SWE30011
THE INTERNET OF THINGS PROGRAMMING
(HANOI)

Survey Paper
Topic: Smart House Services

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Abstract

The Internet of Things (IoT) is a network of computers, mechanical and digital equipment, products, animals, and people that can communicate data without having to speak to each other or their computers. So smart houses are getting increasingly popular. Today's smart home has automation, multi-function, adaptive, interactive, and efficient services like automated coffee makers and parking doors. This research will examine smart home services in detail, including their utilization, limits, and challenges. This research examines current papers on smart home services, compares them to comparable themes, and suggests changes.

Introduction

The term "Internet of Things" (IoT) is now widely used in the field of information and communication technology. The basic goal of the Internet of Things is to link electronic devices, systems, and people in order to gather as much data as possible. Data is translated into information, which is then transformed into knowledge that may be put to use later on in the learning process.

IoT-enabled devices can communicate with a broad variety of features found in contemporary, smart homes, making them a valuable resource for consumers. If the wired future is to come true, every smart home gadget will be interconnected. As a result of the Internet of Things, smart home technology has transformed the lives of millions of people across the world.

With the help of the Internet of Things, you'll be able to monitor and manage all of the operations that take place in your home. If your yogurt expires in two days, the fridge may send you an alert or add milk to your shopping list. It's much easier to save money on your smart home's energy and labor costs if you have detailed data on how much each smart device uses. Devices that aren't being used are turned off if no one is home, saving energy. You have total control over everything inside and outside your house with a smart home security system, making it an excellent tool for keeping it safe and secure. In the event of an emergency, you'll be alerted by a variety of sensors, including security cameras and smart locks. As long as you have an Internet connection and an Internet connection in your home, you may monitor what's happening on inside and outside of your house from any location.

Current state of art

- **The definition of Smart House (Home Automation). What does it concern about IoT?**

House automation is the automatic control of technology gadgets in your home. It is possible to operate these gadgets from afar since they are connected to the Internet. With home automation, devices may trigger one another, removing the need for human control through an app or voice assistant. You may save money on your energy costs, as well as simplify your life, by installing home automation systems. Internet of Things devices, such security cameras and systems, may also boost the security of a house via home automation technology. Home automation gadgets are all connected to the Internet of Things (IoT) and may be configured to interact with one another. IoT refers to the devices, whereas Home Automation describes what you may do with such devices. To make your life a little bit simpler and a lot more enjoyable.

- **How does smart house work?**

A smartphone, tablet, or laptop can control all of the smart home's gadgets since they are all interconnected. Door locks, TVs, thermostats, cameras, lights, and even refrigerators may all be controlled by a single home automation system. On a mobile or networked device, the user may specify timers for the implementation of specified modifications.

As a result of their self-learning capabilities, smart home appliances can learn the routines of their owners and make modifications as necessary. It is possible to lower the amount of power used in a house via the use of lighting controls in smart homes. When motion is detected in a house, some home automation systems will inform the homeowner and others will call the police or fire department in the case of an emergency.

The internet of things (IoT) is a network of physical items that can collect and exchange electronic data once they are linked, such as a smart doorbell, smart security system, and smart appliances.

- **Appliances of Smart House**
1. **Automated coffee machine:**

People all around the globe use many types of coffee makers to prepare their daily cup of joe, from basic pour-over funnels to Keurig K-cup machines and even multi-function devices capable of grinding beans, foaming milk, and serving either a hot or cold version of the morning beverage.

A well-designed smartphone app that connects to the internet enables users to monitor and manage their coffee-making processes with unprecedented levels of ease and accuracy.

Most smart coffee machines these days come with their own smartphone or smart speaker applications that enable you to choose which beverages to prepare and also modify the quantity of coffee, milk, and portion size.

For example: Keurig K-Elite K Single Serve K-Cup Pod Maker, Hamilton Beach 49350 Smart Coffee Maker with Echo Dot, Keurig K-Mini Coffee Maker, etc.

Methods: The working methods of these smart coffee machines are usually the same. They necessitate their own mobile applications. Using the Wi-Fi connection as a bridge between the machine and the app with which users can interact, users can easily control the machine via voice, distance control via apps, and so on.

2. Automated Parking Door System:

The automated sliding door system was developed with the help of an infrared sensor. These three components work together to automate door opening and closing at a public building's entry. It is the major objective of this investigation to have a thorough understanding of how the automated door system works. Another objective is to develop a circuit model that illustrates the system in action. One way to improve a machine or process's automaticity is to automate the process so that it can act or move on its own. This is accomplished by giving the machine or process the ability to act or move on its own.

Since the development of the first electronic computing machine, automation in the fields of electrical, electronic, and mechanical engineering has advanced rapidly. As a result, human intervention is reduced or eliminated, and the automated sliding door is included in the electro-computing world's list of automation. The term "automatic door" refers to a door that opens automatically when a moving item approaches. An electromechanical door that has been automated is what you'll find here.

Methods: The activation of an automatic door can be accomplished in one of these ways. Traffic is approaching, according to a sensor. The following sensors are commonly used in automatic doors:

i.   Motion sensors using low-power microwave radar may perform the same function as a traditional motion sensor.
ii. When anything carried by a person or put within a vehicle activates an electronic sensor (for example, based on infrared or radio waves), the sensor is said to have been activated. These are really common when it comes to garage doors.
     In addition, when the user opens or shuts a door by pushing or pulling it open or closed, the door detects the action and completes the cycle. Additionally, power-assisted doors are used to refer to these doors.

- **Limitations**
i.   Cost: IoT devices are undoubtedly more costly than non-Wi-Fi connected counterparts. The typical price of a smart bulb, for example, is around $32, whereas the price of a regular light bulb is about $5. Home automation isn't cheap, depending on where you buy, but it does include features like remote control, dimming, 16 million various colors, and voice interfaces, to name a few.
ii.   Security issues: It's scary, but it's true: everything linked to the Internet, even Internet of Things devices, may be hacked. Unfortunately, large IT businesses that make IoT devices have had their fair share of hacks and security breaches. IoT devices, on the other hand, need the use of optimal digital security measures if you don't want to be harmed by hackers.
iii. New technology: The Internet of Things is still a relatively new technology, and you may face certain challenges, such as devices having difficulty connecting to the Internet or experiencing slowness, depending on the type and brand of the item.

    iv.   Surveillance: If you're concerned about privacy, smart security may not be for you, since users may livestream video from the camera's individual app.

- **Personal opinion**

Typically, we encounter a variety of unique Smart House service strategies, such as remote access, which enables you to control your devices from afar. From the comfort of your bed, you can switch off smart light bulbs without getting out of bed. In addition, it may help you get the most out of your energy use. In the long term, these smart thermostats may save you money. Everything is handier than being able to manage devices remotely or by voice commands, schedule them, and even sync them with the sunrise and sunset. Finally, there are a number of smart security options that may enhance your home's safety, including door and window sensors, security cameras that can identify persons, and video doorbells that enable you to greet anybody who is knocking from anywhere with an Internet connection.

Thanks to smart home IoT technologies, we have a new level of control over our houses. Apps may be used to switch on and off our appliances, but they can also be used to control their complete range of operations. Dashboards of your app are populated with data from connected devices, which are then processed and analyzed. As a consequence, you can monitor things like how much power each device consumes, how much money you spend on utilities, how much humidity and other air quality conditions exist in your area, and so on. This is where the Internet of Things application in home automation helps everyone – homeowners, their neighbors, the nation, and even the whole planet. We can lower our carbon footprint and other forms of pollution while simultaneously saving money by making the most efficient use of resources. Ideas for IoT-based home automation are continually being developed in this field.

In spite of the fact that home automation and the Internet of Things have been around for some time, many solutions are still in the early stages of development or are being tested, and there is always potential for improvement. Cross-compatibility — the capacity of smart equipment to connect and function together while securely exchanging data – is a hotly disputed topic in smart home and home automation. Home automation will fail if this is not addressed. These problems are addressed in a variety of ways by the makers of home automation equipment. They cooperate to make their goods compatible with each other. It is not uncommon for companies to offer a whole range of gadgets that enable homes to construct a central hub for monitoring and controlling security or power.

The smart home of the future is already here, due to increasing IoT investment, and it's evolving swiftly. Connected solutions that help consumers and utility businesses save money, increase the comfort and efficiency of their homes as well as go green may be shown today. A smart home that anticipates what its occupants need or desire and offers them with a smooth user experience will be possible in the future as IoT and artificial intelligence technologies are progressively integrated into linked systems, according to us.

Conclusion

A home automation system is described in this document (that was previously owned). The smart home is the first step toward living a more intelligent life. Make your life easier and more efficient by using this technology. However, IoT solutions for smart homes may suddenly be too pricey for certain consumers. The sector is likely to reach its zenith of significance over the next decade, and prices may be more tolerable for us. In the meanwhile, we may learn about smart home technology, which is expected to be utilized by a huge number of people in the future. Smart home technology is predicted to be a billion-dollar market by the 2020s, which represents the most cutting-edge part of the Internet of Things. Humans benefit from more access to data, increased autonomy, and increased home automation because they can make better judgments and make better use of limited resources. Smart home solutions, however, will face substantial hurdles unless security weaknesses are addressed at least in part. In the 4.0 technology age, when people are finding more and more new technical possibilities, all of which contribute to the growth of evolution and human development, these smart home services are quite valuable.

References

[1]   Networks, A 2020, "What is a smart coffee maker?," *What is a Smart Coffee Maker?*, Ayla Networks, viewed 12 February, 2022, <https://www.aylanetworks.com/blog/what-is-a-smart-coffee-maker>

[2]   Oladunmoye, O 2014, "Design and construction of an automatic sliding door using ...," viewed 15 February, 2022, <https://www.researchgate.net/publication/338430785_DESIGN_AND_CONSTRUCTION_OF_AN_AUTOMATIC_SLIDING_DOOR_USING_INFRARED_SENSOR>

[3]   Academy, S 2021, "Design and implementation of remote control door system," *Samphina Academy*, viewed 15 February, 2022, <https://samphina.com.ng/design-implementation-remote-control-door-system/>

[4]   Shea, S (ed.) 2020, "What is smart home or building (Home Automation or domotics)? - definition from whatis.com," *IoT Agenda*, TechTarget, viewed 13 February, 2022, <https://internetofthingsagenda.techtarget.com/definition/smart-home-or-building>

[5]   Team, D 2022, "Smart homes: The internet of things (IOT) home automation," *Digiteum*, Digiteum Team, viewed 14 February, 2022, <https://www.digiteum.com/iot-smart-home-automation/>

[6]   Vigderman, A & Turner, G (eds) 2021, "What is home automation and how does it work?," *Security.org*, viewed 15 February, 2022, <https://www.security.org/home-automation/>