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Internet of Things for Smart Cities

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Abstract: *This paper aims at clarifying the significance of the word "smart" with regard to the cities through an approach based on an in-depth literature review of international institutions. It also recognizes the main dimensions and elements characterizing a smart city. The diverse measurements of urban smartness are reviewed to demonstrate the requirement for a mutual meaning of what constitutes a smart city, which is its highlights, and how it performs in contrast with conventional urban areas. Smart cities advocate future environments where sensor pervasiveness, data delivery and exchange, and information mash-up enable better support of every aspect of (social) life in human settlements. As this vision matures, evolves and is shaped against several application scenarios, and adoption perspectives, a common need for scalable, pervasive, flexible and replicable infrastructures emerges.*

Keywords: IoT technology, IoT application.

I. INTRODUCTION

Smart city can be characterized as the city which remarkably varies from conventional urban areas by consolidating modern technologies and new plans to improve the life of its citizens. With the fast development in world's urban population, urban areas presently confront the risks. The IoT consists of three layers, including the application layer, network layer, the perception layer. The perception layer includes a group of internet-enabled devices that are able to gather the data, detect objects, perceive and exchange information with other devices through the internet communication networks. Cameras, Radio Frequency Identification Devices (RFID), Global Positioning Systems (GPS), sensors are some examples of perception layer devices. Sending information from the perception layer to the application layer under the requirements of network limitation, device capabilities and the application constraints are the functions of the network layer. IoT systems use a combination of short-range networks communication technologies such as ZigBee and Bluetooth which are used to carry the data from perception devices to a nearby gateway based on the potential of the communicating parties. Internet technologies such as 4G, Wifi,5G, and power line communication (PLC) carry the data over long distances based on the implementation. Since applications objective is to create smart cities, power system monitoring, smart homes, demand-side energy management, integration of renewable energy generators and coordination of distributed power storage, the final layer which is the application layer, is where the data is received and processed.

Accordingly, we are able to design better power dissemination and management methodologies. Worldwide interest in Smart Cities is strong and increasing, fostered by the need to find effective solutions to the major challenges foreseen for the next years, which are expected to strongly affect the current urban landscapes. The main economic and social challenges to be addressed cover: climate change, energy supply and demand, scarcity of fuel and natural resources, population growth, healthcare, urbanization, food traceability and safety, decline of the natural ecosystem, etc.Smart lighting system is a lighting technology, its designed for energy efficiency. This may include high efficiency fixtures and automated control that can be adjustments based on condition such as occupancy and availability of the day light. It is one of the good ways to achieves minimizes the energy consumption and also it helps to utilizes a natural light from the sun and then eliminating man made lighting. One of the key concepts involved in smart lighting system means is light will be automatically turned OFF when person leave a room or place.

Adaptive Street light is also lighting technology that is designed for adaptive condition such as environment condition. Based on environments conditions like rainy, cloudy it automatically adjusts the intensity of light means make a intensity of light to brighter**.** Several joint research projects are currently investigating aspects related to smart city design and adoption both in Europe and US, among them: 1) The Smart Santander project2 provides a city-scale

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experimental research facility in support of typical applications and services for a smart city. Current ALMANAC solutions already integrate data managed by Smart Santander thanks to a strong collaboration between the two projects; 2) The Urban Water project3, is installing smart meters in Almeria (Spain) to achieve greater efficiencies in water management; 3) The Open IoT project4 defines an open-source cloud solution for the Internet of Things, which can be seen as a technological enabler for smart city platforms such the one presented in this paper; 4) The Mobosens US research project5 provides citizens with a platform for collecting and sharing environmental data, from stream quality to drinking water safety.

II. ARCHITECTURE

The overall logical architecture of the smart city framework is purposely kept general to be easily adaptable to any city. It includes functional blocks well aligned with the IoT-A reference architecture specification and mainly addresses four different concerns:

- Enabling external applications to exploit functions and services offered by the platform.
- Enabling efficient handling of high-cardinality, high-frequency event data, context data and metadata associated to managed entities (e.g., sensors).
- Mapping low-level data representations and communication paradigms into a common, shared and machine understandable set of models, and data-exchange paradigmsand finally,
- Supporting effective communication inside and outside the platform. This high-level specification is materialized into a platform architecture organized around four layers the API, Virtualization, Data Management and Smart City Resource Adaptation.

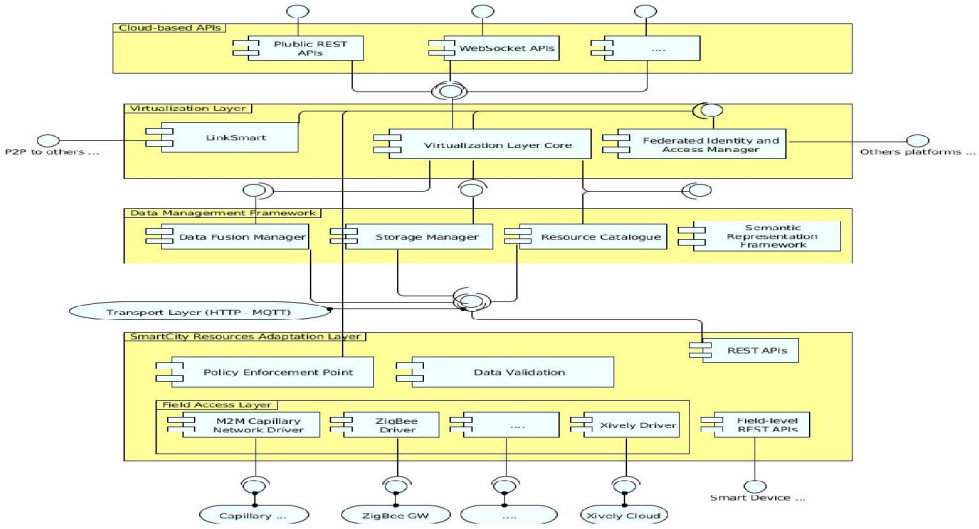

Figure.1 Smart city Platform architecture

2.1 API

The API layer encompasses modules giving endpoints for third party applications to integrate services provided by the platform. presently enclosed modules comprise. a relaxing API end point for client/server interactions, e.g., sorting out specific device types; and a WebSocket API for facultative effective management and delivery of live knowledge streams, e.g., measures taken at the town premises.

For example, functions exposed through the API layer include:

- Semantic Library services, allowing external applications to search for IoT resources (e.g., devices) based on specific metadata requirements, e.g., by resource type(ontology classes), by location, by application domain(e.g., waste management), etc.
- Historical Data services, offering access to time series of events and measures associated to IoT resources managed by the platform (or by other federated platform instances)Such resources can be either “direct”, i.e.,

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corresponding to a tangible service or device deployed in the smart city,or "derived" as result of data-fusion and complex event processing.

- .Data fusion services enabling applications to define their own operators and queries using complex event processing languages (e.g., the Esper EPL6).

3.2 Virtualization

The Virtualization layer represents the very best level of associate platform instance and hosts modules coordinating the activities of the core platform parts. Inter-platform communication, secure handling of information and social control of access policies is enabled by this layer, each at the platform and at the federation level. concerned modules encompass: the Virtualization Layer Core, Link Smart, the Federation Identity and also the Access Manager. specifically, the VLC:

- proxies' requests and responses (as well as event streams) to/from different internal modules, acting as front-end towards the API layer;
- routes incoming data and outgoing information through the proper modules be they internal or belonging to other federated platforms;
- wires and coordinates the activities of different core modules with the aim of effectively fulfilling complex application requests, e.g., involving a directory search, a data fusion query and an historical data extraction;
- transforms requests/responses payload formats to better support interoperability with different systems and smart city platforms. Translation services depend extensively on ontology models and metadata representations managed by the platform semantic modules.

The Link Smart module is based on the well-known, and widely adopted (at EU-level), Link Smart middleware. It ensures inter-platform connectivity through peer-to-peer data exchange, and seamlessly exposes remote platform services as part of the local platform.

3.3 Data Management

The Data Management layer encompasses parts for storing, retrieving and managing each (semantic) information and live information gathered from the sensible town. information filtering, aggregation and fusion of measurements gathered from sensors deployed within the town territory square measure performed at this level, due to the questionable information Fusion Manager module (DFM). Such information is then kept and created accessible to applications through the upper layers. Resources deployed within the town is retrieved and queried due to the joint work of the Resource Catalogue, that effectively handles descriptions of real devices and systems (instances), and of the linguistics illustration Framework, that provides information and context in wide adopted linguistics net standards supporting SPARQL-based CRUD operations.

III. IOT TECHNOLOGIES FOR SMART CITIES

The IoT may be a broadband network that employs normal communication protocols, whereas the web would be its convergence purpose. the key notion of the IoT is that the widespread existence of objects that square measure ready to be measured and inferred, still because it is in a position to switch true. consequently, IoT is authorized by the growth of many things and facility. Things within the IoT involve sensible instrumentation like mobile phones and different facilities together with foodstuff, appliances and landmarks which will collaborate to realize a joint objective. the most characteristic of the IoT is its result on shoppers' life. per location and distance coverage, some networks square measure introduced as follows.

- Home Area Networks (HAN) which use short-range standards like, ZigBee, Dash7, and Wi-Fi. All monitoring and control components in a home are connected by the HAN.
- Wide Area Networks (WAN), provide communication between customers and distribution utilities which require much broader coverage than HAN and for implementation needs fibre cable or broadband wireless like 3G and LTE.
- Field Area Networks, which are used for connection between customers and substations.

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3.1 Radio-Frequency Identification (RFID)

RFID as well as readers and tags contain a very important task within the framework of the IoT. using the technologies on every connected issue, accomplishing their automatic identification and dedicating the only digital identity to any of the items are doable, to incorporate the network related to the digital info and services. RFID provides some applications in sensible grids, as well as trailing and localization of objects, attention applications, parking tons and quality management.

3.2 Near Field Communication (NFC)

Near Field Communication (NFC) is employed for bidirectional short distance communication, particularly in smart-phones. This vary typically involves a centimetre vary. the appliance of NFC in good phones allows United States to use it in smart cities, as well. one in every of its applications includes exploitation smartphones with NFC as a pocketbook that allows United States to use smartphones as our personal cards like charge card, identification card, public transportation card, access management cards. it's potential to alter the standing of objects by checking the situation for instance start the Wi-Fi once the user comes home.

3.3 Low-Rate Wireless Personal Area Network (LWPAN)

LWPAN is amongst short-range radio technology, that covers giant distances of up to 10–15 kilometre. The energy consumption of this technology is very low and battery time period is regarding ten years. consistent with the IEEE 802.15.4 standard, it provides low value and low-rate communication for detector networks. it's the bottom 2 layers of protocols as well as physical and medium access level, besides higher layers protocols as well as 6LoWPAN and ZigBee.

A. ZigBee

In the detector nodes, ZigBee is applied as a low-power and low-priced wireless communication technology. it's supported the IEEE 802.15.4 customary and is appropriate for making wireless personal space networks (WPAN) like home automation, medical device assortment and different low-power, low-bandwidth. a number of its applications embrace wireless lightweight switches, electrical meters, and traffic management systems. ZigBee is appropriate for restricted ranges, coverage of town region and supporting billions of devices.

B. 6LoWPAN

The 6LoWPAN customary is such as to adapt IPv6 communication. Over the time, IPv4 that was the leading addressing technology supported by web hosts has been replaced by IPv6 thanks to the exhaustion of its address blocks and therefore the inability to severally address billions of nodes that may be a characteristic of IoT networks. IPv6 by providing 128-bit addresses solves the dearth of enough nodes for IoT networks, however it creates another downside but, that is compatibility with affected nodes. This downside is self-addressed by 6LoWPAN that is that the compression format for IPv6.

3.4 Wireless Sensor Networks (WSNs)

WSNs build various correct information obtainable and could be applied in ample uses like care, also as government and environmental services. Moreover, WSNs is aggregate with RFIDs to get many targets like gaining information associated with the position of individuals and objects, movement, temperatures, etc. A WSN consists of wireless sensing element nodes that embrace a radio interface, Associate in Nursing digitizer (ADC), multiple sensors, memory and an influence offer. the various elements of a wireless sensing element node square measure illustrated in Figure. in step with the wireless sensing element node framework, it includes numerous forms of sensors that live information in Associate in Nursing log format that square measure regenerate to digital information through an ADC. Some procedures square measure processed on through a memory and microcontroller in step with data necessities. Finally, information square measure transmitted by a radio interface.

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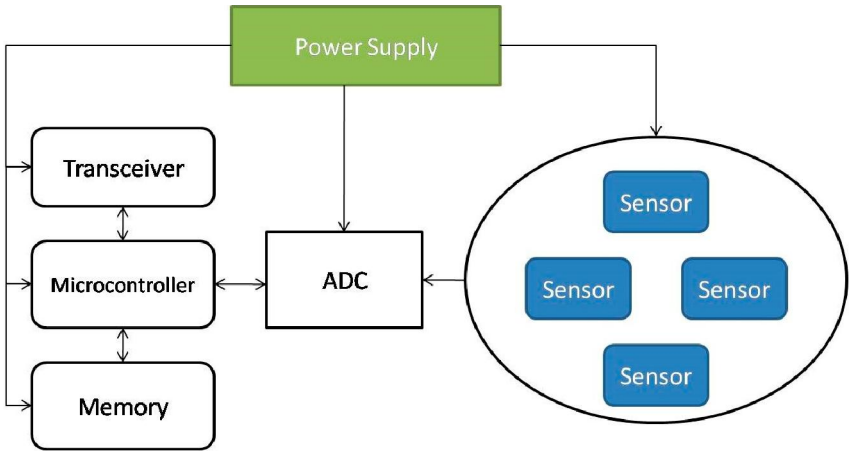

Figure 2: The architecture of a wireless sensor node.

3.5 Dash7

Dash seven may be a promising customary for WSNs employed in long distance and low power sensing applications like building automation and supplying. This protocol is for kilometre-distance vary and operates at 433 MHz that not solely has higher penetration through walls than two.4 Gc however is additionally appealing for HANs. it's price noticing that Dash is incredibly enticing in military application particularly station construction. a number of its applications area unit venturesome material observation, producing and warehouse optimizations and good meter development.

3.6 3G and Long-Term Evolution (LTE)

3G and LTE area unit standards for wireless communication for mobile phones and information terminals. relating to the event and growth of wireless communication infrastructures, LTE and 3G area unit obtainable everyplace, even in accumulation countries. This technology is for broadband property and wasn't designed for brief vary uses. Hence, it's applied for WANs that need longer distance ranges. however, there area unit some barriers to their implementation that ought to be self-addressed.

3.7. Addressing

The Internet empowers a big interconnection among persons, and equally, the present tendency within the IoT creates Associate in Nursing interconnection of things and stuff, for providing good environments. For this purpose, the flexibility of completely characteristic devices and things is important for fascinating results of the IoT. the rationale behind this can be the very fact that completely addressing the large-scale mixture of things is crucial to manage them through the net. Besides the expressed exclusivity plan, responsibility, quantifiability Associate in Nursing strength indicate the most must establish an improved distinctive addressing structure.

3.8. Middleware

Due to many considerations relating to the heterogeneousness of contributory objects, to the restricted storage and processability, alongside to the massive completely different sorts of application, the middleware contains a very important task within the interconnection of the items to the applications' layers. the most target of the middleware is to in brief mixture the practicality and communication talents of all enclosed devices.

3.9. Smart Cities Platforms and Standards

The relationship between the physical and IT infrastructure constructs a unique machine-to-machine (M2M) communication for good cities that alongside new options of network drive good cities communication platforms. These platforms facilitate to hide the communication necessities between heterogenous access technologies and application suppliers. Moreover, these platforms facilitate kind the IoT with planet sensors and communication

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networks. one in every of these platforms that is being employed wide is openMTC extracted from the most recent ETSI standards for the smartM2M specification.

IV. ACTUAL IOT APPLICATIONS FOR SMART CITIES

The IoT uses the web to merge varied heterogeneous things. consequently, and for providing the benefit of access, all existing things need to be coupled to the web. the explanation behind this is often that sensible cities embrace device networks and affiliation of intelligent appliances to the web is important to remotely monitor their treatment like power usage observation to boost the electricity usage, light-weight management, cooling system management. to urge this aim, sensors square measure able to be extended at varied locations to assemble and analyse knowledge for utilization improvement. Figure illustrates the foremost utilizations of the IoT for a sensible town.

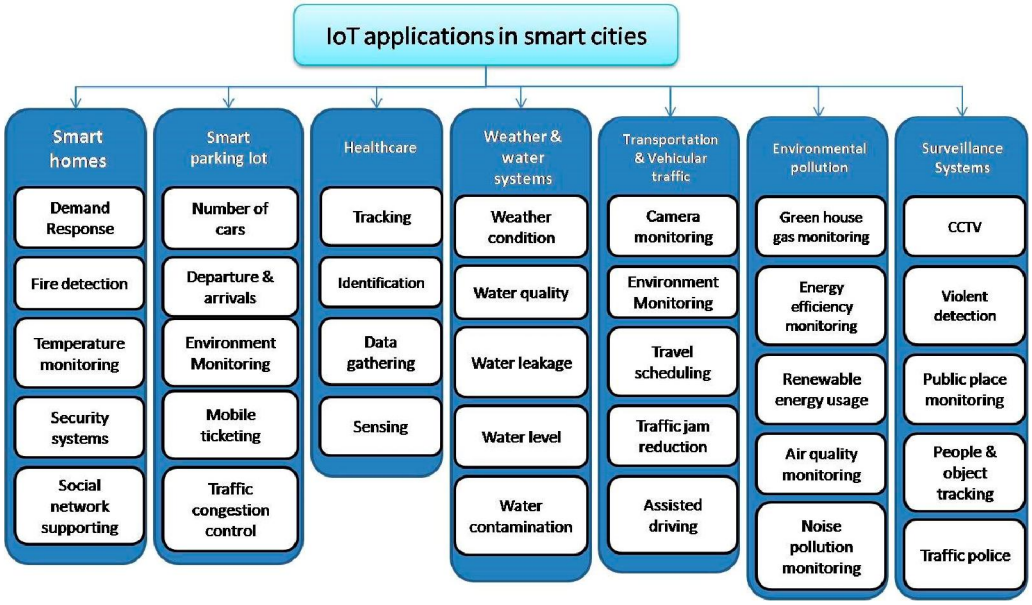

Figure 3: The main applications of the IoT.

4.1 Smart Homes

By utilizing the info that are made by numerous sensors, good homes may be determined. for instance, novel demand response (DR) strategies may be applied, or customers may be cautioned within the case wherever pollution is on top of its acceptable limit through observation the pollution. In fact, IoT technology ends up in having good homes and appliances as well as good TVs, home security system, lighting management, fireplace detection, and temperature observation. Moreover, good homes in an exceedingly neighbourhood may be connected along through Neighbour space Network (NAN) to make a sensible community. during this case, homes are ready to share some police investigation information like outside camera to search out associate accident or report events to a station.

4.2. Healthcare

In the attention domain, IoT technologies have several blessings in good cities. a number of those applications are following of individuals and objects as well as patients, employees and machine, identification of individuals, and automatic information gathering and sensing. In terms of individuals and objective following, the standing of patients in an exceedingly clinic or hospital is monitored so as to produce higher and quicker work-flow within the hospital. the placement of the machine, blood merchandise and completely different organs for transplantation are monitored to visualize the supply on-line. In terms of individuals identification, in an exceedingly info, patients are recognized to decrease the danger of mistake for bar of obtaining wrong medication, doses and procedures. The employee's authentication aims to enhance the employee's behaviour toward patients. concerning the info assortment and sensing, it helps to save lots of time for processing and preventing human errors. Through sensing element devices, designation

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patient conditions, providing time period info on patient health indicators like prescription compliance by the patient is enforced. By victimization bio-signal observation, the patient condition is investigated through heterogeneous wireless access-based strategies to change for obtaining the patient information anyplace.

4.3 Water and Weather Systems

Weather systems use various sensors to produce correct information like temperature, rain, star irradiation and wind speed, in addition on facilitate enhance the potency of a sensible town. Besides the electricity one, water distribution systems ar essential components of each good town. typical strategies of water distribution from the water supply to the client premises don't seem to be appropriate and economical, particularly for designation any discharge within the pipeline or alternative components of the system. Therefore, by deploying sensors at applicable locations of the distribution system, it becomes associate intelligent one for detection of any reasonably faults or alternative applications. Water distribution systems have some components as well as a water supply sort of a lake or a watercourse, storage facilities like reservoirs, and distribution networks like under- or surface pipelines which might be seen in Figure.

Aside from once a town experience an excessive amount of or insufficient rain, several of them face severe issues with water. in keeping with the wants of a vicinity, native utilities will develop innovative strategies to set up and manage irrigation, finding excessive water consumption, improvement of conservation and allocating their scarce resources additional effectively, addressing flooding and waste material management throughout a storm through IoT.

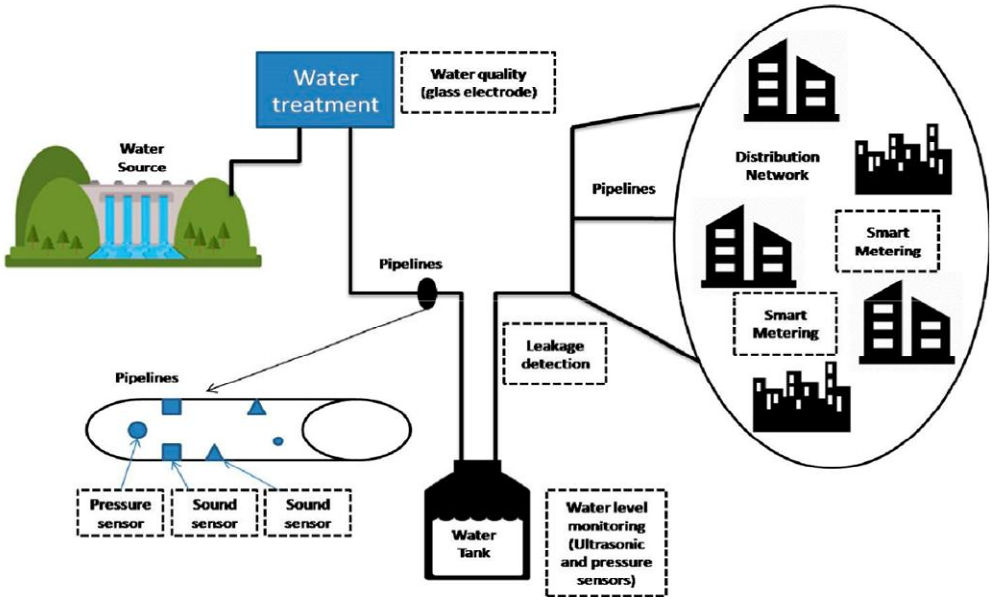

Figure 4: Smart water distribution.

4.4. Surveillance Systems

Security is that the most important part of the sensible cities from the citizens' purpose of read. to the current finish, the whole sensible town must be perpetually monitored and discovered, however evaluating the data and discovering criminal acts area unit extremely difficult. Reference offered new eventualities to spice up sensible cities´ security. typical television (CCTV) systems offer associate degree infrastructure for sensible police investigation systems. However, they connected to a video recorder; don't have the potential of intelligent process. Moreover, human operators could miss some scene and cause a fault. With sensible police investigation, it's attainable to observe folks' actions to search out any violent act and even find the people concerned. sensible police investigation systems will alarm just in case of any event of interest happens. It is used as steerage for the longer-term style of pedestrian facilities or its modification through observance people's angle and finding traffic patterns. in a very concert or a public place like airports wherever there are a unit a large range of individuals, a control theme for pedestrian crowd observance and

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emergency management system is important. For detection and chase folks in the dead of night, infrared cameras area unit used as a result of they work supported temperature. Another facet of this technique is to find what quite objects folks area unit carrying so as to search out any illegitimate or prohibited object. to the current finish, video sequence frameworks area unit applied, that work supported considering any irregularities in people's silhouette. this is often performed by scrutiny a guide of a traditional individual walking within the same direction and within the case of any protrusions and deviation, thought-about as attainable pixels for carrying objects. a number of the opposite camera police investigation systems will find abnormal things embody pedestrians crossing the road while not crosswalks and vehicles entering into a wrong direction by running motion detection algorithms to extract video data and format it in XML, aggregating many frames for performing arts route detection.

V. CONCLUSION AND FUTURE ENHANCEMENT

The purpose of this review essay was to look into different specifications and how they differed. Properties of IoT systems, as well as effective incentives for their use Because the completion of IoT substructures can open up a slew of possibilities for smart cities, The most essential research motives were discussed, followed by a list of key and useful resources explained applications It was demonstrated how everyday tasks might be enhanced and expanded by making use of them Similarly, the difficulties encountered during the implementation of the IoT system were numerous. According to the plan In this regard, the integration of the IoT platform with other independent platforms is a hot topic. One of the most intriguing aspects of smart systems is their ability to provide intelligent and widespread use. One of the most intriguing future trends is the development of systems that allow intelligent and widespread use.

The concept of smart cities has gotten a lot of attention recently, and it will most likely continue to do so in the future. The public and private sectors should collaborate. with cities on developing innovative products and services financial viability, as well as the ability to respond to local concerns essentials. The smart city evolves in tandem with its surroundings as well as the ongoing projects that provide an effective and efficient service a long-term response to the demands of its citizens, clever, according to people who use new technology and the internet. the city's design. The administration should maintain its efforts. make funding available for pilot projects and novel ideas products. Furthermore, since the smart home market is still growing, because technology is relatively new, it necessitates the creation of new businesses. paradigms and ways of functioning that have yet to be developed.

5.1 Future Development will include

- Improved federation capabilities and a systematic approach to trust and service agreement issues.
- An API design that is self-descriptive and machine-understandable.
- Support tools to make it easier for people to embrace the platform for the purpose of disseminating the platform throughout EU cities and, potentially.
- Support for citizen-centric apps on a global scale. to include Citizenship in virtuous cycles, which owing to the platform are possible characteristics. the city should see substantial gains, quality of life, with a special emphasis on waste and water domains of management.

REFERENCES

[1]. A Review of Smart Cities Based on the Internet of Things Concept,Energies | An Open Access Journal from MDPIPublished: 23 March 2017, 10, 421doi:10.3390/en10040421.

[2]. Internet of Things in 2020: Roadmap for the Future. Available online: http://www.smart-systems-integration.org/public/documents/publications/Internet-of- Things_in_2020_EC-EPoSS_Workshop_ Report 2008 v3.pdf(accessed on 24 February 2017).

[3]. Internet of Things (IoT) Technologies for Smart Cities ISSN 1751-8644 doi:www.ietdl.org

[4]. Debian He and ShefaliFeudally. An analysis of rid authentication schemes for internet of things in healthcare environment using elliptic curve cryptography. IEEE internet of things journal, 2(1):72–83, 2015.

[5]. Applications of IoT in Smart City: A Study published by International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV8IS050464 (This work is licensed under a Creative Commons Attribution 4.0 International License.) www.ijert.org Vol. 8 Issue 05, May-2019

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[6]. Adil, Syed Hasan, et al. "3D smart city simulator." Robotics and Manufacturing Automation (ROMA), 2017 IEEE 3rd International Symposium in. IEEE, 2017.

[7]. Research Direction in Realizing Sustainable IoT Based Smart City Ecosystem 2018 2nd International Conference on Energy and Environmental Science Publishing IOP Conf. Series: Earth and Environmental Science 164 (2018) 012036 doi :10.1088/1755-1315/164/1/012036