

**AWARENESS OF INTERNET OF THING AMONG STUDENTS OF  
SOUTH EASTERN UNIVERSITY OF SRI LANKA**

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**Abstract**

Internet of Things (IoT) is an emerging technology which is a network of interconnected objects using internet capable to collect and exchange data with each other. It facilitates human activities by providing a platform which includes different types of embedded devices such as sensors and responders. Hence most of the people are using IoT devices and its applications in day to day life, but as an innocent about the technological impact. This study was carried out to analyze the eminence of awareness on IoT among the undergraduate students based on different factors. Sample data were collected from all six (06) faculties of South Eastern University of Sri Lanka (SEUSL) using online questionnaire forms. Both qualitative and quantitative research design approaches were used on collected data with random sampling method. Analysis results of the study proved that most of the students extended their knowledge on IoT by self-learning and they believe that IoT based applications are more fun to use. More than 80% of the students have faith in that the IoT encourages them to use latest technologies and will lead to learn more technologies in future as well. Furthermore, most of the students have interest to work with IoT projects, thus they have suggested to create a subject in their syllabus about IoT. However significant number of students are not ready to use IoT today, since they believe that the use of IoT have negative impact such as excessive distraction and time wastage. Around 35% of students worried about data privacy and lack of security, especially on location-based IoT applications which lead to avoid use of IoT. The analysis results enlighten that there should be a good system to alleviate their anxiety by providing awareness on use of IoT in order to escalate the involvement of undergraduate students with IoT technologies.

**INTRODUCTION:**

Internet of Things (IoT) is one of the advancements of the ubiquitous computing where everyone and everything are connected to the Internet for exchanging different kinds of information among things on present Internet infrastructure. It is the improved technology of Internet – based network to connect among human to human, human to things and things to things. Several techniques are used to for IoT applications, such as Radio Frequency Identification (RFID), sensor technology and smart technology to connect the surrounding things. IoT used for intelligent identification, tracking, location identification, monitoring and managing [1].

These days' battery capacity, computing power and storage available for cheaper price and lower size. Result of this manufacturers can embed these for the devices and systems to produce smaller IoT devices. The following characteristics needs for IoT;

1. Comprehensive perception – remote connectivity done by the sensor network and RFID used for tracking and location identification.
2. Reliable Transmission – needs to transfer between real world, virtual world, human to human, human to machine, machine to human and machine to machine.
3. Intelligent processing – billions of data needs to processed in IoT. Therefore, mostly IoT uses cloud computing for data processing.

Researchers forecast that there will be 42 billion devices will be interconnected in by 2025. The existing architectures OSI and TCP/IP are not efficient enough this kind of big network. Therefore, new open architectures are proposed by the researchers. It ensures the security, Quality of Services (QoS) and same time support the existing architecture without any modifications with new protocols. There are three-layer, four-layer, five layer and six-layer architectures suggested by several researchers. However, the most commonly used architecture is six layers;

1. Coding layer: assign a unique ID for each device
2. Perception layer: data sensors (RFID, IR sensor and etc.) are available in this layer. Receives information and convert them into digital signals for further processing.
3. Network layer: transmit the received digital signal from perception layer to the middleware layer
4. Middleware layer: responsible to process the information using cloud computing, ubiquitous computing
5. Application layer: based on the process data create application for industries
6. Business layer: succeeds the application and services of IoT

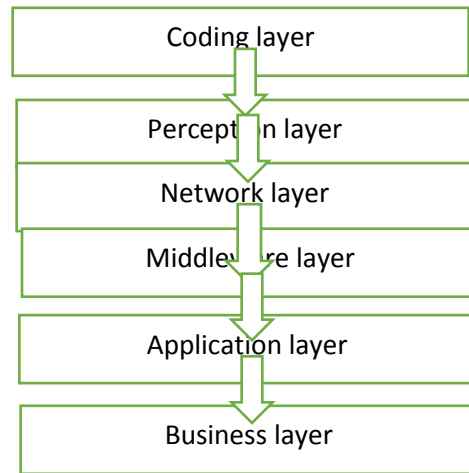


Fig : IoT six layer architecture

IoT are used in several day to day life activities. For an example, smart traffic system, smart environment, smart home, smart agriculture, smart business and commerce and smart supply chain management.

The South Eastern University of Sri Lanka (SEUSL), the 10th National University, was established first as University College on 23.10.1995 and subsequently upgraded as a fully-fledged university on 15.05.1996 with three Faculties viz. Arts & Culture, Commerce & Management and Applied Sciences with the view to accommodate 463 displaced students of Eastern University of Sri Lanka. There was an addition of three new Faculties viz. Faculty of Islamic Studies and Arabic Language, Faculty of Engineering and Faculty of Technology.

This University is located (Main Campus) at Oluvil in the Ampara District in the former paddy marketing Board premises and the activities of faculties of Arts & Culture (FAC), Islamic Studies and Arabic Language (FIA) and Management & Commerce (FMC) are being carried out in newly constructed faculty buildings while the activities of Faculty of Engineering and Faculty of Technology are being carried out in incomplete buildings. The activities of Faculty of Applied Sciences are being carried out at Sammanthurai which is 25.0 km away from the Main Campus. The ware house single story buildings were modified and are presently being used as lecture halls and offices for academic and nonacademic departments of the Faculty of Applied Sciences at this location.

The present full time (Internal) student population of this university is 5,500 while the external student population is 11,500.

**LITERATURE REVIEW**

As indicated by Ya-fu Bao that, Internet of Things used for connecting Thing to thing, Human to human and Human to thing. Also form this study he mentioned that, Distance Learning approach in current world for variety of purposes, and mostly and frequently people dealing with distance learning for on-line teaching, online assignments, model examination, clearing doubts with expertise and so on [2][3]. Even though online examination conducted by variety of area, it is considerable complex to collect all information and answer proper manner. But dealing with internet of thing solves these types of complications very easily by extracting the student’s information proper manner and dealing all activates by automatic mode. Most of the students and teachers do not have well awareness

of internet of things in current days[4], which lead them to avoid this technology without knowing and utilizing the all advantage of it [5].

Thirachit Saenphon done a study called “An Analysis of the Technology Acceptance Model in Understanding University Student’s Awareness to Using Internet of Things”. In this study he had used Technological Acceptance Model (TAM) for find out the IoT awareness of students to check safety, Ease of use of IoT and usefulness. To this study, he was selected 70 samples and various aspect of IoT were developed, used and checked. Which include smart home, Wearable, Smart City, Smart Grid, Connection Car and Smart Farm. This study concluded that, all those developed and used IoT aspect provide highly safe to students and it protects the student’s privacy. And also, students used this IoT applications because of its ease of use. Safety and Ease of use of IoT provides high range of advantages in Educations[6].

IoT devices are work with combination of wired and wireless, most of the time it uses wireless connection in most of the area, nowadays wireless connection provides with encryption technology hence IoT devices are providing better safety protocols with efficient algorithm so IoTs are very good tools among undergraduate students and others to work with[7][8]. Generally, IoT devices collect most personal data and information from individual person. If the information is leaked then particular person needs to face variety of problems since implicit authentication of IoT technology provides different and highly secure platform for protecting personal information rather than just encryption technology[9][10].

**METHODOLOGY:**

This research was conducted among the students of all the six faculties of South Eastern University of Sri Lanka. A total of 300 students were randomly approached in the above region and questionnaires developed using Google form were sent to the students through Email, Whatsapp and Facebook messenger, among them 246 students submitted their answers. However, a proper sampling size was conducted through eliminating uncompleted questionnaires’ answers and as such the exact sampling size 217 were included into the data sheet.

This research process mainly focusses undergraduates of South Eastern University of Sri Lanka about the Awareness of Internet of Things. And this study was conducted using a simple random sampling technique during the period of October 2019 to December 2019 and using both qualitative and quantitative research designs were used. Further, this research study has been carried out to examine the Awareness of Internet of Things among the undergraduates of South Eastern University of Sri Lanka to find out the leading break between this technology and students’ awareness, based on faculties, year of studies, and gender; further, find out students’ interest in Internet of Things according to the way IoT relate to students’ academic life. Also, Frequency and Descriptive test statistics were implemented using SPSS software.

**RESULTS AND DISCUSSION**

The personal demographic profile of the students is shown in Table 1. The majority of respondents were females (61.2%). Students from the Faculty of Management and Commerce (28.3%), Technology (24.2%), and Islamic Studies & Arabic Language (20.1%) participated in this study. They were from the Information and Communication Technology (ICT) (24.4%) and Management and Information Technology/Management Information System (MIT/MIS) (22.4%) fields at 1<sup>st</sup> year (36.5%) and 2<sup>nd</sup> year (33.8%).

Table 1. Demographic variable of the respondents

Variables	Frequency	%
Gender		
Male	83	37.9
Female	134	61.2
Faculty		
Technology	53	24.2
Management & Commerce	62	28.3
Arts & Culture	27	12.3
Field		
Applied Sciences	15	6.8
Islamic Studies & Arabic Language	44	20.1
Engineering	16	7.3
ICT	53	24.4
MIT/ MIS	49	22.4
CS	9	4.1
Other	106	48.4

Academic year		
1 <sup>st</sup>	80	36.5
2 <sup>nd</sup>	74	33.8

3 <sup>rd</sup>	42	19.2
4 <sup>th</sup>	21	9.6

Undergraduate students were asked if they had ever worked with any Internet of Things (IoT) project or not. But only few percentages of the students have worked in IoT so far (28.8%). On the other hand, 21.5% of the students have the idea to do their final year project/research in IoT in future. And 45.2% of them have suggested that to create a subject in their syllabus about IoT. Results are shown in figure 1.

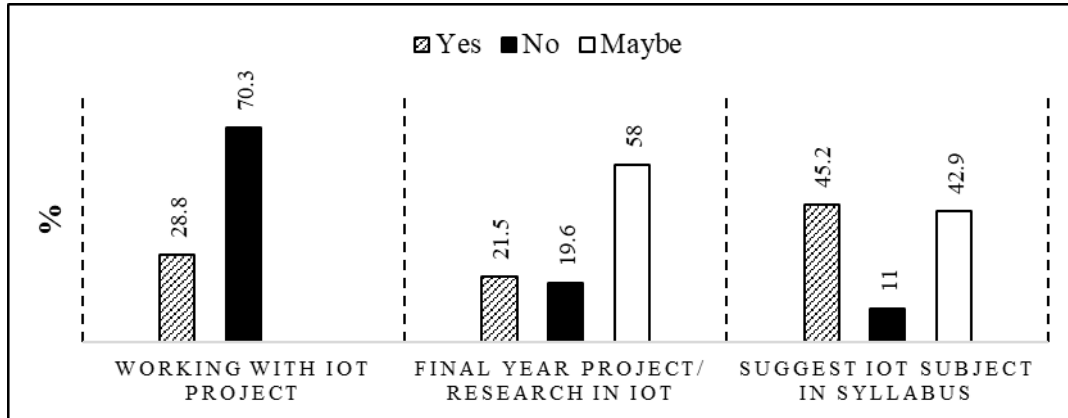


Figure 1. Students' view on IoT

Figure 2 shows that the students' perceptions and disadvantages in IoT. More students pointed out some reasons such as using IoT is less secure (35%), more expensive to use (21%), there is no privacy (23%) and it is difficult to manage (15%). And they have got more knowledge about IoT by self-learning (39%) and a significant amount of the students have got it from classrooms (21%) and friends (16%). Figure 3 shows that where the students got the knowledge about IoT.

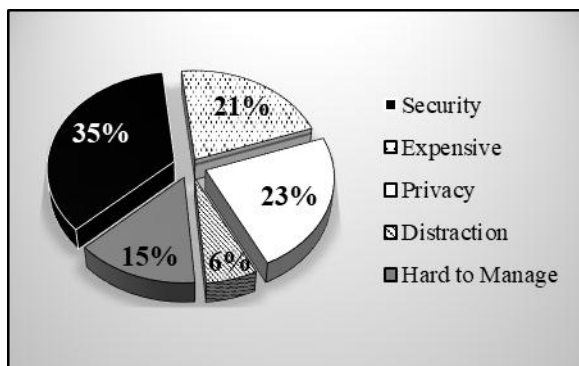


Figure 2. Drawbacks in IoT

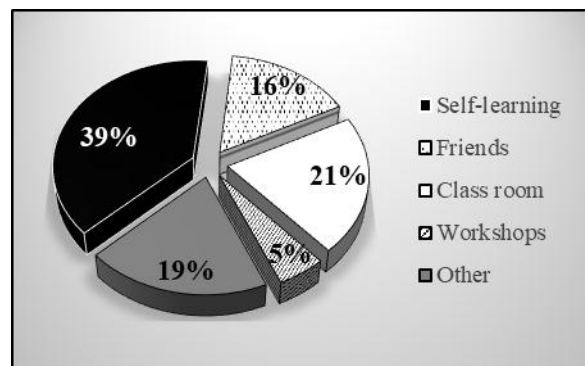


Figure 3. Knowledge in IoT

Table 2 shows the influence of IoT among the undergraduates. 80.3% of the students have believed that IoT encourages them to use the latest technologies and IoT will help them to learn more technologies in future also (82.2%). They have proved that they are ready to learn and use the latest technologies by 71.2% of them agreeing to prefer to join a campus with IoT technology. Majority of the students have declared that IoT connectivity improves their learning skills (83.5%) and learning experience (78%) too. And IoT based applications are more fun to use for 62.5% of them. Furthermore, 58.5% of students prefer to have the lecture attendance recorded automatically.

Table 2. Influence of IoT among the students

Values	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
IOT encourages to use the latest technologies	45	20.5	131	59.8	37	16.9	1	0.5	3	1.4
Believe IoT will help to learn more technologies	41	18.7	139	63.5	31	14.2	3	1.4	3	1.4
Willingness to join a campus with IoT technology	46	21	110	50.2	46	21	6	2.7	8	3.7
IoT Connectivity improves learning skills	43	19.6	140	63.9	29	13.2	4	1.8	1	0.5
IoT improves the learning experience	29	13.2	142	64.8	36	16.4	4	1.8	5	2.3
IoT based applications are more fun to use	22	10	115	52.5	64	29.2	15	6.8	1	0.5
Prefer the lecture attendance is automatically recorded	24	11	104	47.5	67	30.6	14	6.4	7	3.2

However, some students also have negative opinions about IoT regarding privacy concerns (34.7%). And they feel discomfort that privacy will be the most important issue for them due to having problems with IoT location-based applications. Therefore, the good systems should provide help to alleviate their anxiety. They believe that IoT usage can have a negative impact on their learning process, such as excessive distractions and wasting time using newly introduced services (30.9%). For these reasons, 38% said that they are not ready to use the IoT now. These negative outputs are shown in table 3.

Table 3. Negative impacts of IoT among the students

Values	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
IoT is not used because of privacy concerns	5	2.3	71	32.4	87	39.7	48	21.9	6	2.7
Feeling IoT can have negative effects and distractions	2	0.9	65	30	103	47.5	34	15.7	12	5.5
Feeling not ready to use IoT	2	0.9	83	37.9	64	29.2	55	25.3	13	5.9

**REFERENCES**

[1] S. M. R. Islam, D. Kwak, and H. Kabir, “The Internet of Things for Health Care : A Comprehensive Survey,” vol. 3, 2015.  
 [2] H. Li, “A Web-based virtual laboratory for distance education,” *World Trans. Engng. Technol. Educ*, vol.

- 13, no. 4, pp. 544–549, 2015.
- [3] J. Yao, “Multilayer model for on-line learning resources based on cognitive load theory,” *World Trans. Engng. Technol. Educ.*, vol. 13, no. 3, pp. 245–250, 2015.
- [4] Y. Wang, “English Interactive Teaching Model which based upon Internet of Things Keywords- Internet of things ; English ; Characteristics of,” no. Iccasm, pp. 587–590, 2010.
- [5] Y. Bao, “Analysis of the learning evaluation of distance education based on the Internet of Things,” vol. 14, no. 1, pp. 168–172, 2016.
- [6] T. Saenphon, “An Analysis of the Technology Acceptance Model in Understanding University Student ’ s Awareness to Using Internet of Things,” pp. 61–64, 2017.
- [7] D. Bandyopadhyay and J. Sen, “Internet of things: Applications and challenges in technology and standardization,” *Wirel. Pers. Commun.*, vol. 58, no. 1, pp. 49–69, 2011.
- [8] R. Roman, P. Najera, and J. Lopez, “Securing the internet of things,” *Computer (Long. Beach. Calif.)*, no. 9, pp. 51–58, 2011.
- [9] E. Shi, Y. Niu, M. Jakobsson, and R. Chow, “Implicit authentication through learning user behavior,” in *International Conference on Information Security*, 2010, pp. 99–113.
- [10] C. Perera, M. Barhamgi, A. K. Bandara, M. Ajmal, B. Price, and B. Nuseibeh, “Designing Privacy-aware Internet of Things Applications,” *Inf. Sci. (Ny)*, 2019.