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Overview for Internet of Things: Basics, Components and Applications

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ABSTRACT

There are significant developments in the field of remote sensing, communications, and control in the world today. The Internet of Things (IoT) is the result of cooperation between them. It is a system of interconnected computing devices, mechanical and digital machines, and things that are capable of sensing and are able to communicate with each other and with machines linked to a network intelligently to take advantage of the data collected through the sensors imbedded into devices. The resulting data can be collected and analyzed in order to reveal insights and propose measures that will produce cost savings, increase efficiency or improve products and services. As IoT is expected to grow and spread rapidly in the coming years, this will improve the quality of consumers' lives and productivity of enterprises. The future is the IoT, which will change the real world objects to smart virtual entities. It is one of the platforms of smart modern cities and intelligent power management systems. This research aims to provide a comprehensive review of the IoT, its main components, and architecture, along with its applications, features and challenges.

Introduction

Internet of Things (IoT) is one of the clearest titles in information technology (1). It connects the things in the physical world in a sensitive and intelligent way with virtual world at any time and at any place. The IoT can be considered as a network of different physical objects embedded with sensors, communication technology, and assigned a unique address, which are connected via cables or wirelessly and interact with the environment to form a network of smart things, which sense the environment of real world and send data for intelligent analysis and make useful independent decisions (2, 3).

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The things that Internet of Things deal with are entities in the real world like food, clothing, and household appliances, industrial devices, plants, electronic devices, parking brackets, and power poles. Thus, anything can become a smart thing by embedding sensors and internal network capabilities (1, 4, 5). The Smart Things are the key in the IoT vision (5). The IoT will make it possible to observe many elements, features and details of the real world at a very low cost, allowing understanding, managing and controlling them better (5). This will open the possibilities to deal with complex and critical situations in the real world and improve many business operations (5). The IoT needs a wide range of technologies and depends on their development (1, 6).

Radio Frequency Identifier (RFID) technology is the sensing network technology and the backbone of the Internet of Things (6). In the IoT, the things are identified by labels or RFID tags coded or Internet Protocol (IP) connected with the electronic network product code (EPC), where sensors and actuators are embedded in physical objects and then connected through a wireless network or cables, often using IP (1, 3, 5). Thus, real world objects can be introduced into the Internet of Things and can be read and followed on the Internet (1). The small size, cheap prices, and low power consumption of microprocessors, as well as communications models and other electronic components, have increased their integration with real-life objects (5).

In sum, the Internet of Things is an open, comprehensive network of smart, self-organizing objects with low storage capacity, low processing capacity, sharing of information, data and resources, responding to situations and changes that occur in their environment and generating unified data without human interference. Its aim is to process these data and provide results for decision-making (1, 7, 8).

Internet of Things covers a wide variety of technologies that provide a wide range of applications and intelligent services that enable intelligent solutions (6). The IoT brings the opportunity and potential to create creative applications. The devices can be integrated into the Internet of Things based on location, whereby communications take place without reliance on location and use sensing services to collect useful information for many applications (7, 8). Internet of Things brings solutions that improve efficiency and create an environment that makes energy, transport, security, health, and education smarter and improves many other considerations for the daily lives of customers. It also provides solutions that improve decision making and productivity in factories, retail, agriculture and other sectors (3, 6). For smart cities, the IoT aims to improve reliability, security and quality of life. Its applications are useful in many daily information gathering initiatives in the city, including public transport, parking lots, traffic jams, energy consumption, air and water pollution, noise pollution and making decisions. It can also help create smart homes (4). IoT-related technologies have become a global concern. It is widely regarded as one of the best and most important infrastructures that promote and improve economic development and technological innovation (9). The ability to trace and program objects in the Internet of Things has allowed companies to become more efficient, speeding up processes, reducing errors, and preventing theft, while also enabling cooperation of complex systems of organizations and companies through the Internet (1). Its use affects various sectors of the economy, as many international factories routinely use IoT technology.

The main objective of this paper is to provide an overview of the Internet of Things and its architecture, highlighting its significance for the future. Focus is given to the basic requirements, characteristics, components, objectives, and its applications, especially in the industrial field**.**

Related Work

Some of the related work will be discussed in this section. A review and examination of current security conditions in Nigeria and how unique components of brilliant participating articles and assemble insight security information that can help law implementation and security agents capture these recognized national security challenges which were introduced in (10). Similarly, in worldwide research that is going ahead in the IoT field, the primary part players and the future patterns have also been investigated (7). Then we can find the examined illustration instead of finish Two

aims first to highlight various huge look into requirements for future IoT systems, and second to bring issues to light of work being performed crosswise over different research groups (11), "Re-inquiry and application on the savvy locally established on segment advances and Internet of Things", the included key advances of IoT are RFID, the sensor innovation, Nano innovation and knowledge inserted innovation. Among them, RFID is the establishment was Presented in (1). Talked about the advantages and difficulties of digital innovations inside "Brilliant Cities", particularly the IoT (Internet of Things) for shrewd groups, which implies considering the advantages and difficulties of IoT digital innovations on joint brilliant urban areas physical frameworks and their human partners was introduced (12). A combined savvy city stage (SCS) was created with regard to the ALMANAC FP7 EU which extends and talks about lessons learned amid the main exploratory application of the stage to a keen waste administration situation in a medium-sized, European city (13). In (14), the authors concentrate on IoT Service Support and Economic Impact, as well as clarify IoT applications and the IoT and M2M ecosystem. Keeping in mind the end goal to depict the IoT architecture, points of interest on the Application Layer, Management Service Layer, Gateway and Network Layer and Sensor Layer are clarified. Then (15) provided the first examination on the achievability of the utilization of an IoT approach and proposed a specific engineering for a maintainable travel application.

Zeinab Kamal Aldein Mohammed and Elmustafa Sayed Ali Ahmed explains what the Internet of things means, the researchers present the concepts of Internet of things and its components and the types of communication it uses such as RFID, Wi-Fi, Bluetooth and ZigBee, also explain the use of many technologies such as GSM, GPRS, 3G and LTE.It shows the importance of Internet of things to the world and how to use things that support Internet of Things by giving information about the surrounding, Also the researchers present the most important applications , So by using internet of things many smart applications will be available such as smart healthcare, smart cities, smart homes and construction, in addition to many important applications such as smart waste management and smart energy (16).

Also explain, the future possibilities of Internet of things technology, the new related things, and the challenges facing the implementation of internet of things. There are many challenges facing Internet of things, but there are two main challenges to ensure smooth access to the network; the first is the fact that the different networks today coexist and the other issue is related to the large size of Internet data. Other challenges include other issues such as address restriction, automatic address setup, security functions such as authentication and encryption, and functions to effectively communicate voice and video signals (16).

Tara Salman and Raj Jain briefly presented The IoT Ecosystem study, its seven layers, and its role. The research focuses on the interconnection layer because of its importance, as well as the standards that cover these seven layers. This research aims at a comprehensive survey of the protocols used in Internet of things. and explain the IoT Data Link Protocols such as the IEEE 802.15.4e protocol that uses in the MAC layer and the IEEE 802.11ah protocol designed to supports low-connection overhead, and power suitable for sensors, and WirelessHART , Z-Wave , Bluetooth Low Energy , ZigBee Smart Energy , DASH7 , HomePlug , G.9959 , LTE-A , LoRaWAN , Weightless , DECT/ULE , EnOcean protocols and others , And Network Layer Routing Protocols (RPL, CORPL, CARP and E-CARP) , And Network Layer

Encapsulation Protocols such as 6LoWPAN, 6TiSCH, 6Lo, IPv6 over G.9959 and IPv6 over Bluetooth Low Energ. , also Session Layer Protocols such as MQTT, SMQTT, AMQP, CoAP, XMPP, and DDS, And IoT Management Protocols such as IEEE 1905.1 - Interconnection of Heterogeneous Data Links, Smart Transducer Interface, TR-069, OMA-DM, and LWM2M. Also the research discussed the security and administrative protocols, and some of the current security standards, also discussed the security of Internet protocols and the TLS / DTLS Transport layer security (TLS) and the widely used TLS (DTLS) datagram security, OAuth 2.0, SASL and ACE. Finally, the research discussed many of the current Internet challenges that still exist in Internet of things that are solved by researchers in future such as Mobility, Reliability, Scalability, Management, Availability, Interoperability, Cost and Complexity, and Power Harvesting (17).

To understand the root causes of Internet of things threats and the new challenges facing existing research better, this research first conducted a survey of the concept of “features of Internet of things". Then the security and privacy implications of eight new features of the Internet were discussed, including threats and solutions to each of these features, also examined the current solutions to these challenges and pointed out what the new security technology requires, And existing challenges that have yet to be resolved. Each feature was highlighted and the threat statement faced then presented the solutions and the possibilities for each of these features of the Internet of things. the new eight feathers are : Interdependence , Diversity ,Constrained , Myriad , Unattended , Intimacy , Mobile , Ubiquitous (18).

Porkodi, R. and Bhuvaneswari, V. in their research covers the use of the main communication technologies in the Internet of things. The possible communication of the internet of things were divided into four fields: first the communication technology of the objects daily, the second the communication of the devices with the large databases and the networks, the third the technology of data collection and the sensitivity of the variables in the physical state of things and the fourth The technology of taking action by means of extended intelligence in objects and finally giving small objects the ability to communicate and interact. The research Explain RFID, sensors and smart phones and gave details on the standards of communication technology used in Internet of things and then describes the challenges and issues of Internet things in various architecture Which were divided into four types: the wireless sensor networks, European Union projects of SENSEI , and Architecture Internet of Things and cloud (19).

Then describes challenges and issues of Internet of things like the security and privacy challenge and attacks that Internet of things systems can be exposed to, and the challenge of addressing the large volume of aggregated data from connected devices and the Quality of Service (QoS) challenge for Internet of things applications, the need to display data and the importance of Communication Protocols, which may sometimes fail, that will leads to the lack of reliability of the end- to –end communication in the Internet of things systems (19).

There is a study on the creation of the Internet of things project in Padova, Italy, after presenting a survey about internet of things used in the cities in terms of technologies and protocols used in addition to the structure of Internet of things, etc., explaining the Internet components of things using REST ,then shows the concept of smart city and its services and Obstacles encountered ,also addresses the services of the urban Internet of things model such as waste management, noise control, traffic violations traps (20) .

J. Lanza, et al. show how to integrate existing city services with a comprehensive system. This research is conducted in real time in parking spaces and uses the available data in Santander city, Spain. The city has been equipped with several types of sensors that have several functions such as traffic control, environmental monitoring and parking control. More than 12,000 sensors were distributed in many areas and locations of the city such as buildings, buses and vehicles to put Internet of things applications in this city put into practice(21).

Arasteh, H. et al. provide a comprehensive review of the concepts, motivations and applications of smart cities. This research explained how to use RFID techniques, WSN, and how to handle internet of things. This survey describes the technologies used in smart city operations and smart city components and explains different characteristics of Internet of things as well as the objectives of their use. Practical experiences and some useful applications were explained around the world, and the challenges of implementing the Internet of things system were fully explained, and what are the most interesting future trends such as combining the Internet of things platform and other independent smart systems to provide large-scale intelligent applications (22).

Basic Requirements

Internet of Things is a result of connecting several techniques together to establish a bridge linking the virtual and physical worlds. It requires:

1. Communications: You must connect things to a network with Internet resources or between them to be able to use data and services.
2. Addressing and identification: Everything has a unique address and unique identifier.
3. Sensing: Objects collect information in their environment with extended sensors, record information, and send data or interact directly with them.
4. Triggers: Objects contain triggers for remote control of real-world operations.
5. Embedded information processing: Smart objects have processor with a simple storage capacity which is used to process sensor information.
6. Localization: is required to know the position of smart objects by GPS.
7. User Interface: is used for the purpose of communicating between smart objects and users(5).

The Components Used in Internet of Things

These are some techniques related to Internet of Things:

1. Radio Frequency Identification (RFID): It uses radio waves to transmit the identity of the object wirelessly in a serial number format. RFID technology plays an important role in the IoT to solve the identification issues of objects. It is classified into three categories based on the processing method, namely active, passive, and semi active. RFID consists mainly of tag, reader, antenna, access controller, software, and server. It is useful to carry an automatic definition and assigns a unique digital identity to everything for the purpose of subscribing to a network. It is reliable, efficient, cheap, and accurate. It is included in many wireless applications, such as traceability, patient monitoring, and military applications.
2. Electronic product code (EPC): This is a 64-bit or 98-bit code that electronically registers on an RFID tag and is designed to improve the design of the EPC bar code and store information about the EPC type, product serial number, product specification, and manufacturer information. It consists of four components, ONS Object Naming Service, EPCDS

Discovery service, EPCIS Information Service, and EPCSS security service.

3. Barcode: This is a different way of encoding numbers and messages using a set of bars and spaces with different widths. The barcode is an optical machine-readable label placed on items that records information associated with the item. There are three types of barcode, Alpha Numeric, Numeric 2, and Dimensional. It is designed to be readable by machine but can be read with laser scanner or cameras.
4. Internet Protocol (IP): It is the primary network protocol used to connect data migration across the perimeter and network boundaries. There are two versions of IP presently in use: IPV4 and IPV6. IPV4 is currently used on the Internet.
5. Addressing scheme: In the Internet of Things, the connections between things are created for the purpose of establishing a smart environment. Thus, all objects must be uniquely identified and their location and function must be known. This is important for the purpose of digitizing all entities associated with Internet of Things and everything is identified with a unique number that distinguishes it from other things for the purpose of remote control over the Internet. This is important for the IoT success. Reliability and scalability are also important, as is individuality, all of which address key needs for developing a unique addressing scheme. IPV4 assigns a range of sensors to be geographically defined. IPV6 is also a good option to remotely access sources in a unique way.
6. Wireless sensor network: It is a wireless network consisting of distributed devices that use smart sensors to form a set and cooperate in monitoring physical or environmental conditions, such as temperature, sound, etc. The collected information is sent to a centralized system for analysis.
7. Wireless Fidelity (WI-Fi): This is a networking technology that allows computers and other devices to communicate via a wireless signal.
8. Bluetooth: This is a cheap wireless technology utilizing short-range radio waves.
9. ZigBee: A protocol developed to improve the advantages of wireless sensor networks.
10. Near Filed Communication (NFC): This wireless technology is short-term.
11. Middleware: The middle layer plays an important role in the connections and interconnections between objects and the application layer, because there is the difference and multiplicity of things used in the Internet of Things, in addition to the restricted storage and diversity of applications. This layer facilitates the integration of functions and communication between connected devices. In addition, it allows for data storage, analysis, use of appropriate software to use data smartly and take appropriate automatic decisions.
12. Actuators: These are found in the physical layer and convert the energy into motion. There are three types of actuators, hydraulic (which use a hydraulic fluid), the electric (use the electric current), while the third type uses compressed air. The movement is linear, circular or pulsed, covering small distances, up to 30 feet. Connected to less than 1 Mbps (1, 8,18).

The Infrastructure of the Internet of Things

Generally, this section will discuss the basic concepts of free stuff by the way Internet infrastructure divided things based on machine-to-machine system to three levels or three layers (perception, network layer and application layer), where you can observe that for each layer of which there are two subcategories of this layer, which gives us the final outcome of the six layers of the Internet of things. Perception layer is introduced in the general

structure of the Internet of Things, and contains keen gadgets, for example, sensors and mechanical drives. The capacity of this layer is open discernment and related information accumulation of gear, gadgets and distinctive sources, and for the second layer, which is the network layer is responsible for reliable information transfer process through the collected layer perception through networks such as various network, mobile devices, the Internet and other networks. The application layer serves to exchange the security of the data accumulated from the layer discernment through various systems, for example, cell phones, the Internet and different systems. For the application layer is the premise and substance of the foundation of the Internet of things, as the principal goal of the Internet of Things is to create numerous applications through which we can control and exchange data between various gadgets, and thus handle information with savvy preparing methods (14) to sum up with as in Figure 1.

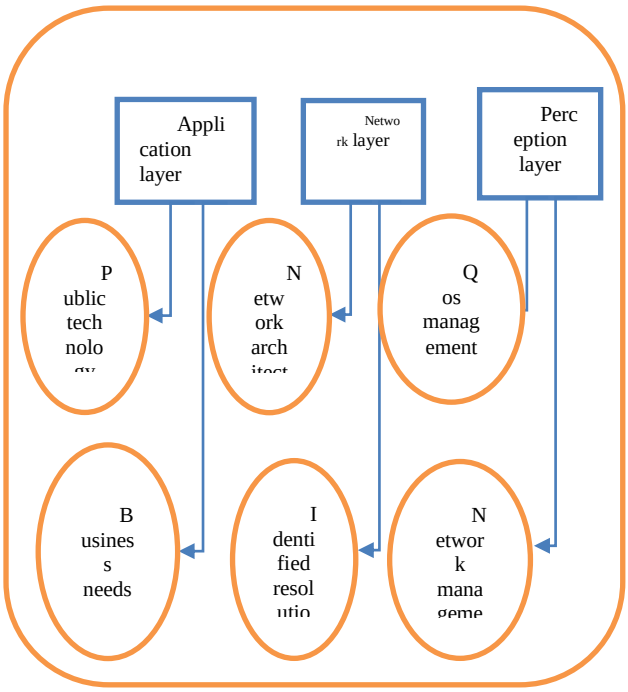

Figure 1: The infrastructure of the Internet of Things

How The Internet of Things Works

The following steps show how the IoT works:

1. Information is obtained from the sense of identified and connected things, such as humidity, temperature, vibration, movement, direction, acceleration, chemical changes in the air, etc., depending on the type of sensor. Different sensors can be combined to design a smart service.
2. Trigger of the action, the information received from the object is processed by a system or intelligent device that determines the automatic action to be invoked.
3. There is a mechanism of feedback to the administration by the device or the smart system about the state of the general system and evokes the results of the acts (2)

Internet of Things Characteristics

The basic features of the Internet of Things are as follows:

1. Intelligence: It makes things smarter by providing them with computing techniques and software.
2. Connectivity: It has the ability to produce and consume data.
3. Interconnection: Depending on the Internet of Things, anything can be linked and used within the information and communication infrastructure.
4. Sense: It uses smart objects to know the surrounding physical environment.
5. Power: Smart power should be designed.
6. Safety: The safety and security of Internet of Things components must be guaranteed during design, work and integrity of the data in circulation.
7. Diversity and Difference: The devices and networks used in the Internet of Things is interconnected, despite its diversity based on its various physical platforms (9, 24, 25).

IoT Applications

IoT technology can be used in many fields and can be adopted to implement useful applications, such as

healthcare, traffic, security, industry, etc. (7). The following are some examples of IoT applications:

Healthcare

IOT technologies provide many benefits to the health care domain which including tracking of objects, pationts and staff, authentication identification of people, collecting data automatically and sensing (26).

Many medical applications are supported by IOT technologies such as remote health monitoring, cardivascular diseases and eldrly care (27).

Zhibo Pang et al. in 2015 designed an intelligent system for healthcare. This system was built by combining the IoT ecosystem with the information system supported by information from stakeholders, health cloud in additional to home of patients through the home health care station (IHHS) (28). The iMEDBOX is designed and considered as the core of IHHS system which can be used via high-performance tablet or a PC. The iMEDBOX incorporates several principles, such as the reuse of 3C platform, Health Extension's certification, interoperability and extendibility, confident distributed software, electrical healthcare that records handing and secured, effective service composition and efficient data fusion (28). There are two applications related with this system to use that system in a correct way. The first application is telemedicine service where the patient and the doctor communicate using Skype and the electrocardiogram (ECG) sensor. The second application is medication service used by the doctor who inputs the patient information through the web page and downloads it via iMEDBOX. The patient information includes name and ID of the patient, medication's time, medicine's name, amount of every dose and another supplementary data (28).

Muscular stimuli can be delivered to paraplegic persons by implemented electrical simulation system of smart things controlled in order to restore movement system (29).

Traffic Management

IoT Technologies can making transport easier ans safer. When the IOT technologies provid the communication between the vehicles and internet, it gives rise to the wealth of applications and possibilities which produce new functionalities to the individuals (27).

There are three main conceptions deal with smart transportation . the first conception is transportation analytic which analysis anomaly detection and demand prediction, the second conceptation is transportation control which including the routing of vehicles, traffic management and speed control, the third conceptions is vehicles connectivity which is tightly related to the way, and allover governd by multi-technology dissemination (16).

Vlad Coroama and ETH Zurich, Institute for Pervasive Computing, Switzerland, in 2006 proposed a prototypical platform that allows traffic-related cost to be measured on individual basis (30). This smart technology involves various concepts used in other applications, like sensors, sensor nodes, wireless communication, location and context awareness, and machine-to-machine communication. It works by providing it with many accounting authorities and sensor information, which are connected to this system by cloud. Those sensors notice the manner and circumstance in the vehicle that is driven. All of the relations of application, including sensors and software which is supporting with group of basic feature to use by this system, are put in a black box designed for this purpose (30).

Industrial IoT Application

There are many taskes should be considered in industrial automation for example emergency actions

shuld be supported, plants should be operated safety, controling on automated regularoty and supervisory, loggging information and alerting, downloading and uploading information (31).

Vandana Sharma and Ravi Tiwari designed a system which can used in industrial organization to provide some taskes such as control and machine auto-diagnosis for problems, ensuring safety for goods and workers by monitoring the oxygen level and gas, temperature is monitored inside the industry and monitoring ozon level in food factories (32).

Simon Bergweiler and German Research Center for Artificial Intelligence in 2016 built cyber physical system in a factory to provide many functions aiming to ensure that the technical communication and data exchange were done well, perform and execute independent easy state and feature checks up to confident level of complexity (33). This system was implemented using cloud-based smart components, whereby data related to objects is stored in active digital object memory (ADOMe) and is hosted on dedicated object memory. The cyber physical system (CPS) allow all memories to perform small task through the connected network, like storage cleaning, monitoring the threshold value or comparing actual target value depending on data in ADOMe (33).

Security Application

The IOT technologies are increasly used in the the field of security and emergencies for example controling on perimeter access, liquid presence, radiation level, and explosive and hazard gas, etc (26).

Most important security applications based on identification technology, therefore many contries start to develop identity card system for thrir citizens, for example in China each chinese citizen has a second-generation ID card which stored in side it a chip and some privateenciphered data (31). a scure environments wre provided to the readers, the reading processing will be operated by well-trained clerk in order to ensure that the second generation ID card system is secure (31).

ousIn Nigeria, Obodoeze F. C. et al., with the help of federal and state government, in 2013 designed and implemented security smart system in order to reduce security breaches related to terrorism and violent crimes (10). This system was implemented using smart objects, IoT and many other technologies, like RFID, GPS, Wireless sensor and actuator networks (WSANs) and monitoring IP camera. The output of that system is stored in database and security gateway by web-based portable interface connected to the server/client (10).

Internet of Things Objectives

1. The basic purpose of Internet of Things is to enable things to connect at any time and at any place with anything and anyone using any route / network and for any service.
2. Internet of Things enables computers to observe and understand the world without human limitations to collect, trace data and calculate everything.
3. The Internet of Things is looking forward to be more comprehensive and support larger capacity of communication between the smart physical devices, computers and mobile devices. There is a huge increase in the number of these different types of devices and different communication models, which requires the development of new types of models addressing dynamic network elements in addition to the existing Internet Protocol.
4. The Internet of Things aims to expand the traditional single-sense domain of the environment to combine multiple sensors to achieve global environmental awareness. This, however, introduces difficulties in representing information, balancing the cost of specifications and protecting

authorizations during the internal interaction between different network devices, which must be addressed to make correct and effective decisions.

5. The Internet of Things aspires to provide sophisticated, adaptive services that can adapt to a more dynamic environment. This calls for the development of new modeling software to achieve this aim (9, 23, 24).

The Challenges Faced by Internet of Things

1. Managing title and definition of things: Due to the large number of things, a good management system is required.
2. Standard specification: Provision of standards for the purpose of providing interoperability between the different devices and objects in the Internet of Thing applications.
3. Security, privacy and data reliability: Sensitive and aggregated data must be protected from attacks, violations and data leakage. Data encryption is essential to ensure data integrity and reliability when processed, transmitted and stored.
4. Big data size: Internet of Things is a source of large data sets due to the large number of connected devices and these big data require attention in transfer, storage and analysis.
5. Protection of objects: As a result of the large number of entities connected to the Internet of Things that are distributed over a wide geographical area, it is necessary to prevent subversion or unwanted changes by intruders and hackers.
6. Local and community considerations: Internet of Things can be global, so service providers should be familiar with the various local and international laws and must protect the rights of users (2, 8).

Conclusions

This research provided a review of the Internet of Things in terms of the theoretical framework, the basic concepts, features, and architecture, also it explained the components associated with it, and how it works in a simplified manner. It also showed the objectives, challenges and applications, especially the industrial ones. Internet of Things brings many technological changes to our daily lives, aiming to make our lives simpler and more comfortable. Currently, there are many IoT applications. Combining its platform with other intelligent systems to provide widespread applications is one of the goals for the near future, as this will yield many personal and economic benefits. With IoT, the future lifestyle will be different from the present. There are many challenges facing the Internet of Things, such as security, reliability, big data, and privacy rights of civilians. As there are no standard definitions for Internet of Things, global standards are required at the level of architecture, giving that technology varies from one service provider to another. For the purpose of global governance, standard protocols are required. Internet of Things applications now extend to different areas for the purpose of managing people's production and living more accurately and improving the relationship between humans and the environment. There are many useful IoT applications in all fields, including medical, industrial, laboratory, transportation, and education. The expected applications are numerous and can reach the global level. Now there is still a large area for various research related with Internet of Things.

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نظرة عن أنترنيت الأشياء و أسسه و مكوناته و تطبيقاته

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الخلاصة:

إنترنت الأشياء هو نظام من الأجهزة المترابطة الحوسبة، والآلات الميكانيكية والرقمية، والأشياء التي هي قادرة على الاستشعار وقادرة على التواصل مع بعضها البعض والاستفادة من البيانات التي تم جمعها وتحليلها من أجل الكشف عن رؤى واقتراح الإجراءات التي سوف تنتج وفورات في التكاليف، وزيادة الكفاءة أو تحسين المنتجات والخدمات.من المتوقع نموه بسرعة مستقبلا ، وهذا سوف يطلق العنان لبعد جديد من الخدمات التي من شأنها تحسين نوعية حياة المستهلكين وإنتاجية المؤسسات.أن المستقبل هو إنترنت الأشياء، والذي سيغير العالم الحقيقي للاشياء إلى أشياء افتراضية ذكية. مما يتيح لنا مراقبة الأشياء من حولنا،. أن أنترنيت الأشياء هي واحدة من منصات من المدن الذكية اليوم، وأنظمة إدارة الطاقة الذكية. الهدف الرئيسي من هذه الورقة هو تقديم لمحة عامة عن إنترنت الأشياء و فهمه، و هيكليته و مكوناته أضافة الى التطبيقات و الخصائص والتحديات .