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Research Article

Internet of Things (IOT) Uses and Applications - Solutions in Emerging Markets and Vietnam

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Abstract: We experienced that there are various internet of things (IoT) solutions rising in recent years which created applications in many companies and many developing countries.

Authors mainly use qualitative analysis regarding to internet of things issues and applications and design for emerging markets including Vietnam.

Therefore, this papers aims to analyzes it and proposes some recommendations for IoT design solutions in emerging markets and Vietnam.

For instance, authors summarized and analyzed solutions such as: applications for smart house and solutions for office building with IoTs uses such as warning system and cameras, as well as initial principles to set up IoT design.

Keywords: Internet of Things, IoT Applications, Design, Solutions, Vietnam.

1. Introduction

IoTs have many applications in daily life and workplace, from our mobiles, laptop to our houses and office and warehouses.

Nguyen Van Thuy (2020) mentioned that Internet of Things (IoT), Blockchain along with Artificial Intelligence (AI), Big Data, are groundbreaking technological solutions of the way industrial network 4.0. IoT is the basic foundation for developing e-government, smart city, smart house, etc. With statistics from Vietnam-VINVC, there are 64 m users in Vietnam who use internet and accounting for 67% of the population and the number will reach up to 80% population in 2020-2021. The above figures presents the strong development trend of the Internet in Vietnam market. However, for a country with a transiting economy like Vietnam, technology development is at its early stage. Vietnam is facing the risk of falling behind in the industrial revolution 4.0.

IoT can be understood as millions of things and devices connecting to Internet including receiving and transferring and processing data. This created kinds of a robotic or smart level of devices applications which is not involving human interaction, mainly digital.

However together with the growth and development of IoTs there are some problems we need to take care, relating to security. Ahmad et al (2020) stated that **Software Attacks**: In these types of attacks, the attackers are trying to steal data or deny the service by using some viruses, spyware, and other malicious codes. For instance, **Virus, warms & Spywares:** Attackers are trying to send some malicious files as an email attachment when the recipient receives the email and download the attachment or download other files from the internet so it will affect the system. Then, **Malicious scripts:** In this type of attack the adversary using malicious scripts with the normal query. When normal quires are executing so the scripts run automatically like normal quires and making a threat to the users. According to the Imperva Web Application Attack Report (WAAR) round, about 96.15 % Web attacks have been performed. Next, **Phishing attack:** This type of attack usually uses to strip the user's important information such as Credit card details, email passwords, etc. in this type of attack the emails or website is used. Adversary makes the phishing sites exactly like the original one and track the users. The adversary can use the emails, website and also phone calls. Last but not least, **DoS Attack:** In denial of service

attack, the adversary sending unusual traffic on systems, which makes the resources unavailable to other users. In denial of service attack, the adversary can also mislead the data and tempering it for resending.

This study organized with introduction, research questions, literature review, main results, discussion and conclusion.

2. Literature Review

We summarize previous studies in below table.

Table 1. Summary of relating studies

Authors	Year	Content, result
Kumar et al	2018	IoTs has presented in many sides of smart house, cities, transportation and pollution control with hi-tech styles.
Sheik	2018	IoTs has various applications which usufe for our life and based on IoTs, people can read many data from remote areas or locations
Khanna and Kaur	2020	IoTs has been considered in a few years ago and it is considered under many aspects including challengers, applications and tech.
Ghost et al	2020	Concentrates on applications and uses of IoTs for construction and building (smart objects)
Ahmad et al	2021	As IoT is in fast-growing stage and demand of smart devices also increasing so the manufactures oversight the security aspects and delivering the vulnerable devices in the market attackers easily targeting the devices using these vulnerabilities and performing a large number of DDoS and other types of Attacks to steal user personal information and data from IoT Devices.

3. Methodology

This paper mainly use qualitative analysis with technical issues relating to cyber-attacks and security and network solutions.

We also propose to build a security system design principles in order to contribute to reduce cyber-attacks and their consequences.

4. Main Results

4.1. The Principles of IoT Application System Design

IoTs Application system must be set up based on the following guidelines:

+ Security: the IoTs system design need to be safe and organized well with security solutions. In many cases of our smart house and office buildings, we need quite a lot of security and warning system and cameras to protect our houses and assets and vehicles from illegal entering of robbers or strangers.

+ Hi technologies can be used: in the industry 4.0 ear, companies and people might consider to use hi-technology in order to manage their warehouses and control inventory better, as well as creating more smart applications for office or work place, for example, gestures and hand recognition, etc.

+ Applying or Using International standards: Today there are some international standard certifications ISO/IEC 18405:2005 EAL4, etc.

Based on the following criteria and guidelines, there are several groups of IoTs applications needed:

4.2. Hand Gestures Recognition and other IoTs Solution System Design Hand Gesture Recognition

Below figure shows us that data collection process as follows:

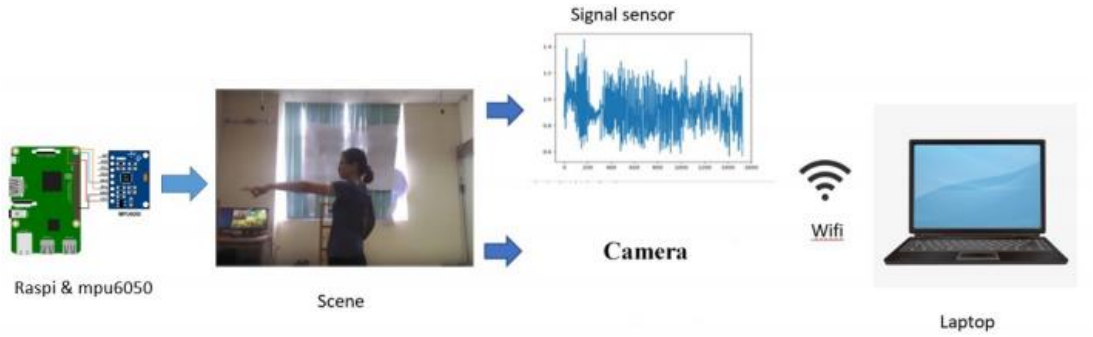

Figure 1. Collecting data and results

Collecting data stage: researchers has uses a data sample and observe gusture of hands involving twelve prior define gestures with thirteen labels. So researchers also recognize difference between mean and variations of gestures.

Moreover, time length of each gesture is changing and different depending on person.

Results: researchers can use data with acceleration to recognize gestures. Results showed that SVM (among 55 Naive Bayes, BayesNet) *generate optimal result* C = 32.0 and gamma = 0.0078125, Adaboot and Random Forest (showed a good result of 80.90% of accuracy).

Other Applications of Internet of Things (IoT)

Smart House Application System

Nowadays, we can easily connect our mobile, laptop, Tivi LCDs, etc. with Internet and there are various uses of Internet of Things (IoTs) in our house so we call it “smart house solution”.

When we mention “house” we consider Internet of Things (IoTs) application for the house as a physical structure in which we can take advantage of IoTs applications.

In many cases, we can apply and use IoTs for our smart house, for instance, we can use smart system of electric light system, or LED light system in our house, controlled automatically for saving costs and energy, money, etc.

Then in another case, people can design a smart house with remote lock which they can allow their friends to enter their houses from remote areas that they do not need to go back home to unlock or open the house doors for friends.

Last but not least, in cases of smart house or smart office, we can take advantage of installing smart cameras that we can monitor from remote areas.

Office building solution system

This is the solution in which we can apply hand gesture or face gesture recognition to allow people to enter in and out the buildings.

Or even in the warning system of thieves or robbers in banking or office buildings with camera system to control, we can install warning system and cameras with IoTs applications to allow us to control, monitor and discover illegal entering from thieves to prevent losses and injuries for people and protect our assets and vehicles.

Other Industry Applications with IoTs

Manufacturing Industry

Manufacturers can improve their competitive capacity if they use industrial sensors in manufacturing processes because they can help them to record errors and faults and for testing accuracy of devices. It will help to reduce cost, increase productivity and net profits.

Or for transporting inventory (goods or products) we can apply IoTs for transportation means and vehicles during the process of transporting our goods to customer place or transport inventory to our warehouses.

5. Discussion

We can realize there are some popular applications of IoTs such as: nowadays, there are range of applications and uses of IoTs such as bluetooth, wifi, memory stick and microprocessors which helped us to keep information, data and behaviors. Cheap price of wearable devices, just < 50USD may generate problems to recognize gestures.

6. Conclusion

In above section, we also see that Internet of Things (IoTs) have many applications and uses in either management tasks, in building smart house and office or workplace, in manufacturing, industries and warehouses, in daily life and work, in vehicle and assets monitoring, in banking, etc.

Ahmad et al (2020) said that Most of the IoT applications are performing jobs an automatic manner without interactions of human or physical objects. It's required that the current and upcoming devices will be smart, efficient and able to provide the services to the users to implement such a new technology with a secure manner. Thus the security issues are exploring day by day by the researchers. IoT devices are most portable and light in nature so it has several issues such as battery consumption, memory, and as these devices are working open range so the most important is security. In this survey paper, we have elaborated on the security attacks with reference to the different kinds of IoT layers.

Beside, we also could consider other solutions, for instance, for Smart office block building solutions, we cam apply IoTs solutions to help to give users very special features:

- Automatically emit warning signals when there is a fire incident, …
- Intervention and control automatically the mechanical
- Electrical systems of the building.
- Manage and control security systems inside and outside the building.

Limitation of Research

Authors need to make deeper analysis on IoTs applications in areas such as Big Data, etc.

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