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Security Consideration for Secure and Trustworthy Smart Home System in the IoT Environment

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ABSTRACT :-

Authentication is a key challenge in the Internet of Things (IoT), and it is a foundation for data integrity and confidentiality. Security and privacy preservation are crucial for the integration of IoT in our daily life. Due to the resource-constrained nature of IoT sensors, It is not applicable to utilize traditional cryptography techniques in IoT domains. Wireless network devices are used for IoT in a wide range of applications. In this paper, we propose an efficient and secure authentication architecture for IoT. Compared to the existing constrained applications Protocols, the proposed architecture increases efficiency by minimizing the number of message exchanges and implementing a lightweight cryptosystem. Also, the proposed architecture increases security by eliminating any key storage on device memory as well as third-party certificate authority. The main idea of the proposed architecture is to integrate lightweight cryptography and hardware security approaches to be the basis to face the current security challenges.

Keywords :-

Internet of things (IoT), smart home, Security device, Machine to Machine Communication,Security Threats, Security Countermeasures.

INTRODUCTION:-

Iot or internet things refers to the network of connected physical objects that can communicate and exchange data among themselves without the need for any human intervention. It has been formally defined as an “infrastructure of information society” because iot allows us to collect information from all kinds of mediums such as humans, animals, vehicles, and kitchen appliances. Thus any object in the physical world which can be provided with an ip address to enable data transmission over a network can be made part of the iot system by embedding them with electronic hardware such as sensors, software, and networking gear. Iot is different from than internet as in a way it transcends internet connectivity by enabling everyday objects that uses embedded circuits to interact and communicate with each other utilizing the current internet infrastructure.

The term iot and its conception can be traced back to 1985 when peter t lewis spoke about the concept during his speech at federal communications commission (fcc). Since then the scope of iot has grown tremendously as currently, it consists of more than 12 billion connected devices and according to the experts, it will increase to 50 billion by the end of 2020. The iot infrastructure has helped by providing real-time information gathering and analysis using accurate sensors and seamless connectivity, which help in making efficient decisions. With the advent of iot both manufacturers and consumers have benefited. Manufacturers have gained insight into how their products are used and how they perform out in the real world and increase their revenues by providing value-added services which enhance and elongate the lifecycle of their products or services. Consumers on the other hand have the ability to integrate and control more than one device for a more customized and improved user experience.

The internet of things (iot) is a system that allows devices to be connected and remotely monitored across the internet. In the last years, the iot concept has had a strong evolution, being currently used in various domains

such as smart homes, telemedicine, industrial environments, etc. Wireless sensor network technologies integrated into the iot enable a global interconnection of smart devices with advanced functionalities.

A wireless home automation network, composed of sensors and actuators that share resources and are interconnected to each other, is the key technology to making intelligent homes. A "smart home" is a part of the iot paradigm and aims to integrate home automation. Allowing objects and devices in a home to be connected to the internet enables users to remotely monitor and control them. These include light switches that can be turned on and off by using a smartphone or by voice command, thermostats that will adjust the 2 indoor temperatures and generate reports about energy usage, or smart irrigation systems that will start at a specific time of of day, on a custom monthly schedule, and thus will control water waste. Smart home solutions have become very popular in the last years. Figure shows an example of a smart home that uses different iot-connected utilities. One of the greatest advantages of home automation systems is their easy management and control using different devices, including smartphones, laptops and desktops, tablets, smart watches, or voice assistants. Home automation systems offer a series of benefits; they kmadd safety through appliance and lighting control, secure the home through automated door locks, increase awareness through security cameras, increase convenience through temperature adjustment, save precious time, give control, and save money.

Literature Survey :-

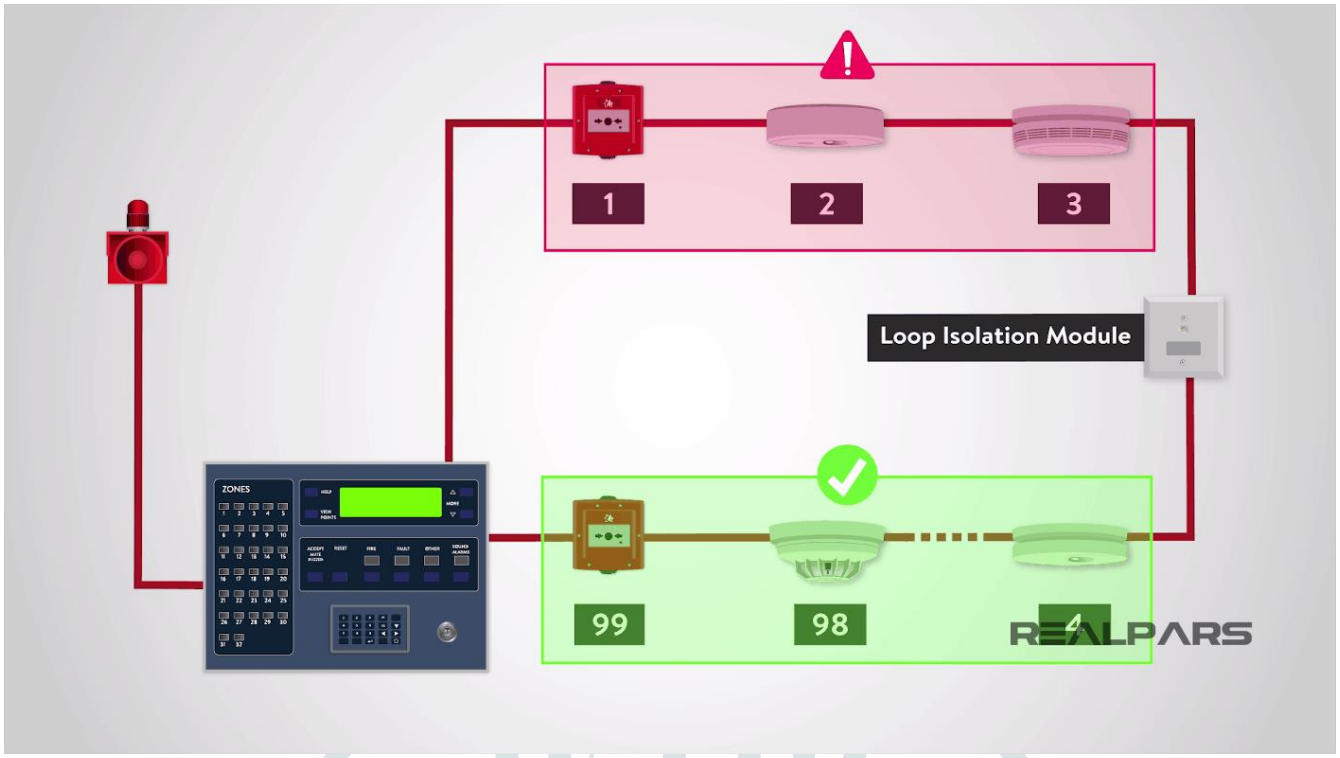
Literature survey is the most important step in software development process. Before developing the tool, it is necessary to determine the time factor, economy. Once these things are satisfied, then next steps are to determine which operating system and language can be used to developing the tools. Once the programmer start building the tool the programmer need lots of external support. This support can be obtained from senior friends, teachers, from book or from websites. Before building the system, the above consideration are taken into account for developing the proposed system.

1. Raspberry pie home automation with wireless sensors using smart phone:-

Home Automation System has been developed with Raspberry Pi by reading the algorithm and subject of Email. Raspberry Pi guarantees to be an efficient platform for implementation powerful, and economic smart home automation. home automation using Raspberry pi is better than any other home automation methods in several ways. For example, DTMF (dual tone multi-frequency) using home automation, the call tariff is a big demerit, which is not the problem in their proposed method. In Home Automation using web server, the design of web server and the memory space required is dismiss by this method, because it just uses the already established web server service given by G-mail. LEDs were used to identify the switching action. This System is efficient and flexible interactive. Sending Command.

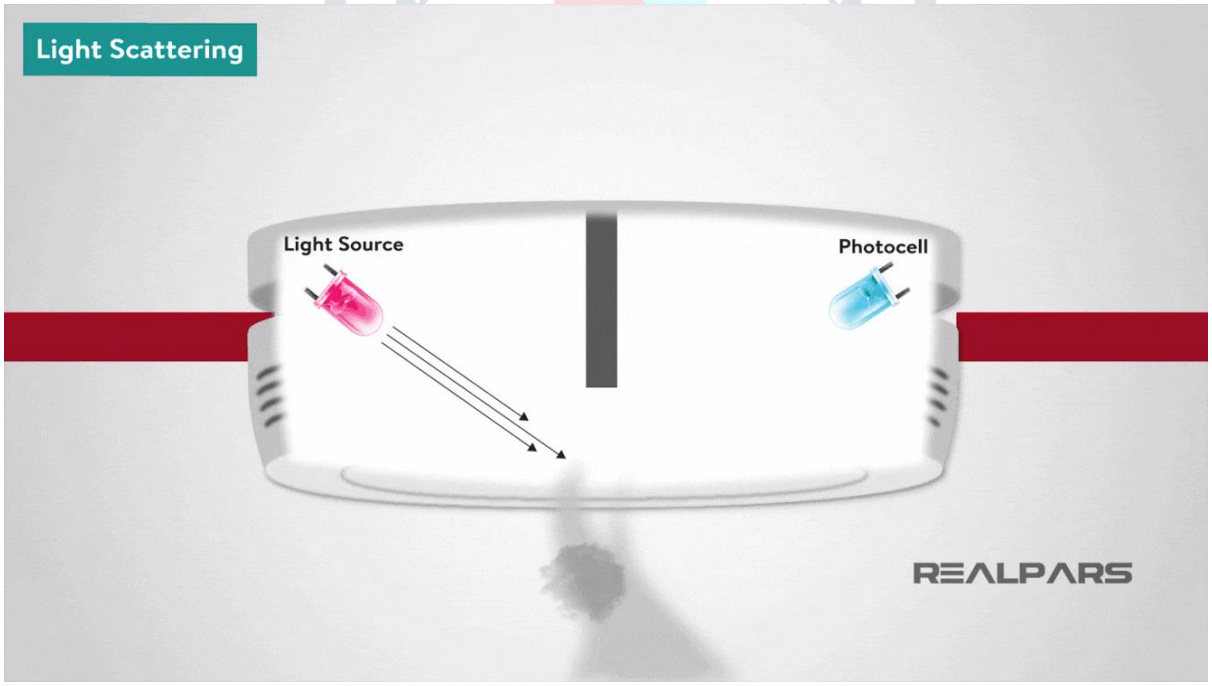
Methedology :-

1. The Home Security system composes of two different sensors which can monitor the home conditions. The sensors used in this paper are Passive Infrared sensor and Infrared sensor.
2. Next, the ESPresso Lite V2.0 is used to connect all the sensors together and act as the main controller. The Blynk application is used as a switch to turn ON and OFF the device. The FAVORIOT platform is used to receive the data send from the ESPresso Lite V2.0.
3. This paper used an ESPresso Lite V2 as the microcontroller. The ESPresso Lite V2 will be connected to the UC00A that will supplied a 3.3V to power up the board. As the ESPresso Lite V2 operated, it will automatically connected to the internet via build in Wi-Fi board.
4. This microcontroller used ESP-WROOM02 as the WiFi board and send data to the FAVORIOT platform. The inputs for this project are the data from the PIR sensor and IR sensor which will monitor the home surrounding and send the data to the ESPresso Lite V2.
5. This project will only operate when the user are not at home, thus, a 'Blynk' application will be used to act as a switch to turn the project 'ON' and 'OFF'. The OLED display will show the output for each conditions and the data is send to the webserver which is FAVORIOT. The webserver will automatically send an alert to the user via smartphone.



Result and Discussion:-

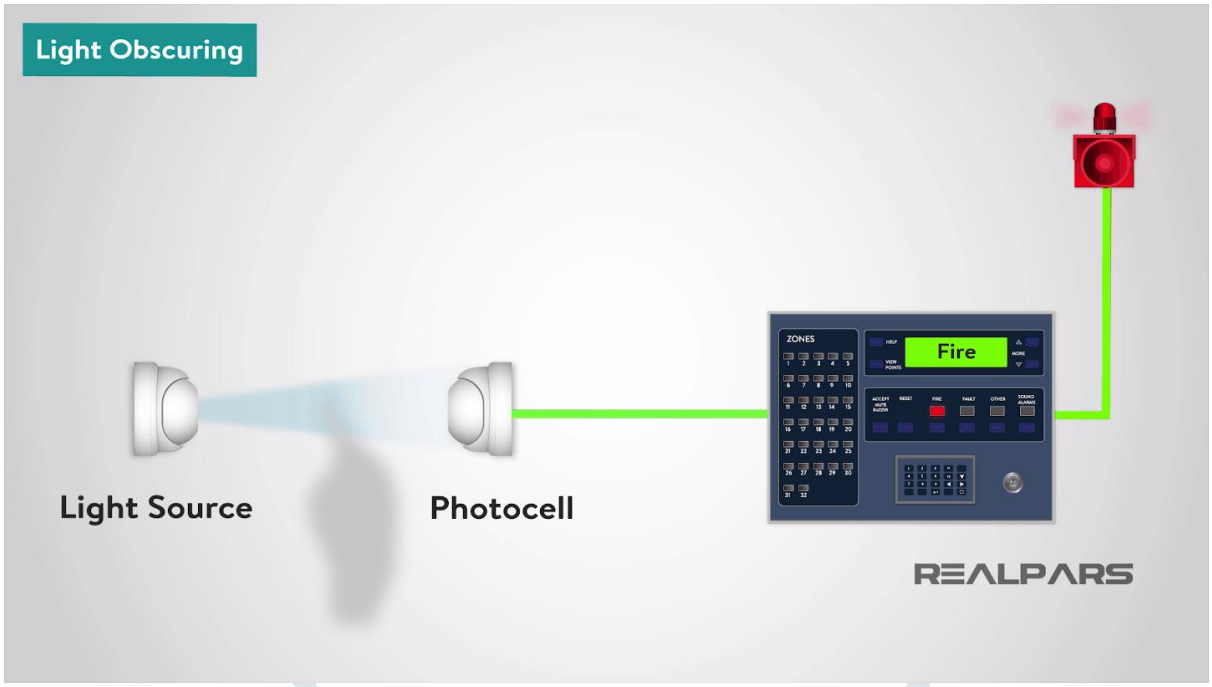
Light Scattering



The light scattering smoke detector operates on the Tyndall effect; a photocell and light source are separated from each other by a darkened chamber such that the light source does not fall on the photocell.

The passage of smoke into the chamber causes the light from the source to be scattered and fall on the photocell. The photocell output is being used to initiate an alarm.

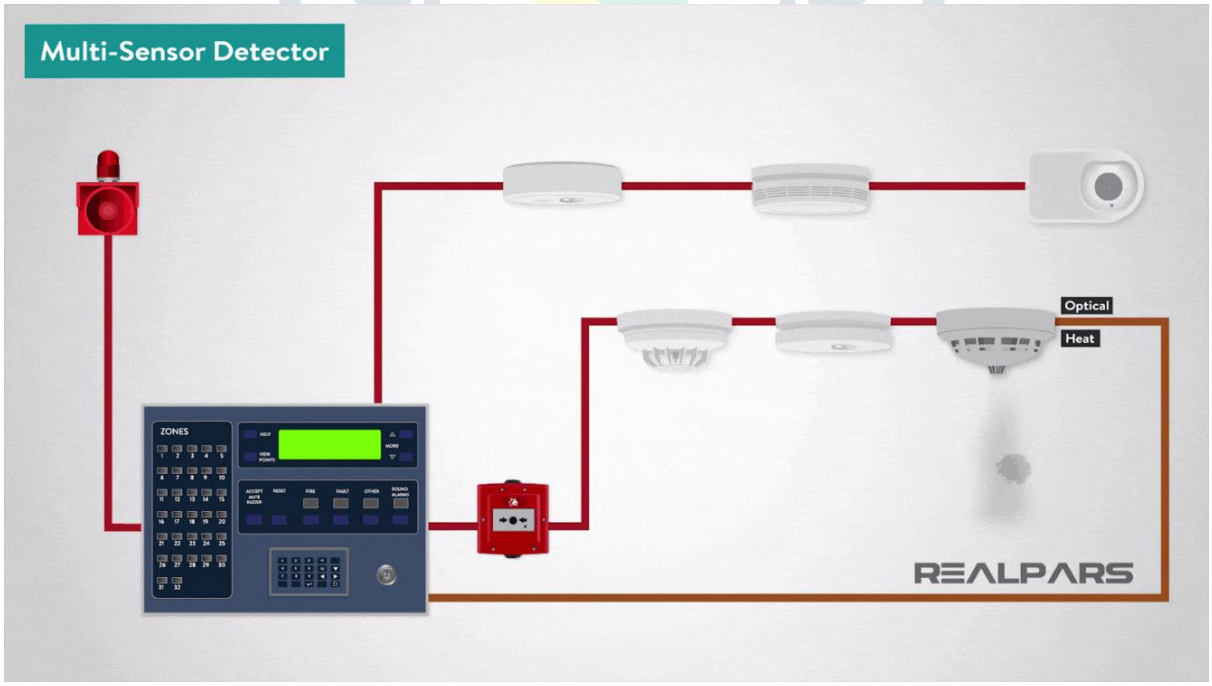
Light Obscuring Smoke Detector



In the Light obscuring smoke detector, smoke interferes with a light beam between a light source and photocell. The photocell measures the amount of light it receives. The variation in photocell output, is being used to initiate an alarm.

This type of fire detection equipment can be used to protect large areas with the light source and photocell positioned some distance apart.

Multi-Sensor Dectector



A Manual Call Point or Break Glass Call Point is a device which enables personnel to raise the alarm by breaking the frangible element on the fascia; this then triggers the alarm.

Conclusions:-

Since a user privacy data leakage, social infrastructure paralysis, and economic losses as well as a risk of human life can be occurred in the IoT environment, we have defined the security requirements for the smart home service which is emerged as a hot item of major IT companies. In this paper, we specifically proposed the smart home system security requirements reflecting the IoT environmental characteristics. And, the security functions of the components that make up the smart home system was classified and defined according to confidentiality, integrity, and availability. However, since we consider only the basic security functions for the smart home system, we will analyze additional security functions which are against the security vulnerabilities and the security flaws caused by device to device infection as a future work. In addition, network security functions and the security features related to a specific service (i.e., smart metering service, smart health service, etc.), and also a remote service in the smart home will be defined in the near future.

Acknowledgment:-

The Internet of Things (IoT) is a system that allows devices to be connected and remotely monitored across the Internet. In the last years, the IoT concept has had a strong evolution, being currently used in various domains such as smart homes, telemedicine, industrial environments, etc. Wireless sensor network technologies integrated into the IoT enable a global interconnection of smart devices with advanced functionalities . A wireless home automation network, composed of sensors and actuators that share resources and are interconnected to each other, is the key technology to making intelligent homes. A “smart home” is a part of the IoT paradigm and aims to integrate home automation. Allowing objects and devices in a home to be connected to the Internet enables users to remotely monitor and control them . These include light switches that can be turned on and off by using a smartphone or by voice command, thermostats that will adjust the 2 indoor temperatures and generate reports about energy usage, or smart irrigation systems that will start at a specific time of a day, on a custom monthly schedule, and thus will control water waste.

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