their current stage of use/deployment in contrast to previous research [1]–[4].

A Smart City is difficult to define; in reality, urban areas claim to be "smart" for a variety of reasons, including the adoption of unique e-government systems, the development of social learning initiatives but also community support programmes, the promotion of sustainable living, and the use of information or communications technologies for innovation. Smarter Cities are discussed in the article as the use of a variety of communication or information technology to better the lives for a city's people. This involves, among other things, the use of these technologies in governance, transportation, housing, commerce, sustainable living, social learning, civic engagement, including opportunity providing. In an ideal scenario, the notion of a smart city goes beyond the previously defined borders of a standard city's administrative or social systems, enabling them to interact but also operate more cohesively as well as efficiently. Smart cities, as compared to

traditional city environments, offer several advantages (in terms of value)

1. Attaining climate goals: Smart cities have been at the forefront of cutting-edge technology that might help countries achieve their climate targets. Smart cities are engaged with power generation, smart transportations infrastructure, as well as smart city administration in order to reduce cities' carbon footprints but also enable the implementation of innovative.
2. Financial projects would value giving a major financial motivation for the government or commercial organizations to lead to improvement of keenest city technology.
3. Social impact: A smart city project's purpose is to improve city inhabitants' quality of life or to contribute to the establishment of an inclusive society whereby all opinions are valued as well as equal opportunities are provided. Information systems are a vital component of public service delivery in smart cities since they enable citizen connections with the city environment but also make life easier.

II. SMART TOWN COMPONENT

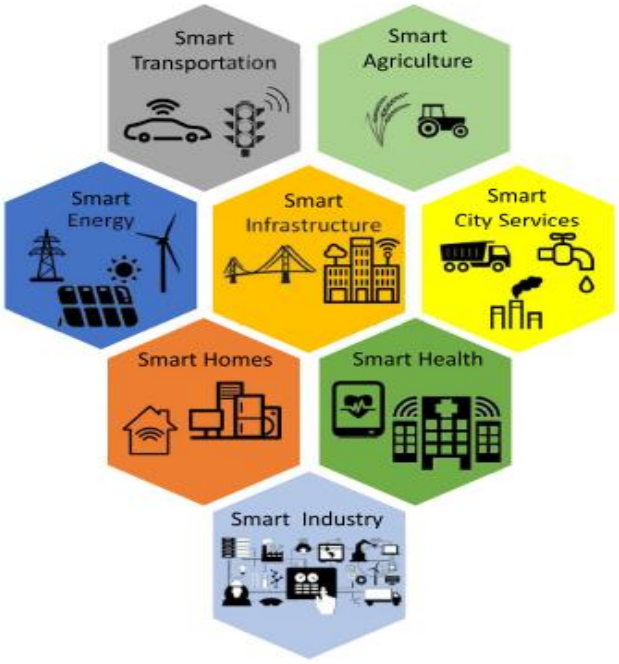

Figure 1: Illustrates the several components of the smart city such as smart agriculture, smart heath, etc.

A smart town is mades up of number of component, as shown in the Figure 1 [5]. Data collecting is generally the initial step in a smart city application, following by data, storage, but also analysis. Data collection depends on the requirements, and it remained primary drivers of the sensors development in range of the sector. Information exchange is the second component, which comprises transmitting data from data-gathering devices and the cloud for storages and processing. This goal has been accomplished in a variety of ways. Which entails storing and organising data using various storage technology in order to utilise this in stage 4, data analysis. Data analysis is the procedure of extracting patterns or conclusions from obtained data in order to enhance decision-making. A Smart City is difficult to define; in reality, urban areas claim to be "smart" for a variety of reasons, including the adoption of unique e-government systems, the development of social learning initiatives but also community support programmes, the promotion of sustainable living, and the use of information or communications technologies for innovation. Smarter Cities are discussed in the article as the use of a variety of communication or information technology to better the lives for a city's people [6].

A. Agriculture in the 21st Century

Food security was among the most important parts of the United Nations Sustainable Development Goals for 2030. With an increasing population as well as severe climate science causing changeable weather in the world's energy centres, the race to ensure that food industry is made durable and that significantly decreasing resources such as water are effectively used became a primary priority for international locations. The use of monitors embedded in plants including farms to monitor a range of parameters to help in decision-making or the avoidance of illnesses, pests, as well as other issues is equipped with smart agriculture.

B. Services for Smart Cities

Water distribution, rubbish collection, ecological monitoring or management, and other municipal tasks are examples of smart city services. Groundwater resources sensors may have been used to deliver real-time data on the city's water quality as well as identify leaks. Waste management is a key element of smart city development, and it's been a core component of several other program previously mentioned, from chutes in Barcelona to bins sensor technology or connected to the data center so that they could not only immediately notify the appropriate authorities when they also have to be emptied, while also using AI to determine the most cost-effective way to do so.

C. Energy Efficiency

A traditional electrical structure is predicated on a one-way transfer of energy from a primary energy source, it is often a hydropower or non - renewable energy power plant. Since there is no informational input from the user, the power generated by any of these sources must far exceed demand to provide a steady supply of energy. Within those systems, detecting issues or taking remedial action takes patience as well. In addition, as renewable energies become far more affordable, today's customer not only receives a supply from the main utility, and also generates their personal energy. The use of ict infrastructure to make modern and freshly installed grids extra visible, to facilitate distributed power production at either the consumer but also utility

end, as well as to add personality capabilities towards the power network are all examples of smart grids.

D. Intelligent Health

The term "smart health" refers to utilized of the information or communications technology (ICT) to enhance the availability and quality of health care. With an aging population and growing healthcare expenditures, academics and healthcare providers have been concentrating their efforts in this field. Current health-care systems are overloaded, and as a result, they are unable to meet rising public demand. In this respect, smart health seeks to make healthcare accessible to as many people as possible via telemedicine and AI-assisted diagnostic help for physicians.

E. Home Automation

Because it is at the centre of people' life, the Smart Home is an important component of Smart Cities. Smart houses employ sensing devices installed throughout a mans house to provide information well about home and its residents. Environmental sensors, movement trackers, including power/energy use monitoring among forms of user behavior monitors.

F. Intelligent Infrastructure

A city's infrastructure is critical to its residents' quality of life; city councils must develop new bridges, roads, but also buildings, along with maintain them to ensure that they are used. By deploying sensors to verify building/bridge physical condition for condition monitoring utilizing accelerometers as well as smart materials, system functionality helps cities guarantee their infrastructure is in good form and useable. These sensors collect data that enables for preventive maintenance of these critical components, assuring that perhaps the city works smoothly.

G. Intelligent Transportation

Many metropolitan areas are beset by traffic, pollutants, public transportation schedule, but also cost-cutting factors. Vehicle-infrastructure-pedestrian interaction has become ubiquitous as a result of the fast development or production of additional Knowledge as well as Communication Standards. Vehicle-to-vehicle (V2V), vehicle-to-pedestrian (V2P), vehicle-to-infrastructure (V2I), and pedestrian-to-infrastructure (P2I) technology have paved the way for smart transportation systems to emerge. With every vehicle having a Gps system as well as every driver having a smartphone, many strategies rely on GPS data to monitor driving behaviour and traffic patterns. In apps like Waze but also Google Maps, this real-time data has already been utilised for route planning or urban transportation trip booking. Sensor-enabled parking systems may also route vehicles to the closest available parking place.

III. INTERNET OF THE THINGS FOR SMART CITIES

The authors concentrate on IoT architecture but also applications in Smart Cities, and often a quick overview of the technologies used. Case studies of municipalities with active smart city initiatives follow up on surveys, which give an application-oriented analysis of particular systems built for different smart city components. The authors address data collecting, storage, analytics, as well as safety in cyber-physical systems, but also techniques for making such devices more environmentally sustainable. They also go through the many applications for which such systems might well be employed made up of data collecting and big data to obtain information which may be utilised to enhance decisions aking including policy-making. It is expected that just by 2026, or more 75 billion gadgets will be linked to the internet, allowing for even greater business applications. Smart urban sensors might gather and transmit data on the state of the city to a central cloud, where it could be mined or analyzed for pattern extraction as well as decision-making [7], [8].

A. Internet of Things (IoT) for Smart Cities

The Internets of Things integrates data sensing, transmissions/reception, processing, as well as storage operations by using cloud services. A technology-based IoT architecture consists of five tiers, each of which functions on data from the previous layer. The Sensing layer, also known as the Perceptual layer, is made up of sensors that collect data on physical values of parameters in any process, as well as actuators that operate with physical objects, including RFID readers that scan RFID tags and other similar technologies. Wireless network techniques like as Wi-Fi, cellular internet, Zigbee, and Bluetooth are used to transport data from the sensor surface to the Middleware through the networking layers. The Middleware layers connects the sensing equipment to the Protocol stack, which utilises the data to provide services to users via APIs including database management solutions. The business layer, which is coupled to the application layer, is used to set system management plans and policies. IoT designs are often classified into architectures depending on the types of operating activities assigned to different IoT system components; this classification is mostly centred on data processing duties. The three architectures of Iot applications are Cloud, Fog, as well as Edge Models in respect of the stage of the Iot platform where data processing might take place. The three IoT topologies mentioned were not really mutually contradictory; rather, the upper layer's aim is to augment the lower layer by giving only pertinent information that increases the system's productivity or dependability. The objective of any IoT system designer is to strike a balance between the different tiers' capacities while keeping operating cost and needs in mind.

IV. DISCUSSION

Weaknesses and Strengths Opportunities Threat Opportunities or threats on IoT for Smart Cities that analyses the advantages of IoT for the Smart Towns, the weaknesses in the current implementation situation, the potential for future research in the field, as well as the dangers that IoT deployment to digital infrastructure confronts [9], [10].

A. Advantages

The advantages of IoT smart cities include that they enhance the quality of life for city residents while also lowering operating costs and enabling towns to be more sustainable. Sensors or devices might well be strategically placed across a city to offer an understanding of the current of the city's primary services, including such transport, electrical, water, as well as gas delivery, including crime tracking, to name a few. This real time data helps municipal administrations, businesses, or other stakeholders provide better services to residents while cutting costs.

B. Weaknesses

In terms of technology, IoT in Smart Cities has several flaws. For example, the present deployment As explained in the study, the situation contains a variety of different technologies relating to networks, physical hardware, including software frameworks that do not necessarily operate well together. Standards for information exchange, network discovery, identity, as well as management software, among other items, have been contributed by the Internet Protocol (IETF), the European Telecommunications Standards Institute (ETSI), the Institute of Electrical & Electronic Engineer, or others organizations. However, the sheer number of 'standards,' which are often compatible with each other, hasn't fully solved the interoperability problem, which might stymie IoT system development unless system components are totally redesigned. A lack of information regulations and legislation is another difficulty that IoT systems are now facing. The problem, as previously noted, is that data standards are insufficiently created to control how information is handled in Connected systems.

C. Possibilities

In terms of reducing vulnerabilities and providing new municipal services, IoT in the Smart Cities offers numerous possibilities to academics and companies alike. The information collected by sensor in IoT system has potential to offer a comprehensive picture of the city's condition, enabling for the development of new applications and services using big data techniques. For data analytics researchers, this heterogeneous data presents a fantastic chance to create novel data science methods for service delivery.

V. CONCLUSION

The Internet of Things in Smart Cities is the subject of this article, which covers a broad variety of issues. In this thorough introduction of Smart Cities or its numerous aspects, we illustrate IoT as a vital facilitator of information systems but also discuss the many sustainable urban designs or the obstacles that are experienced in the advent of smart healthcare applications. Then we'll go into the sensing but also communication networks used in these applications, but also how AI is used in smart cities. To present a summary of the present research position in IoT-based Smart Cities, scientists disputed the kind of implementation based on the technologies systems indicated for each of the application addressed for the various components. Finally, a SWOT analysis is provided to address the security and privacy challenges that IoT-based Smart Cities face. This study will aid researchers since it will give a detailed starting point for the use of IoT in Smart Cities. The security or privacy of IoT in smart cities is a key research issue in terms of encryption methods, authentication procedures, data anonymization techniques, and other approaches to prevent unauthorised access to the IoT network. As previously stated, blockchain-based technologies may help with access measurement and reporting, secured equipment, spoof protection, and data loss prevention while ensuring edge encryption.

REFERENCES

[1] P. Surapaneni, M. Symala, and L. P. Maguluri, "Solid Waste Management in Smart Cities using IoT," Int. J. Pure Appl. Math., 2018.

[2] A. Giyenko and Y. I. Cho, "Intelligent UAV in smart cities using IoT," 2016, doi: 10.1109/ICCAS.2016.7832322.

[3] P. P. Kale et al., "Analysis on Smart Waste Management System for Smart Cities using IOT," Int. Res. J. Eng. Technol., 2017.

[4] M. M. Rathore, A. Paul, W. H. Hong, H. C. Seo, I. Awan, and S. Saeed, "Exploiting IoT and big data analytics: Defining Smart Digital City using real-time urban data," Sustain. Cities Soc., 2018, doi: 10.1016/j.scs.2017.12.022.

[5] A. S. Syed, D. Sierra-Sosa, A. Kumar, and A. Elmaghraby, "IoT in Smart Cities: A Survey of Technologies, Practices and Challenges," Smart Cities, vol. 4, no. 2, pp. 429–475, 2017, doi: 10.3390/smartcities4020024.

[6] B. N. Silva et al., "Urban planning and smart city decision management empowered by real-time data processing using big data analytics," Sensors (Switzerland), 2018, doi: 10.3390/s18092994.

[7] S. V. N. Srinivasu, T. Venkateswarlu, and P. Avinash, "A valuable role of digital payments in building smart cities using IoT technology," J. Adv. Res. Dyn. Control Syst., 2018.

[8] S. Poslad, A. Ma, Z. Wang, and H. Mei, "Using a smart city IOT to incentivise and target shifts in mobility behaviour—Is it a piece of pie?," Sensors (Switzerland), 2015, doi: 10.3390/s150613069.

[9] J. W. Bull et al., "Strengths, Weaknesses, Opportunities and Threats: A SWOT analysis of the ecosystem services framework," Ecosyst. Serv., 2016, doi: 10.1016/j.ecoser.2015.11.012.

[10] S. C. Esteves, A. Agarwal, C. L. Cho, and A. Majzoub, "A Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis on the clinical utility of sperm DNA fragmentation testing in specific male infertility scenarios," Transl. Androl. Urol., 2017, doi: 10.21037/tau.2017.08.20.