Exploring Internet of Things (IoT) in Safety and Security Environment

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***Abstract*—Internet of things (IoT) is new technology aimed to achieve the goals of daily life, because every transaction via the Internet and we have to live with it. The aim of this study is to enhance the security and safety objectives to virtually monitor the organizations before the problem occurs as a preventive measure by implementing new monitoring technology using multiple sensors. Internet of things is a new technology in security and safety environment. In this study the implementation of this new technique focus on the office of security and safety affairs, which allows them to monitor through the screen about the work environment in the organization and inform the management about the incident such as fire or suffocation in a room by sending an email and also by notification in the screen. Implemented sensors and through which the data are sent to the servers. This technological development contributes to the organizational growth by controlling any remote device and to take quick decisions in an unforeseen event and provide proper protection during such occurrence. This technological evolution in the name of Internet of things (IoT) in our regular work environment helps to increase remote monitoring and roaming capabilities. This exploratory study-based solution is implemented use new things in raspberry pi3 device and the sensor that are connected through internet. This Sensor monitors occurring in their location and the data is sent to the server in order to monitor security and safety of the organization from control center located remotely. This technology also enables communication with the office of security and safety notified about any event and can send an email alert or notification through their monitoring screen.**
This study is an innovative advent about safety and security, helping to communicate with the human and the network. Internet of things is nearly the things that can control remotely over internet. This technology helps companies that need the work environment to integrate with Internet of Things, which will help them through it in safety and security matters.

Keywords: Internet of Things (IoT), Remote Monitoring, Safety & Security, Sensors, Raspberry pi.

I. INTRODUCTION

Nowadays the world is moving towards the technologies which make our lives easier, flexible and safer, Internet of things (IoT) is one of these technologies and now it has all the researcher's attention, since it is one of the most important technologies which provide us a smart human being life by creating communications between each and everything together with people. Internet of things is new technology achieve the goals of daily life because every transaction via the Internet as the internet has a great impact on our lives regarding education, science, business, communication and government. Internet of things technology get the objects to recognize their services and have an intelligence behavior by letting these objects take decisions depending on the information that aggregated through the other objects on the same network, by the help of internet. Figure.1 shows that the internet of things is able to let anything communicate with the internet at anytime from anywhere to provide any service to anyone. This concept is used in any application which has got IoT in it such as smart home, it provides for it many services for example: security, energy saving, notifications …etc.

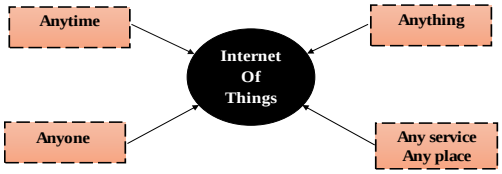

Fig.1" Concept of Internet of Things"

Internet of things is a new technology in security and safety environment. This new technique focusses on the organization of security and safety affairs, which allows them to monitor any danger that may occur through the screen on the work environment in the company and inform them about the latest incidents such as fire or suffocation in a room by sending email and notifications in the screen.
In each room, there are sensors and through these sensors the data are sent to the server and that will allow to monitor all rooms in the company.

The aim of the project is to achieve the security and safety objectives by monitoring all over the campus before any problem occurs, that will make something new to monitor all the building by using multiple sensors. This project is new in the safety and security field, helping to communicate with the man and the network. Nearly, in internet of things the objects can be controlled remotely. In this project, the Internet of things to help the organization of safety and security before something occurs in the organization.

II. PROBLEM DEFINITION

In general, the problems that you get in some of the companies or institutions are mostly in the security and safety measures, as many types of problems may occur and

can affect the company in a bad way. This system has been proposed to solve the following problems:

- **Wasting money:** as any problem or danger happens in the company, it leads to high budget in order to fix its drawbacks.
- **Late alarm:** usually after the problem happens, we get alerted so most of the time there are lots of casualties.
- **Hardly to secure every room:** as lots of security guards required for the company to secure company's rooms as much as they can.
- **Difficulty to deal with the safety equipment:** from the safety procedures, you must deal with objects to protect others from the problem such as: fire extinguisher so not all people know how to use it in the right way.

Therefore, to provide more secured and safer environment for the people working in a company that will need to screen and monitor all the rooms and buildings in the campus for the company's security man so it will be notified if any problem is about to occur, by this way, safety and secured features will be implemented in the company by watching all over the campus and get alerted before the problem happens.

III. REVIEW OF LITERATURE

A detailed literature review based on hardware, software and network environment was conducted based on the objectives of this study. For beginners in the Internet of things they wish to use raspberry pi for ease of using it [1]. Raspberry pi is a small card sized computer, it has got various kinds of processor which can run on it, but Microsoft Windows cannot be installed on it. Raspberry acts like a complete Linux computer which can provide any expected abilities with the lowest power consumption. The advantages of using Raspberry pi in any project are: a cheap device so it is easy to be afforded, easy to be used, small in size, can be hidden anywhere, allows HD (High-Definition) of basic computer function such as: web browsing and video streaming and its powerful and versatile. In this report, we obtained data from the sensors which are mounted in the raspberry pi, therefore they are used in smart cities [2]. Additionally, this paper talked about the sensor MQ-2 which is a gas sensor which operates at 5 volts and suitable for different applications. This sensor has got low energy cost, detect if any low conductivity in the clean fresh air in a room, discovers if any existence of combustible gas and its small in size too [3]. In addition, temperature sensors are used to measure the temperature environment around them accurately, this temperature sensor is small-sized and operates at 5 volts, has no effect on the medium it measures, measure temperature precisely and mostly it responses instantly [4]. Moreover, there is water sensor which is used to measure the level of water that exceeded its normal safe range. The advantages of using water sensor are: water conservation, energy saving in long term as it operates at 6 volts and providing safer environment and less percentage of causing any disaster in properties [5]. This paper also investigated Layer 3 & Layer 2 switches and the smart features in Catalyst 2960 controls access to Access control list (ACL) and promote improved security and bandwidth. Moreover, the existence of encryption technologies Data-dependent, the ports and the member in MAC addresses. In addition to easy to build wireless local area networks and it is supported by Access Points (AP), to enable different applications and services to be provided for the users and allow the wireless network all over the campus as it will be difficult to access the wired LAN. In addition to help Organizations to increase and to improve cooperation between the network devices and the users, improved the performance firewall capability by implementing CISCO ASA 5520 SECURITY this type provides users data security in the network. The benefits of this literature review for this project to meet the company's needs in terms of surveillance.

IV. METHODOLOGY

Methodology is the theoretical analysis in the field of study for the project, it includes models and stages and methods that help in the passage of the project that determines the way the project was framed for successful implementation. The methodology implemented in this project was prepare plan design implement operate optimize (PPDIOO) model as shown in the “Fig. 1”.
PPDIOO stages are:

1. Prepare: it is the first step in PPDIOO. It includes establishing the requirements for the project, identify the best devices and technologies that will fit with the project and let you be clear about the financial part for the proposed project.
2. Plan: it is the second stage in PPDIOO. It includes the initial project network requirements based on the objectives of the project, helps to manage the tasks and the resources required to accomplish the project. Additionally, this stage focuses on the cost, scope and resource parameters of the project.
3. Design: this is the third stage in PPDIOO. it helps to define the design of the network that meets with the technical requirements and the implementation basis of the project.
4. Implement: this is the fourth stage in PPDIOO. it helps to know the components of the project and the suitable devices.
5. Operate: It is the fifth stage in PPDIOO. it is the final test for the network design and it provides the data which is used in the optimizing stage.
6. Optimize: it is the last step in PPDIOO. it is the major step as it detects in the project any fault detection, performance and how it works and if it requires redesigning.

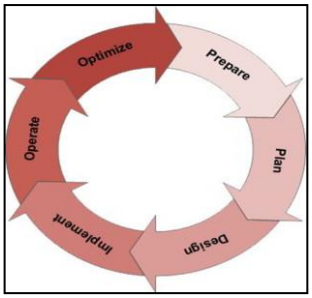

Fig.2" PPDIOO Model"

V. PROPOSED SYSTEM

The project work in this study is not only for the experience, but for trading in the company can sell this technology to companies that need the work of the Internet of Things, which will help them through it in safety and security matters. Therefore, the comparison between the existing methodology and choose the best one for the project was given in this network system using PPDIOO model. The proposed system includes the following design for a secured network environment as shown in the "Fig.2 for example, if a fire occurred in a building and need the system to inform the people in there to get out safe, the two sensors in the room "gas sensor, temperature sensor"

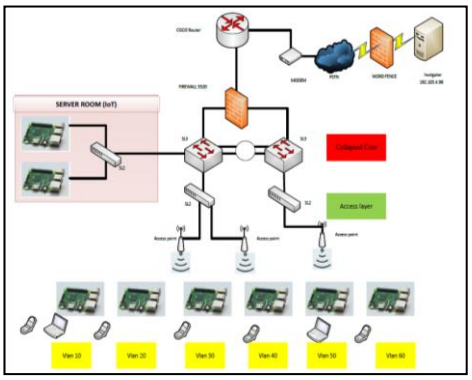

Fig.3 "Proposed Network Infrastructure"

Post Implementation Acceptance test:
This test was carried out for all network resources in order to make sure that the new system is at the accepted level for the company environment and the design is perfect for their work environment and received feedback from work team of the engineers of technical in the company in the name of user acceptance criteria such as: The interface of system: it should be easy when the user is using to contact with the system in good way and be share that the user is accepting the proposed system.

VI. CONCLUSION

In conclusion, in order to help the company to provide a secured safety environment for its employees and customers as well as to upgrade their reputation and to develop their network infrastructure, all above will be achieved by applying and implementing the available system. By activating the mentioned system will benefit the company in many ways which are:

- **Secured safety environment:** by providing in each room in the company these sensors, so it will detect any danger that may happen before it happens.
- **Saving money:** as it will implement this system with low budget and will provide many features in return and it will save money as any problem that happens in any company it needs money to fix it or treat it.
- **Small-sized devices:** as this system can be activated by small-sized devices which can be hidden easily so it will not harm the figure of the room or the company.
- **Low percentage for any problem to occur:** this system will detect any problem before it happens by the help of the mentioned sensors above.
- **Safety Notification:** this system will provide the feature of safety notification which is when any problem or abnormal thing may happen the users which are saved on the server will get notified so they will do the safety procedures to protect themselves from that problem.
- **Easy monitoring:** as this system will monitor each room has got raspberry pi device, through internet you can monitor these rooms, so the security guards can watch the status of each room so less security guards will be required for the company.

The mentioned above are the advantages of the system that will benefit the company and the life of the human being as well. All in all, Internet of things is a trending modern technology and the world is moving towards it and the things around us as well, so this system helps you and your company's network to be developed, moving with the world and be updated like the things around you.

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