Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (1) January 2019

The Role of ICT in our Daily Life Applications:
Obstacles and Challenges

BBRC
Bioscience Biotechnology
Research Communications

Internet of Things–IOT–New Reality

Ali Theeb Alaklabi
Deputy Supervisor of King Saud University of Scientific Press, Riyadh, Saudi Arabia

ABSTRACT

This study aims to identify Internet of Things, in addition to fields in which internet of things can be used to improve different fields of life and also, helping to function internet of things capabilities. This study seeks to answer main question: "what is internet of things in the new reality"? Importance of this study is that internet of things is one of modern subjects that are still under research, and the matter needs to be more researched. Based on researcher experience, his strong connection to work environment in Information Institutions, and what he observed of incredible improvements in internet of things services, He feels the importance of internet of things and the urgent need to prepare this study that from its results, social, practical and scientific benefit can be achieved. In order to answer the main question of this study, the researcher uses Descriptive analytical research method that copes with this kind of studies. This study reaches in its results to the description of set of challenges that face internet of things, in addition to explanation of most important advantages of internet of things in life fields of present reality such as active participation in improving services of civil organization and institution, and also, improvements of Artificial intelligence capabilities assisting in real increscent of things connects to internet and devices equipped with Sensors in which humans wear to identify their hobbies and addresses which produces and will produce massive quantity of huge information. This study recommends increasing awareness of internet of things role in improving activities and services in all fields of life. It also recommends improving and processing automatic systems of different institutions and organizations in order to comply with requirements of internet of things applications, furthermore fixing a lot of discussions and internet of things specialized seminars in order to find more promise opportunities, and finally, studding concerns that threaten investment of internet of things applications in work and several services.

KEY WORDS: INTERNET-INTERNET OF THINGS-HUGE INFORMATION-INSTITUTIONAL SERVICES-ANALYTICAL METHOD

ARTICLE INFORMATION:

**Corresponding Author: aalaklubi@ksu.edu.sa*
Received 3rd Nov, 2018
Accepted after revision 19th Dec, 2018
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2018: 4.31 SJIF 2017: 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/12.1/7

INTRODUCTION

The term of "internet of things" appeared for the first time in 2000 A.D in order to add new chapter of advancement in Information Technologies **[1]** to transfer internet from being internet of communications to be internet of things. Thus, a lot of organizations and companies tend to continuity of functioning internet of things capabilities meeting modern life needs, and providing best services achieving best benefits, and best services to beneficiations.

Due to Arab researches Lack for discussing and functioning internet of things in modern life, according to the knowledge of the researcher, and because of urgent need of coping with new things in the activities and services based on internet of things technology, the researcher feels the importance of preparing this study to clarify some available potentials of internet of things in order to invest in works and activities of organizations and institutions in Arab countries or in other countries.

In recent years, several scientists and specialists in the field of information and communication technology started to consider and follow the usage of internet of things in modern life; and tended to identity internet of things. They also asked to be trained on samples of internet of things as being one of the subjects which was tackled in works papers in international conferences, became researchers and associations focus, and was discussed largely in blogs, therefore, the subject is very important, [2].

According to researcher feeling of the study importance on internet of things as a concept, advantages and benefits, and in addition to discuss available and hoped application methods providing the main question: "how can we benefit from internet of things in modern life?", branching into two subsidiary questions: "what is the internet of things?" and "in which field can we use internet of things in order to improve several services and activities?".

Study sample consists of a group of previous studies and literary works discussing this subject using content analysis method, this study sums up with number of results of a group of challenges that face internet of things. In addition to explanations of most important advantages and benefits of internet of things in life fields such as active participation in improving services of civil institutions and organizations, potential of using internet of things in serving society, and forming a lot of groups cooperating in common interests fields, also improving artificial intelligence capabilities helping in real increscent of things connected to internet and devices equipped with Sensors in which humans wear to identify their hobbies and addresses which produces and will produce massive quantity of huge information.

Later, through this practical paper, present study problems, its composition, its main and subsidiary questions was submitted, in addition to previous works related to the subject symbolizing study sample. Also, submitting study method "content analysis method" in which he defined as a subject of the study, and submitting study findings and recommendations reached through applying study method in order to answer main and subsidiary questions.

2- Previous works and researches:Study of Magdalena Wójcik [2] tackles libraries benefits from internet of things services used in other institutions. This study aims at identifying activities which can be applied using internet of things in libraries services. This study focuses on designing theoretical model of appropriate usages of internet of things in libraries. The study compares between activities effect in commercial institutions and non commercial institutions identifying activities effect using or planning to use internet of things which can be applied in libraries. Through this method, theoretical model of internet of things applications was designed which can be used in improving library activities. The findings show that internet of things technology can be used in library activity and services can be used similarly to what executed in commercial institutions.

Study of Massis [3] discusses internet of things applications and its possible effect on libraries. The importance of this study is that it seeks to reach accurate information in addition to practical suggestions in order to overcome security gapes or concerns about invasion of internet of things to privacy. This study provides study findings and comments made in this subject through scientific researches prepared by practitioners and researchers. This study confirms that upon reporting about invasion of privacy and security gapes in internet of things, this must not prevent libraries from using internet of things applications as its results will be huge. The study refers that library secretary should make conversations with beneficiaries on invasion of privacy, answer their questions, and give confidence to them after internet of things invades their privacy because their privacy is subject to supervision of library employees. The study presents practical suggestions to overcome security gapes or concerns about invasion of internet of things to privacy.

Chaves-Dieguez et al., [4] provide internet of things services to smart cities, refers that it is expected that smart cities will improve types of citizens depending on new samples like internet of things that enjoys huge abilities to connect thousands of sensor devices and motors all over the city, receiving requests in addition to movable smart personal devices that enable civil entities to perform its duties professionally in the same moment of requesting with the potentially of receiving reports

from population and sending support through the city connection network in a record and in high quality.

Study of Xu.et al., [5] tackles internet of things applications in smart libraries. The study shows that the reader during book cycling process through library system can re-get book information through internet, defining necessity or apriority in order to borrow or get it back if he was a borrower if there is another beneficiary. Smart library is center of information networks which uses internet of things to make all books and essays in the library smart in which all materials in the library is controlled. Data form will be dealt with electronically through network. Also the library will be internet web center in which library devices and equipments will be controlled trough remote sensing technology in order to serve better and faster for all beneficiaries.

Work of Al-Fuqaha. et al., [6] focuses to enable internet of things technologies, protocols and application survey. This study provides overview on internet of things and concentrates on enabling technologies, protocols and application issues. The study aims to provide information about internet of things application issues in order to enable researchers and application improvers to benefit from it in improving different protocols and applications with each other to provide required functions. The study aims to discover the relation between internet of things and other emerging technologies including analysis of huge information and Cloud computing, and provide information helping in improving horizontal integration between services of internet of things.

The study shows that the internet of things is able to engaging recent improvements including Radio-frequency Identification (RFID) technology, smart sensor devices, communication technologies, and internet protocols. The main hypothesis of this study is possession of smart sensor devices collaborates with each other directly without human intervention in order to present a new class of applications through internet of things. Study findings also shows that the directly deal from machine to machine (M2M) without real human intervention as the first phase of internet of things phases. In following years, it is expected that internet of things will connect several technologies to enable new applications to connect materials together and that in turn supports smart decision taking.

Shamprasadand Satyanarayana [1] discusses internet of things and libraries. It shows level of huge technical Upspring caused by internet of things. Internet of things transfers internet of communication to internet of things which make connecting of things and transferring data through internet is possible with or without any human interference. The study expects that internet of things will cause a revolution in the way of living in all life fields such as: other service industries. Also, internet of things will provide huge capabilities that may help in improving library services. The study tries to explain what is "internet of things", what is the technology it uses and the way of improving. It also presents samples of internet of things samples that can be used in library services and defining possible fields that can be actively executed in library services.

3- Identifying the problem:We need, in the present life, continuity improvements in all activities and services in our daily life in order to cope with technology developments and to increase the coverage space to include largest number of beneficiaries. Internet of things revolution presents new form of internet services and applications. Thus it causes quality upspring in kind and style of services achieving high levels of easiness and fastness in serving human. The researcher desires to make this study due to his desire of coping with these improvements and contribution in spreading culture hoping that it will helps with other results to fasten processes of engaging internet of things in improving different services and activities in our daily life helping to meet living, educational, industrial, healthily, touristic and industrial needs etc. The problem of the study is this question: "what is internet of things applications in the modern life?" branching into two subsidiary questions: "what is the internet of things?" and "in which field can we use internet of things in order to improve several services and activities?"

4- Study Method: Because of the nature of this study which trying to define the term Internet of things and highlighting on its features and to know how to use it in developing various services and activities that affect contemporary life, based on the objectives of the study and its questions which seeks to answer it, the method used in the study is an analytical descriptive method that adapt to this type of study through studies of what has already been dealt with in the field of Internet of things and services and activities that affected it and benefit from it in the study by referencing the available literature that the researcher is able to reach.

5-The practical side of the study The concept of internet of things: Internet of things refers to as an abbreviation in English: (IOT, Internet of Things) which is the initials of each word from Internet of Things (IOT) and it is o0ne of the new terminologies that looks at the future of the new generation of the Internet and its uses and the advanced applications based on the internet," Kevin Ashton is the first to use the word internet of things in 1999" Sheikh [7].

Ashton considers one of the pioneers in the field of technology, he is the founder of the first research Center at the Massachusetts Institute of Technology, it's still in the beginning, and this term means that things will be

able to be more useful with less effort by enabling things to communicate with each other through their Internet connection. And the things which may understand through internet are all the things that have a specific address and identity on the Internet either through their real site or for example by connecting a smart chip or a smart bracelet with a special sensor, glasses or Google clock where the other thing can communicate and understand with it across the internet address through the sensors in the thing or the smart piece added to it and the human himself can be among these things as soon as he has his own smart chip Adjoining to him and looks like clock, bracelet or something like that.

Abu Bakr and Hisham [8] refer to the importance and future of Internet of Things and the last report for International Data Corporation (IDC) which interested in Information Technology shown their expectations for internet of things risks depending on the studies and Follow-ups that observe, noting the expectation tremendous growth in the sales of internet of things up to 2020 with an annual growth rate amounting to 16.9%, one of the most important of these investments is health services.

Health care is one of the most important fields that Internet of things applications and technologies can be applied to, because it is regarded one of the most significant requirements of human life and even organisms such as animals and others. Thus, providing medical and health care and medical treatment services represent an obsession for governments. With the existence of equipment and devices connected to Internet of things , improving medical care services can be easily applied through achieving communication between patients and medical care providers and following-up patients online in some diseases that do not require the patients to be present in hospitals for so long. Such as cancer diseases with children as the hospital take the daily readings through connecting the device provided for the patient at his home. The same can be applied to the rest of specialties in which the Internet of things can be used in providing medical advices and correcting some wrong procedures.

In industrial sector, the need to use Internet of things in production, distribution and operation works and controlling the multiple industries whether computers, equipments, transportation means or safety equipment has largely increased. Internet of things is to be connected to a great quantity of huge data that include origin and post-use data. It is known that huge data needs Internet of things services to reuse, control and analyze these data. Internet of things is of great importance to artificial intelligence as it is regarded the resource of improving it and the most important means for artificial intelligence operators. The same applies to computer and programming works.

Without Internet of things, a lot of ideas and development projects will be just dreams. Internet of things can be used to control robots, perform a lot of works in security, industrial and medical fields and others. Internet of things will be one of the most important applied technologies in managing and controlling the house, turning off and on air conditioning, lighting equipment and surveillance cameras, opening and closing doors and windows and moving movable devices and equipment connected directly to Internet of things. Thus, Internet of things will be in the heart of controlling many things in life.

Internet of things has many advantages including but not limited to the following:Internet of things saves time, effort and money through enabling individual and organization to control things online in order to work efficiently. Internet of things also makes harmony between things through sensors connected by the internet. This advantage saves time, effort and money. Internet of things frees a human from time and place constraints as he can manage and control things through internet protocol without the need to be in their places and to manage directly, if he gave instructions in advance.

Internet of things can work through using smart phones, other handheld devices, and generations of data transmission services by phones and software that depend on satellite systems or GPS. Internet of things researchers managed to develop tools, software and conversational Language between things, which led to what is known today as Internet of things.

The things that work through internet are all tangible and material things (smart things), which are connected through the network. These things can be recognized through labeling clear and fixed IP addresses on them. For example; cars, television, goggles Google and different household tools such as fridges, Washing machines, alarms, houses entrances, air conditioning, goods, products at shops shelves, animals in farms and any other thing meant to be managed, monitored or interacted with electronically through software and sensors that can be connected to the network. Therefore, all the previously mentioned things can collect and exchange date. A human in this case is the sole beneficiary of all these understandings and connections between things that are connected through the internet. These things can be monitored and controlled through smart phones applications. Once again, all these things whether in airports, roads, shops, hospitals, schools, universities, homes and places of work became under control and can be managed and controlled through Internet of things by using mobile phones or any means that is connected to the internet.

Technical developments in information services field resulted in a clear change in information system specialist works and those who work in the field of Ref-

erence Data Services at information institutions. Information institutions must cope with these developments and adapt its services to meet the needs of beneficiaries according to the most updated technical developments especially the development of Internet of things applications.

Internet of things can be applied in the field of information services in all organizations through supplying things used and concerned by beneficiaries and information institutions employees with suitable sensors. Communication devices can be connected to these things through the internet to perform its required works such as information, reservations, recall and return of traditional and electronic Information Resources, in addition to finding lost or displaced information. These works also include controlling the internal environment in terms of lightening, air conditioning, opening and closing doors, monitoring in and out the library and collecting the number of visiting the library or using a definite source by one or more users. In addition to that, Internet of things develop group works, technical procedures and many other things, and it is clear enough that Internet of things revolution can be used in all areas of life.

Internet of things enables a human to things effectively and easily whether closely and remotely. Internet things or networked things as stated by [9] are everything that can be recognized by the internet by known internet protocols. A human in this case is the sole beneficiary of all these understandings and connections between things that are connected through the internet. As a kind of science fiction, a human himself can be a "thing", if he or his surroundings is labeled by a definite Internet address as glass, watch, bracelet, electronic cloths or medical equipment labeled whether on or in his body.

The concept of Internet of Things (Internet of things) was initially raised by Kevin Ashton in the early 2000s while working on a project for Proctor and Gamble to improve their supply chain management by linking RFID data to the Internet. In January 2000 LG announced plans for first Internet connected refrigerator. In 2005, International Telecommunications Union (ITU) took cognizance of the development and mentioned about 'Internet of things' in a published International Telecommunications Union report. In 2008, IPSO alliance was formed to promote the use of Internet Protocol (IP) networked devices in energy, consumer, healthcare and industrial applications. In 2012 IPv6 (Internet Protocol version 6) was launched7, which made it possible to assign IP address to every atom on this earth without having any constraints, thus ensuring connectivity between and across millions of devices.

Internet of things is expected to be used quickly as a source of things that are connected through the internet. The importance of Internet of things is generally attributed to the several reasons or factors, including but not limited to the following:Internet of things works by connecting things through private identification.Internet of things does not differ largely from RFID data as workers in information institutions find them quite similar. Both technologies track things through sensors that can be connected online. However, in the Internet of things, connection between things and devices is only done through the internet.

Internet of things is regarded as an effective means to solve some problems that hinder the traditional institutions such as loosing things or not finding them if they are not placed in their usual places. Internet of things can promote the relation between a reader and a book based on the famous concept of Ranganathan (i.e. book for every reader). A reader can access his book through Internet of things before any other person through the advance reservation. In the future, a book can be instructed to move toward the direction of the reader, if there are robots to serve readers and bring them books on their tables. Internet of things represents a successful means of effective marketing for its services through connections between things and persons registered with it continually.

The future under the Internet of Things (IOT):After the processes of research making, education and rest of life areas have transformed from the traditional way to using the computer at all its development stages, the world became ready to move to the next stage represented in technical developments. These technical developments moved from using handheld devices, smart phones, and social media applications through IOT, which reveals many changes in human Life style, pattern and works largely.

Al Nasser [10] Indicates that the people in the world now live in the age of smart devices and mobile phones, which expected to continue for several years, but there is a great transformation to what we may describe as the Internet of Things (IoT). Internet of things has started to appear now, that is to say that some things we use have the ability to be connected to the internet such as watches, televisions, glasses and many other things. Internet of things concept includes all things that we can imagine for examples; cloths, furniture, household utensils, streets, a human himself and any other thing that can be labeled by electronic sensors to be connected to the internet.

Al Nasser [10] adds that the expectations of using the Internet of Things will be amazing in the future. By 2020, the capacity of Internet of things market will excel the markets of mobile phones, computers and tablets and the financial revenue or sales of Internet of things market will exceed 600 billion dollars. Data that will arise

out of using the Internet of things will be more than 40.000 Exabyte of huge data; this number equals 40 trillion Gigabytes now, which is a very huge storage area.

The applications of internet of things in organizations and institutions:Hawkins, Don [11] states that Internet of things will provide many services expected to develop organizations and information institutions including but not limited to the following:

- Controlling electronic Inventory:

  Internet of things can ease and adjust controlling electronic Inventory by the ability to contact, follow-up and manage the inventory materials and receive the data related to the revenues and expenses of the inventory permanently and accurately.
- Organizations can make payment and registration fees related to participating in training and educational events through its respective application. Organizations can also enable beneficiaries to pay all financial dues for services that require fees and pay fines if any through electronic portal. In addition, beneficiaries can register in activities, get registration card and choose lectures and workshops that they want to attend and so on by the applications of such organizations or even general applications.
- One of the services provided by Internet of things is the possibility to access the electronic portal and ratify the identification of the beneficiary by the contact between the beneficiary recognized by his identification and Electronic Library through the internet. Electronic Library through the internet enables the beneficiary after recognizing his identification to read and benefit from the electronic sources.
- Internet of things eases access to the required subjects in an organization. Such service is based on the Internet of things applications, which allows the beneficiary to track the subject through RFID data labeled on the subject and then determine its place through the digital map of the site.
- Mobile devices applications, which contribute to developing services, enable the beneficiary to perform many operations and requests, get their results, and communicate directly with the relevant employee. An authorized beneficiary can get the information, articles and electronic references from information centers electronically through using applications of mobile devices. applications of mobile devices is only allowed to recognize the beneficiary and confirm his identification, then send the digital content to his device only for reading, not to be saved or copied and paste, in order to preserve the intellectual property rights of different authors. Mobile handheld devices connected directly to the Internet of things achieve all of that [12].

Challenges of Internet of things (IOT):

Concern and fear are ones of the dangerous factors surround any developments provided by information institutions in favor of the internet of things. A lot of beneficiaries suffer from such fear. Here,Rainie [13] refers to many factors considered as a source of fear resulting from the use of internet of things applications that affect on work sequences in the current time, Such as:

- Over use of internet of things may cause wide piracy and exploit any available cavities to disrupt services, as well as make information acquisitions.
- There is a growing concern about the capacity of maintaining privacy because of the use of internet of things, for it causes a disclosure of personal or sensitive information.
- The service's security standard and the ability to overcome any circumstances lead to lack of communication between things.
- The extent of bad effects resulting from the use of internet of things in major fields such as: heath, education, banks etc... such as the unintended mistakes or hacking websites and control things by others.
- The capacity of hacking many of networks connected to things via internet.
- Possibility of threatening many fields that use internet of things; security, health and banking sector with malware programs.
- There are concerned fears that tweak internet of things in order to service non-standard work such as: hacking and unorganized way to get information, in addition to manipulate borrowing and recovering processes in the information institutions.
- Things and communication sets connected to the internet of things are increasingly in growth. In the future, the control over these sets will be confusing. Thus, the entities that willing to invest in internet of things: including information institutions will be worried.

6-Conclusion, Future works and Recommendations:The study concluded many findings divided in two important sections.

First, challenges that face Internet of things, which indicate that the huge quantity of data around the world may raise concerns about privacy and human abilities to control and manage their own private lives continually. Also, the desire of commercial companies and else

to track and target the behavioral Pattern of human connected to the Internet of things and exploit it to realize significant gains is regarded one of these challenges. Many beneficiaries may not access quickly to the Internet of things due to challenges related to complex networks. The expansion in using the Internet of things may increase the number of cyber attacks, exploit any possible faults to break down some or all services and posses data related to the beneficiaries. Using Internet of things may disclose or publish some personal and sensitive information; therefore, there is a great concern about the ability to maintain privacy.

There is also a concern about the continuity of the service and being not affected by any circumstances that may arise or lead to not connection or week connections between things. The bad effects of Internet of things on important areas such as; health, education, banks and else in terms of unintended faults, hacking networks or letting others control things is regarded one of these challenges. In addition to that, the contemporary reality, especially in our Arab societies, which is not yet ready to activate the Internet of things applications on a large scale. This is due to the lack of readiness of the automated systems to include these applications except for RFID data technology. All networks connecting things with the internet can be penetrated. Malware programs may target many areas benefiting from the internet in banking, health and security sectors.

Nowadays, the number of things and devices connected to the internet is becoming increasingly significant, and controlling them in the future is not so clear, and that results in a great concern with the entities that desire to invest in the Internet of Things. The issue of unifying communication standards and protocols in order to enable everything to participate and communicate with a each other is a huge challenge for companies investing in the Internet of things sector. Using the Internet of things is still under some concerns and fears, especially when we speak of the issue of privacy, security and piracy (which represents a great obsession for entities desiring to invest in Internet of things applications). Using the Internet of things requires an expensive financial cost, and the related technical support and training for employees is quite difficult.

Second: this section discusses the advantages and benefits of Internet of Things on the contemporary reality, as the Internet of Things can effectively contribute to developing services of institutions and organizations in several areas including the ability to track things lost or placed in wrong places through the feature of tracking things offered by the Internet of Things. This reduces time and efforts of relevant persons and keeps things from being lost. Internet of things can identify the site of the beneficiary to provide his required services online, answer his questions or even deliver things to him. A beneficiary can download the map of thing site and find it in the market, organization or city by the feature of tracking things. Self-operations in most services and needs can be done independently without intervention by humans whether by devices provided by institutions and organizations in their sites or in public places or by their relevant application on the smart phone of the beneficiary.

By using Internet of things, a beneficiary can recognize due amounts as fines or amounts against paid services and pay the same electronically through the application of the organization. A beneficiary can also control the temperature and lightening of a place online the application related thereto according to the available potentials. A beneficiary can also register in different workshops and activities and get entry card online. Internet of things also enables the beneficiary to access virtually all kinds of electronic or printed information sources available at information centers and book whatever he desires. Employees' performance in organizations can be adjusted and followed-up through the feature of tracking things connected to their smart phones or to things they were assigned to transfer or store for example. The beneficiary can register requests that he desires to get from shops, libraries, pharmacies or any other places through the smart phone application of the organization, and the application will communicate with the organization system at the stated times and request to reserve these things and send them to the beneficiary or identify its delivery site.

The second section refers to that the Internet of Things can contribute to serving the community and forming collaboration groups in several areas of common interests through defining the identifications and places of peers who are connected to the Internet of things and specialized in the same major or share definite interests with the beneficiary. The beneficiary can recognizes his peers, communicate with them and form work groups without prior knowledge. Internet of things also develops the abilities of artificial intelligence, which resulted in increasing the number of things connected to the internet and devices equipped with sensors worn by human to identify their identifications and addresses. These devices produced and will continue to produce a great quantity of huge data to enable service entities to communicate permanently with the beneficiaries in areas of health, education and other services, especially the services provided by information institutions.

Based on the current study findings, it is recommended that further studies should be carried out to deal with the issue of enabling the Internet of Things to provide more services that cope with the requirements

and ambitions of planners to develop the contemporary reality and its applications. It is also recommended to raise awareness of the role of the Internet of Things in developing activities and services in all areas of life through workshops, specialized fairs, and share experiences that managed to use the Internet of Things applications. It is also recommended to develop and process the automated systems of different organizations and institutions to be able to comply with the requirements of the Internet of Things applications. Many seminars and Symposiums should be held to discuss the services of Internet of things to discover more promising chances and handle difficulties that hinder using the Internet of things. Finally, it is very important to study the concerns that threaten the investment of the applications of the Internet of Things in different services and operations that affect the environment and the contemporary reality and try to find solutions to them.

REFERENCES

[1] Shamprasad P. M; Satyanarayana, K.V. (2015). Internet of Things and libraries. Annals of Library and Information Studies (ALIS). Vol 62, No 3 (2015).

[2] Magdalena Wójcik, (2016) "Internet of Things – potential for libraries", Library Hi Tech, Vol. 34 Iss: 2, pp.404 – 420, from: http://dx.doi.org/10.1108/LHT-10-2015-0100

[3] Bruce Massis, (2016) "The Internet of Things and its impact on the ... paper is to consider the Internet of Things (IOT) and its potential impact on libraries

[4] Chaves-Dieguez, D., Pellitero-Rivero, A., García-Coego, D., Gonzalez-Castaño, F. J., Rodríguez-Hernandez, P. S., Piñeiro-Gómez, Ó.,... Costa.

[5] Xu. Li. Da, He. Wu, Li. Shancang Li. (2014). Internet of Things in Industries: A Survey. IEEE Transactions On Industrial Informatics, Vol. 10, No. 4, November 2014.

[6] Al-Fuqaha. Ala, Guizani. Mohsen, ,Mohammadi. Mehdi, Aledhari. Mohammed, Ayyash. Moussa. 2015. Internet of Things: A Survey on Enabling: Technologies, Protocols, and Applications IEEE Communication Surveys & Tutorials, Vol. 17, No. 4, Fourth Quarter 2015.

[7] Sheikh Raed. 2015. Internet of things: when the fridge marketing herself. Qafilah magazine, Dhahran, p 3, 64, May-June 2015,from: http://qafilah.com/ar/%D8%A5%D9%86%D8%AA%D8%B1%D9%86%D8%AA-%D8%A7%D9%84%D8%A3%D8%B4%D9%8A%D8%A7%D8%A1/

[8] Abu Bakr, Hisham. 2016. the Internet of things. Dammam: today's newspaper, issue 15644, Thursday 7/7/1437/April 14, 2016,from: http://www.alyaum.com/article/4131167.

[9] Fraihat, Haidar 2015. Internet of things. Division of technology For development in ESCWA. Publication on Wikipedia, from: https://ar.wikipedia.org/wiki/%D8%A5%D9%86%D8%AA%D8%B1%D9%86%D8%AA_%D8%A7%D9%84%D8%A3%D8%B4%D9%8A%D8%A7%D8%A1.

[10] AL Nasser, Nasser. 2014. What do you know about Internet things?. Technical world site. March 4, 2014, from: http://www.tech-wd.com/wd/2015/03/04/internet-of-things/.

[11] Hawkins, Don.(2016). The Internet of Things and Libraries: The Wednesday Evening Session March 11, 2016 in CIL2016.FROM: http://www.libconf.com/2016/03/11/internet-things-libraries-wednesday-evening-session/

[12] Joan K.2010. Mobile Reference: What Are the Questions? The Reference Librarian, vol. 51 (1) January –March, 2010, pp. 1-11Joan K. Lippincott Coalition for Networked Information. From http://old.cni.org/staff/joanpubs/mobile.RefLibn.final.pdf

[13] Rainie, L.2014. The Internet of Things And what it mean for librarians.Pew Research Center Internet Project Presented to: Internet Librarian ,October 28, 2014.