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## Module 11: Build a Use case – Smart Home Automation:

Abstract:

Smart home automation is expected to improve living standards with the evolution of internet of things (IoT) that facilitate the remote control of residential appliances.

Introduction

The momentous evolution of Internet of Things (IoT) has enabled the realisation of smart homes of the future . Ideally, IoT devices in a smart home environment can communicate seamlessly with one another via the internet, with intelligent capabilities for big data-based decision making.

What is a smart home?

It's a fully connected household environment that provides its residents with an unprecedented level of control and comfort. The main purpose of smart home IOT devices is to simplify your home life, make it safer and more convenient.
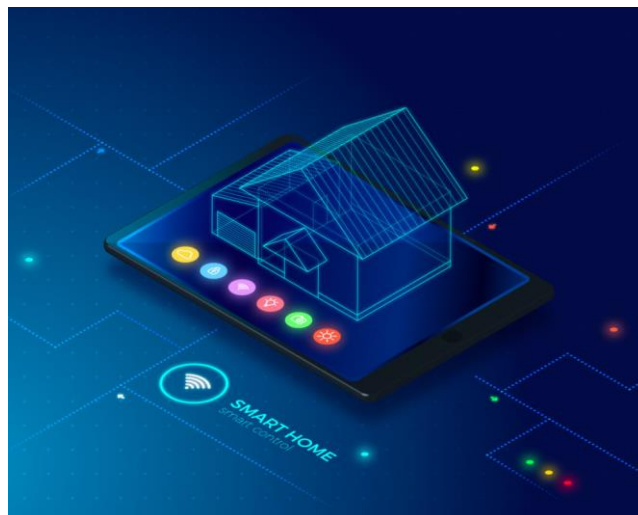
In 2021, the concept of smart home automation implies much more than just remote control and automation. IoT, along with emerging technologies like AI, has opened up possibilities in home automation.

Today, a smart home lives to exceed consumers' expectations. It learns about your habits, your favourite music, room temperature, wake up timings and determine consumption patterns.

Safety and Security Systems:

Safety sensors identify anything wrong at your home. They can notify home users of any overlooked like an appliance left on or any potential threats immediately and even trigger necessary action to prevent them.


How To Build a Smart Home Automation App?

The use of IoT devices to control lighting, appliances, HVAC systems, entertainment systems, security cameras and alarms, and sensors that detect things like water or gas leaks is referred to as smart home automation.

How Does a Home Automation System Work?

A smart home unit consists of a hub, sensing, controllers, and network protocols that enable data sharing and remote device management.
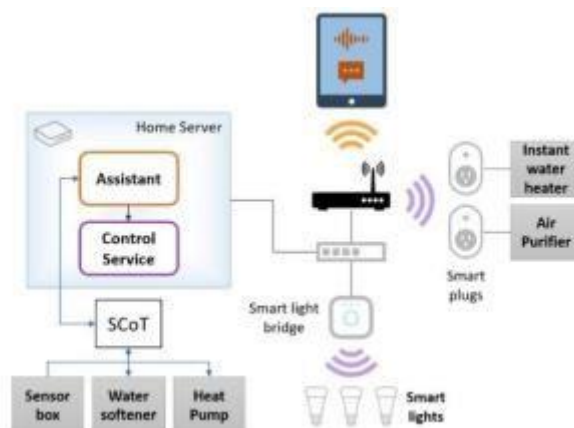
1.Hub

The hub would be the central controller that manages all communication between remote monitoring smart devices and analyzes their data. It is the engine of your smart home system.
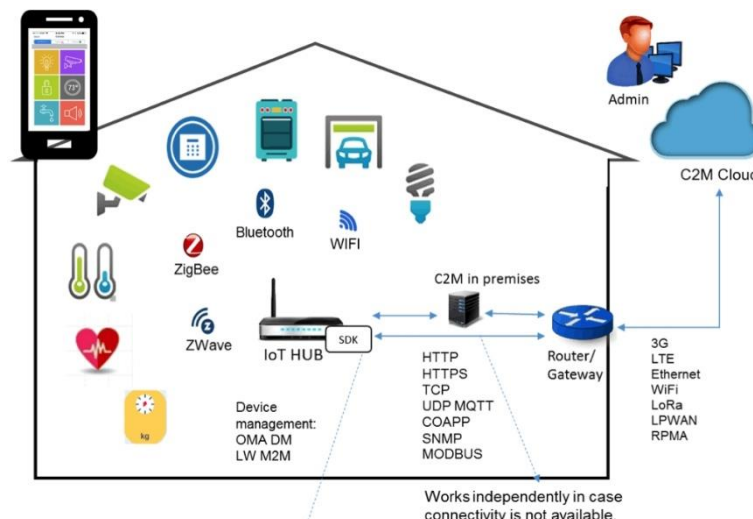

2. Sensors:

Sensors are often small, low-power devices that monitor environmental factors such as temperature,

humidity, elevation, movement, and leakage. Sensors often transmit data directly to the hub and have little storage size. The hub then determines how to use this data.

3. Actuators:

All smart appliances with actuators respond to orders from the hub by changing their properties. The most significant IoT gadgets are actuators, which include timepieces, TVs, voice assistants, valves, thermostats, and automated blinds. A home automation system's components must be able to interact with one another to func
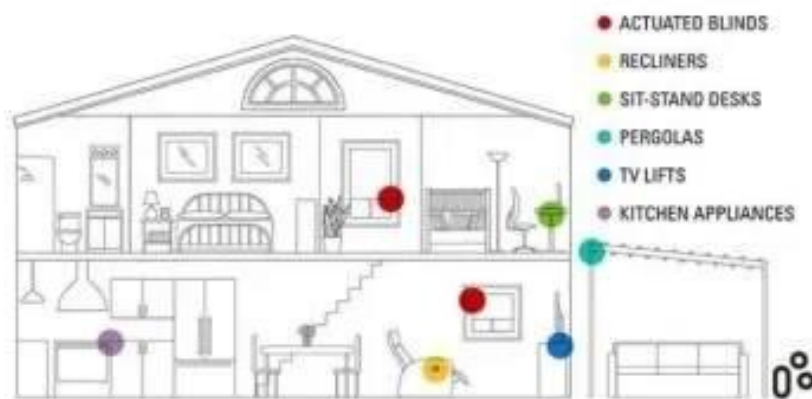
Benefits of Our Smart Home App Development Services:

1. Improved Living Standards
2. Reduced Human Effort
3. Enhanced Home Security
4. Increased Energy Efficiency

Module 12: Introduction to Computer Vision withPython:

Computer Vision:

Computer vision is a discipline that studies how to reconstruct, interrupt and understand a 3d scene from its 2d images, in terms of the properties of the structure present in the scene.

Computer Vision Examples:

Here are some examples of computer vision:

- ➢ Facial recognition: Identifying individuals through visual analysis.
- ➢ Self-driving cars: Using computer vision to navigate and avoid obstacles.

➢ Robotic automation: Enabling robots to perform tasks and make decisions based on visual input.
➢ Medical anomaly detection: Detecting abnormalities in medical images for improved diagnosis.
➢ Sports performance analysis: Tracking athlete movements to analyze and enhance performance.

```python
import cv2
import matplotlib.pyplot as plt

def median_filter():
    # Read image
    input_image = cv2.imread('sp_noise.jpg')

    # Add subplot
    fig, ax = plt.subplots(nrows=1, ncols=2)

    # Apply median blur function
    output_image = cv2.medianBlur(input_image,5)

    # Converts the input image from BGR to RGB and plots
    ax[0].imshow(cv2.cvtColor(input_image, cv2.COLOR_BGR2RGB))
    ax[0].set_title('Input Image')

    # Converts the output image from BGR to RGB and plots
    ax[1].imshow(cv2.cvtColor(output_image, cv2.COLOR_BGR2RGB))
    ax[1].set_title('Output image')

    # Output
    plt.show()

if __name__ == '__main__':
    median_filter()
```

Overview of computer vision and its Applications:

➢ Computer Vision – Introduction
➢ A Quick Overview to Computer Vision
➢ Applications of Computer Vision
➢ Image Formation Tools & Technique
➢ Digital Photography

- ➢ Satellite Image Processing
- ➢ Lidar(Light Detection and Ranging).

How does Computer Vision Work?

Computer Vision Works similarly to our brain and eye work, To get any Information first our eye capture that image and then sends that signal to our brain. Then After, our brain processes that signal data and converted it into meaningful full information about the object then It recognizes/categorises that object based on its properties.

Applications :

Object tracking: Computer vision projects in Python can also focus on object tracking, where algorithms are

designed to track the movement of specific objects within a video stream or sequence of images. This can be useful in various applications, including surveillance systems, autonomous vehicles, and robotics.