



Public Awareness and Attitude about IoT and its Impact

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Available online at: www.isca.in, www.isca.me

Received 13th May 2016, revised 18th June 2016, accepted 25th July 2016

Abstract

Internet of Things circles around connecting everyday devices each other via the Internet. With the passage of time, Internet of Things has grown, and is continuously growing. With this it has become a necessity of each individual's life. Little they are aware of the term itself, especially people in Pakistan. This research highlights how IoT is controlling everyone in some way or the other, but most of the Pakistanis have no recognition of using IoT in their devices while foreign users do. It also talks about security, a major challenge for the technology. The study analyzes a purpose built survey that compares local and foreign users on the awareness level and attitude with regards to IoT itself. The results conclude that most of the local participants are somehow using IoT technology but did not know that these are part of IoT. The survey also proves how all the users are dependent on IoT and would prefer using advanced form of IoT in future. All the participants, be they local or foreign, would like to have IoT in their lives if the issue of security is eliminated.

Keywords: Internet of things, Security, Awareness, Attitude, Technology.

Introduction

Internet has become a part of every individual's life and the need and dependency are increasing each day. With the passage of time, things have shifted from just Internet to Internet of Things.

The "Internet of things" (IoT) may be turning into a progressively developing subject sentence of discussion both in the work environment and outside for it. It's an idea that not best need the possibility will sway how we live as well as how we worth of effort. Be that the thing that precisely is the "Internet of things" and what effect will be it setting off to have on you, if any?¹

Those Internet of things (IoT) is an arrangement about interrelated registering devices, mechanical and advanced machines, objects, animals or kin that would give for exceptional identifiers and the capacity to exchange information through a system without requiring human-to-human or human-to-computer association². IoT connects all the devices to the Internet, and not only this, it also interconnects all these devices to each other via Internet.

Despite the idea wasn't named until 1999, the Internet for things need been for improvement for decades. Those to start with web appliance, to example, might have been a coke machine during carnegie melon school in the promptly 1980s. The programmers might unite with those machine over the Internet, check the status of the machine Furthermore determine if or not there might be an icy drink awaiting them, ought further bolstering

they choose should settle on the excursion down of the machine².

Internet of things may be revolving around expanded machine on machine correspondence step by step. It is a chance that expand on cloud computing and networks from claiming physical article³. Internet of things need settled on a large number invention. Some of the most punctual ventures bring started to pay off, for advanced mobile thermostats, wearable wellness devices, Furthermore other innovations turning into standard. For new IoT items under improvement or as of late propelled going starting with medical-monitoring frameworks should sensors for cars, some examiners accept that the Internet of things will be poised for considerably more excellent additions⁴. But apart from inventions, there are also some challenges that have to be faced.

The main objective of this paper is to examine and compare the awareness level and attitude of users, throughout the world, regarding Internet of Things; along with the limitations of IoT. The paper has 7 sections. The following section discusses the detailed focus of study. Section 3 explains the research approach and methodologies used to conduct our research. In section 4, we have discussed the results of survey based on analysis as well as the security issues-limitations of IoT. Section 5 summarizes the evaluation. Section 6 concludes the paper.

Related Work: Iot is setting off on making those following enormous relic that might have been predicted.

For 2011, Fiscal examiner marc Andreessen comprehensively declared in the divider street Journal, "Software will be

consuming the universe.” Toward mid-2013, as much partner Benedict Evans alarmed us will an evolving of the guard, the point when he declared, “Mobile will be consuming those reality.” Thereabouts the thing that engineering will be setting off to “eat this world” next? It’s an especially appropriate inquiry as we leader under 2016.

John chambers – previous president also official Administrator of Cisc frameworks inc. CSCO predicted that IoTis going to eat the world but yet at some places like Pakistan people don’t even know about this new emerging technology. He says it’s the web for things (IoT).

Talking at Fortune’s worldwide gathering, he predicted that 500 billion gadgets might be associated with the internet by 2025⁵. So most of the devices of daily life will be on Iot in future, here the question arises that whether people want to be dependent on IoT devices or not.

An event for awareness about Iot in Pakistan was organized by Telenor in Karachi and Lahore. Named “Telenor Internet of Things Expo” For the first time in Pakistan, comes the Internet of Things Expo. Let’s embrace the future where we can Switch off our lights, monitor our cars and secure our families and much more – anytime anywhere – with just a smart phone⁶. In Karachi they take initiatives and startups for IoT technology. The Telenor Internet of Things Awards is an acknowledgement and recognition for IoT initiative and startups in ten categories. IoT awards are open to the entire spectrum of companies involved in IoT Expo⁷.

On introduce issues “DHL pattern report card Internet of things “stated that with the Internet of things considering the possibility should attain the real-world progresses depicted above, much of the starting strategy investment must be paid produced vertically, i.e, with admiration to a particular business. Market-specific controllers need off recognizing IoT-related strategy activities for a few of the businesses above, In spite of often never really utilizing those haul “Internet of things”. There are number of critical level approach issues that influence the Internet of things crosswise over business sectors, also use cases. These include, for instance interoperability empowering gadgets, also frameworks with interface for one another (for a specialized foul level, commonly through dependence with respect to as a relatable point guidelines or conventions. Privacy the capacity for shoppers and organizations on shield their personage or benefits of the business information in our current reality for machine-to-machine transmissions.

Security ensuring that devices, networks, and applications are secured from threats by malicious actors. **Data Storage** Where, how, and when the vast amounts of data generated from individual sensors and devices will be stored. **Spectrum and Bandwidth** Ensuring that sensor-enabled and network-aware devices are able to transmit their data in a manner that uses constrained resources efficiently⁸.

Focus of Study

Our focus of study presents that the term Internet of things is not known by the people and even though they use it, they are hardly aware of the impacts. Similarly as shown in the abstract, the objective of this research paper is: i. To study public awareness and attitude about the term “Internet of things”. ii. To equate our outcomes with the hypothesis that creates a basis the term “Internet of things” is not so commonly used. Our first objective gave us the basis to achieve our second objective. iii. To study the security challenges in Internet of Things.

Research Approach

Participants: We gathered our information utilizing two web survey forms- one for local user and another for foreign users to compare the results. To distinguish the familiarity between both set of users we made and assessed a set of hypothesis that is supported on the basis of Internet of things awareness and impact and other researches in this background.

Procedure: The participants chosen for this research are distinguished as of local users and foreign users of different age groups and educational backgrounds (business, science, computer, etc). The foreign users include people majorly from USA, Canada, UAE, Scandinavia, United Kingdom, Australia and Russia.

Results and Discussion

On confirm our 1st objective, we went through significant number other research papers in this topic. Those data assembled in the to start with objective, encouraged previously, checking those theory in the second objective. We then created a list of hypothesis continued with the discussions which are as follows.

Hypothesis: H1: People do not know about the term “Internet of things”, H2: People do not know about IoT’s impact, H3: People are dependent on IoT despite not knowing the term, H4: People know that their data is not secure on internet and this limits them to use IoT, H5: People would prefer Internet of things. We are setting ahead survey analysis that will present the results by comparing the research outcome of local users and foreign users to confirm the hypothesis.

Survey Analysis: Both local and foreign users responded to the survey form which we analyze the following results.

Argument 1: People do not know about the term “Internet of things”: To assess whether both the users know about Internet of things, the first survey question was whether they know this term or not.

Local users: 85.7% of the respondents said ‘NO’ when asked “Do you know the term Internet of Things?” However, the 40%

of the same respondents said ‘YES’ to the next question when asked “Do you controlled your AC/multimedia/ CD players/ printer via your cell phones (apps)?” and 79% of the respondent said they did not know that these things are part of the term “Internet of things”.

Table-1
Local users - Awareness of the term

Do you know the term Internet of things?	
Yes	14.3%
No	85.7%

Table-2
Local users - Using IoT

Do you control your AC/multimedia/ CD players/ printer via your cell phones (apps)?	
Yes	40%
No	60%

Table-3
Local users - Knowledge of the term

Do you know all these are part of “Internet of Things”?	
Yes	21%
No	79%

Foreign users: 85% of the respondents said ‘YES’ when asked “Do you know the term Internet of Things?”. 62.75% also gave a positive response to the question “Do you controlled your AC/multimedia/ CD players/ printer via your cell phones (apps)?” and majority of them knew these things are part of “Internet of things”

Table-4
Local users - Awareness of the term

Do you know the term Internet of things?	
Yes	85%
No	15%

Table-5
Local users - Using IoT

Do you control your AC/multimedia/ CD players/ printer via your cell phones (apps)?	
Yes	62.75%
No	37.25%

Table-6
Local users - Knowledge of the term

Do you know all these are part of “Internet of Things”?	
Yes	76%
No	24%

Our hypothesis 1 was proved to be true for local users and evaluation concludes that no matter how much users deny about the term, they still use the applications of “internet of things” without knowing it. Whereas, foreign users have the knowledge about the term while they use it.

Argument 2: People do not know about Internet of Thing’s impact:

Local users: 88.7% of the respondents said ‘YES’ when asked “Do you feel that interconnecting all objects in our daily life (e.g. Printer, Car, Electrical appliances, e-shopping, smart apps etc.) via the Internet would be beneficial for you?” and 90% of the respondents answered ‘YES’ to the question “Do you feel disconnected when you don’t have mobile phones/Internet?”

Table-7
Local users - Importance of IoT

Do you feel interconnecting all objects in our daily life (e.g. Printer, Car, Electrical appliances, e-shopping, smart apps etc.) via the internet would be beneficial for you?	
Yes	88.7%
No	11.3%

Table-8
Local users – Importance of IoT in daily lives

Do you fell disconnected when you don’t have mobile phones/Internet?	
Yes	90%
No	10%

Foreign users: 80% answered ‘YES’ to the question “Do you feel that interconnecting all objects in our daily life (e.g. Printer, Car, Electrical appliances etc.) via the Internet is important to you?” while 88.2% people responded ‘YES’ to “Do you feel disconnected when you don’t have mobile phones/Internet?”

This turned out that our hypothesis 3 is false and evaluation concludes that as both local and foreign people know the impact of “Internet of things” in their lives and they consider it right.

Table-9
Local users - Importance of IoT

Do you feel interconnecting all objects in our daily life (e.g. Printer, Car, Electrical appliances, e-shopping, smart apps etc.) via the internet would be beneficial for you?	
Yes	80%
No	20%

Table-10
Local users – Importance of IoT in daily lives

Do you feel disconnected when you don't have mobile phones/Internet	
Yes	88.2%
No	11.8%

Argument 3: People are dependent on Internet of Things despite not knowing the term:

Local users: When asked about dependency, 57.1% of the local users said 'YES' to the question "Do you feel dependent on smart apps like (stocks applications, entertainment applications etc.)?"

Table-11
Local users – Dependency on IoT

Do you feel dependent on smart apps like (stocks applications, entertainment applications etc.)?	
Yes	57.1%
No	42.9%

Foreign Users: Same question was asked from the foreign users that "Do you feel you are dependent on "Internet of things?" and 74.5% responded positively.

Table-12
Local users – Dependency on IoT

Do you feel dependent on smart apps like (stocks applications, entertainment applications etc.)?	
Yes	74.5%
No	25.5%

Argument 4: People know that their data is not secure on internet.

Local users: 79% local users answered 'YES' to "Have you ever come across a situation where you feel that your data is not as secure and private as it seems to be?" and 80% responded

'YES' to the question "Do you know your data is unsafe while using such devices?"

Table-13(a)
Local users – IoT privacy

Have you ever come across a situation where you feel that your data is not as secure and private as it seems to be?	
Yes	79%
No	21%

Table-23(b)
Local users – IoT privacy

Do you know your data is unsafe while using such devices?	
Yes	80%
No	20%

Foreign users: 88.24% of the foreign respondents answered 'YES' to "Have you ever come across a situation where you feel that your data is not as secure and private as it seems to be?" and 80.39% responded 'YES' to the question "Do you know your data is unsafe while using such devices?"

Table-14(a)
Foreign users – IoT privacy

Have you ever come across a situation where you feel that your data is not as secure and private as it seems to be?	
Yes	88.24%
No	11.76%

Table 14(b)
Foreign users – IoT privacy

Do you know your data is unsafe while using such devices?	
Yes	80.39%
No	19.61%

This turned out that our hypothesis 4 is true and evaluation concludes that as people have almost same opinion about the privacy and security of the "Internet of things", whether it be a local user or foreign user.

Argument 5: People would prefer Internet of things in future

Local users: When local users were asked "Would you prefer to switch to advanced IoT devices (smart home, electrical appliances, smart kitchen, etc.) or continue to use the current technology?" 69.39% said they would prefer to switch while remaining 30.61% stated the main reason as security for not switching.

Table-15
Local Users – IoT in future

Would you prefer to switch to advanced IoT devices (smart home, electrical appliances, smart kitchen, etc.) or continue to use the current technology?	
Yes	69.39%
No	30.61%

Table-16
Local Users - IoT preference

If you would not prefer to switch to advanced internet of things, specify the reason.	
Cost	32%
Security	53%
Usability	9.9%
Other	5.1%

Foreign users: Foreign users were asked the same question and 70.59% said they would prefer “internet of thing” devices. However 29% stated security as the main issue for not preferring “Internet of things”.

Table-17
Foreign Users – IoT in future

Would you prefer to switch to advanced IoT devices (smart home, electrical appliances, smart kitchen, etc.) or continue to use the current technology?	
Yes	70.59%
No	29.41%

Table-18
Local Users - IoT preference

If you would not prefer to switch to advanced internet of things, specify the reason.	
Cost	19%
Security	61%
Usability	11%
Other	9%

This proves that our hypothesis 5 is true and majority of the people would love to switch to “Internet of thing” devices if security was not an issue.

Limitations and Challenges

As the survey proves, the only reason that majority of participants would not use Internet of Things is security.

Similarly as IoT develops, those accepted idea of web that might have been best interfacing unique units of the web takes another dream that is will coordinate constantly on these gadgets should one another. Same time On late A long time a number mechanical transformation tests bring at that point been tackled through the development What's more adjustment about remote technologies, security and security still remain as those fundamental obstructions for those IoT organization looking into an expansive scale. In this developing paradigm, commonplace situations wrist bindings especially delicate data, What's more whatever spillage for data Might extremely harm the security of clients⁵. For a late 2015 digital security report, AT&T charted An 458% expand in web about things (IoT) defenselessness filters from claiming gadgets. This may be the polar most recent implication that hyper-growth for IoT devices, sensors What's more frameworks over business, customer and administration parts puts users' majority of the data security What's more security during hazard ⁶. There need aid three magic IoT security challenges, as stated by Skarmeta to start with particular case being An trillion focuses about vulnerability: each single gadget Furthermore sensor in the IoT speaks to An possibility danger Concerning illustration person feeble connection Might open up right should hundreds about many units around An organize with possibly genuine results. The opposite one will be trust Also information integrity: corporate frameworks will make bombarded by information starting with the sum way for associated sensors in the IoT. Anyhow how beyond any doubt camwood a association make that those information need not been compromised or interfered with? The third way test as stated by Skarmeta is information collection, insurance and privacy: though information gathered by associated units may be compromised it will undermine trust in the IoT. For All that connected, the IoT smashes the division between those CNI and the shopper universe. Regular family unit things might possibly be misused toward cybercriminals with increase right of the incredulous national framework (CNI).

As stated by Isaac Jones, an alternate methodology ought to be utilized for web of Things, Concerning illustration those accepted approach may be not suitability. Passwords for example need aid officially awful to web also will a chance to be a catastrophe to Internet of things to numerous motivations. Those security policy, protection policy, provision level security Furthermore protocol level security are those layers that ought to make viewed as to IoT security. Developing IoT results for security and more security would be guaranteeing. These incorporate making users' cell telephones their security and protection “key” that camwood affirm gadget pairing, leveraging cryptography as opposed to a console and passwords, also privacy-preserving particular information capacity frameworks thereabouts clients control their private information imparted over IoT frameworks. Client protection and security in IoT might make safeguarded on security is fabricated under IoT from the starting⁶.

Table-19
Summary Evaluation

Hypothesis	Survey questions	Response	Survey questions	Response	Conclusion
	Local users		Foreign users		
People do not know about the term "Internet of things"	Do you know the term IoT?	YES:15% NO: 85 %	Do you know the term "Internet of things"?	YES: 84.3% NO: 15.6%	Hypothesis: True for local users False for foreign users
	Do you controlled your AC/multimedia/ CD players/ printer via your cell phones (apps)?	YES: 38.7% NO: 61.2%	Do you control your AC/multimedia/ CD players/ printer via your cell phones (apps)?	YES: 62.7% NO: 32.7%	
	Have you ever downloaded Applications from Playstore / App Store?	YES: 98% NO: 2%	Have you ever downloaded Applications from Playstore / App Store?	YES: 94.1% NO: 5.8%	
	Do you know all these are part of IoT?	YES: 20.4% NO: 79.5%	Do you know all these are part of "Internet of Things"?	YES: 76% NO: 23%	
People do not know about IoT's impact	Do you feel that interconnecting all objects in our daily life (e.g. Printer, Car, Electrical appliances, e-shopping, smart apps etc.) via the Internet would be beneficial for you?	YES: 88.7% NO:11.2%	Do you feel that interconnecting all objects in our daily life (e.g. Printer, Car, Electrical appliances etc.) via the Internet is important to you?	YES: 80% NO: 19%	Hypothesis: False, Both users know the impact
	Do you feel disconnected when you don't have mobile phones/Internet?	YES: 90.8% NO: 9.1%	Do you feel disconnected when you don't have mobile phones/Internet?	YES: 88.2% NO: 11.7%	
People are dependent on IoTs despite not knowing the term	Do you feel dependent on smart apps like (stocks applications, entertainment applications etc.)?	YES: 57.1% NO: 42.8%	Do you feel you are dependent on Iots?	YES: 74.5% NO: 25.4%	Hypothesis: True for foreign users
	Is it okay if you have to control all objects manually	YES: 43.8% NO: 56.1%	Is it okay if you have to control all objects manually?	YES: 58.8% NO: 43.1%	
	Would you prefer to use paper money instead of Credit Cards/NFC for paying bills?	YES: 31.6% NO: 68.3%	Would you prefer to use paper money instead of Credit Cards/NFC for paying bills?	YES: 29.4% NO: 70.5%	
People know that their data is not secure on internet	Have you ever come across a situation where you feel that your data is not as secure and private as it seems to be?	YES: 79.5% NO: 20.4%	Have you ever come across a situation where you feel that your data is not as secure and private as it seems to be?	YES: 88.2% NO: 11.7%	Hypothesis: True for both users

Hypothesis	Survey questions	Response	Survey questions	Response	Conclusion
	Local users		Foreign users		
	Do you know your data is unsafe while using such devices?	YES: 80.6% NO: 19.3%	Did you know your data is unsafe while using such devices?	YES: 80.3% NO: 19.6%	
	Do you know your private data can get shared with others?	YES: 72.4 NO: 24.5%	Do you know your private data can get shared with others?	YES: 80.6% NO: 19.3%	
People would prefer Internet of things	Would you prefer to switch to advanced IoT devices (smart home, electrical appliances, smart kitchen, etc.) or continue to use the current technology?	Switch: 69.3% Continue to use: 30.6%	Would you prefer to use to Internet of things devices or conventional technology?	IoT: 70.59% Conventional technology: 29.4%	Hypothesis: True for both users
	If you would not prefer internet of things, specify the reason. -Cost -Security -Usability -Others	Security: 53.09% Cost: 32.1%	If you would not prefer internet of things, specify the reason. -Cost -Security -Usability -Others	Security: 60.1% Cost: 18.18%	

Conclusion

In our research paper we have presented our hypothesis and a survey that was conducted on the basis of that hypothesis. Our first hypothesis was about awareness of IoT, that this technology is still unknown in Pakistan as compare to other countries despite the fact that they are using it somewhere in their lives. This has proved true. Our second hypothesis has proved false as local and foreign both users know its impact in their lives. Third hypothesis was about dependency on IoT based devices which is surprisingly true by just 60% for local and 62% for foreign users. Fourth hypothesis is that people both local and foreign know that their data is not secure on internet which has proved true for both. Our fifth and last hypothesis was whether people want to switch to IoT or want to continue on conventional technology and it has also proved true and as per expectations the main reasons to not to choose IoT over conventional technology were security and cost. Security was the major reason according to research.

In our research we have got the facts that hardly 60% to 65% people feel dependent on IoT based devices while in the Technical world it has been called the technology that is going to eat the world in 2016. Security that is the major concern that is not yet resolved in this technology. It is a barrier for more than 30% users in switching to IoT. It is a technology that is unknown in Pakistan for almost all non computer literates. Here in Pakistan there are very few application of IoT can be find out

so dependency on IoT dependent devices is low but surprisingly In other developed countries where people do know this technology and do use it in their lives still don't feel dependent on it. In Pakistan People do want to use it and find it beneficial for them but for some reasons like security and cost they hesitate to switch on this new technology, this is same reason for foreign users that they don't want to switch on it or they are not using it so they don't fell dependent on IoT based devices

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