Smart Home Technology

ABSTRACT: Smart Home technology started for more than a decade to introduce the concept of networking devices and equipment in the house. According to the Smart Homes Association the best definition of smart home technology is: the integration of technology and services through home networking for a better quality of living. Many tools that are used in computer systems can also be integrated in Smart Home Systems. In this paper, we present the Technologies and tools that can be integrated or applied in Smart Home systems.

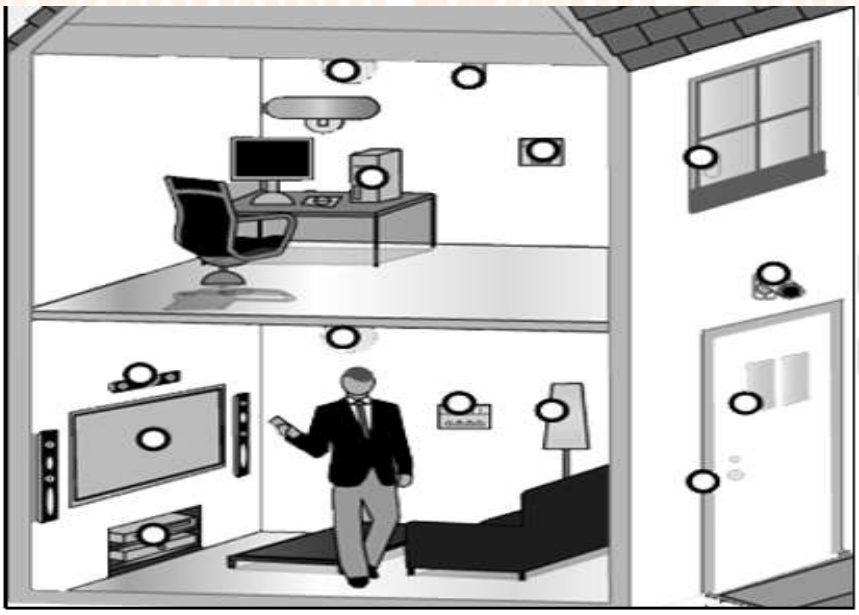
INTRODUCTION:

1. Advancements in the field of smart homes are not an isolated case. First, the developments take place within the society and are influenced by trends within that society. Furthermore, to create added value, the focus should be on the smart home environment instead of only on the used technology. Thirdly creating smart environments to support elderly and disabled persons has enormous potential. To live up fully to the expectations is however a complex process which involves various stakeholders. Smart Home is the integration of technology and services through home networking for a better quality of living. A lot of technologies related to Smart Home are emerging. In the next sections, we define Smart Home, Related Technologies and Trends.

SMART HOME SYSTEMS:

2. Smart Home is the term commonly used to define a residence that uses a Home Controller to integrate the residence's various home automation systems. The most popular Home Controllers are those that are connected to a Windows based PC during programming only and are then left to perform the home control duties on a standalone basis. Integrating the home systems allows them to communicate with one another through the home controller, thereby enabling single button and voice control of the various home systems simultaneously, in preprogrammed scenarios or operating modes. [1] The Home Automation field is expanding rapidly as electronic technologies converge. The home network encompasses communications, entertainment, security, convenience, and information systems. [2] Powerline Carrier Systems (PCS) is a technology which is used to send coded signals along a home's existing electric wiring to programmable switches, or outlets. These signals convey commands that correspond to "addresses" or locations of specific devices, and that control how and when those devices operate.

All the appliances and devices are receivers, and the means of controlling the system, such as remote controls or keypads, are transmitters. If you want to turn off a lamp in another room, the transmitter will issue a message in numerical code that includes the following: An alert to the system that it's issuing a command, An identifying unit number for the device that should receive the command and A code that contains the actual command, such as "turn off." All of this is designed to happen in less than a second, but X10 does have some limitations. Communicating over electrical lines is not always reliable because the lines get "noisy" from powering other devices. An X10 device could interpret electronic interference as a command and react, or it might not receive the command at all. While X10 devices are still around, other technologies have emerged to compete for your home networking dollar. Instead of going through the power lines, some systems use radio waves to communicate, which is also how Wi-Fi and cell phone signals operate. However, home automation networks don't need all the juice of a Wi-Fi network because automation commands are short messages. The two most prominent radio networks in home automation are ZigBee and Z-Wave. Both technologies are mesh networks, meaning there's more than one way for the message to get to its destination.



The dots represent devices that could be connected to your smart home network.

WAVE:

Z-Wave uses a Source Routing Algorithm to determine the fastest route for messages. Each Z-Wave device is embedded with a code, and when the device is plugged into the system, the network controller recognizes the code, determines its location and adds it to the network. When a command comes through, the controller uses the algorithm to determine how the message should be sent.

INSTALLING A SMART HOME:

Z-Wave, X10, Instron and ZigBee just provide the technology for smart home communication. Manufacturers have made alliances with these systems to create the products that use the technology. Here are some examples of smart home products and their functions. Cameras will track your home's exterior even if it's pitch-black outside. Plug your tabletop lamp into a dimmer instead of the wall socket, and you can brighten and dim at the push of a button. A video door phone provides more than a doorbell -- you get a picture of who's at the door. Motion sensors will send an alert when there's motion around your house, and they can even tell the difference between pets and burglars. Door handles can open with scanned fingerprints or a four-digit code, eliminating the need to fumble for house keys. Audio systems distribute the music from your stereo to any room with connected speakers. Channel modulators take any video signal -- from a security camera to your favorite television station -- and make it viewable on every television in the house. Remote controls, keypads and tabletop controllers are the means of activating the smart home applications. Devices also come with built-in web servers that allow you to access their information online. The Remote keypad will send a message to your lamp. These products are available at home improvement stores, electronics stores, from technicians or online. Before buying, check to see what technology is associated

SMART HOME ADVANTAGES:

Smart homes obviously could make life easier and more convenient. Home networking can also provide peace of mind. Whether you're at work or on vacation, the smart home will alert you to what's going on, and security systems can be built to provide an immense amount of help in an emergency. For example, not only would a resident be woken with notification of a fire alarm, the smart home would also unlock doors, dial the fire department and light the path to safety. Smart homes also provide some energy efficiency savings. Because systems like Z-Wave and ZigBee put some devices at a reduced level of functionality, they can go to "sleep" and wake up when commands are given. Electric bills go down when lights are automatically turned off when a person leaves the room, and rooms can be heated or cooled based on who's there at any given moment. One smart homeowner boasted her heating bill was about one third less than a same-sized normal home. Some devices can track how much energy each appliance is using and command it to use less. Smart home technology promises tremendous benefits for an elderly person living alone. Smart homes could notify the resident when it was time to take medicine, alert the hospital if the resident fell and track how much the resident was eating. If the elderly person was a little forgetful, the smart home would perform tasks such as shutting off the water before a tub overflowed or turning off the oven if the cook had wandered away. It also allows adult children who might live elsewhere to participate in the care of their aging parent. Easy-to control automated systems would provide similar benefits to those with disabilities or a limited range of movement.

CONCLUSION:

People who are elderly or disabled benefit the most from a home automation system that employs artificial intelligence. These systems offer those who are less mobile, or in delicate health, the opportunity to be independent, rather than staying in an assisted living facility. Designing a Smart Home is also very crucial. This can be tough; putting together a home design that reflects your taste, yet also fits your needs and budget is a balancing act that takes planning. The following are ten guidelines to help you on your way: [9] Do Your Home Design Homework - You must first decide what type of home to build. House styles today are as varied as those who live in them, offering you a banquet of ideas from which to borrow. Create Your Home Design List - When creating a list of criteria for your home design, start with the basics: the number of bedrooms, the number of bathrooms, the number of family areas, the choice between a formal dining room or a more open, community eating area, porch or deck styles for your home's entrances and the size of your garage. Check Local Zoning Laws - Zoning laws can affect everything from house framing to yard fencing. Design Within Your Budget - Once your list is completed, compare it to your budget and adjust to fit. Design to Fit Your Plot - Your land is unique; each plot has assets and challenges. Keep these in mind while creating your home design. Use existing grades of your plot to your favor. If your lot slopes sharply to the side, consider a walkout side basement door instead of the traditional back door. Working with your land, instead of against, saves you excavating costs and retains more of your plots natural character. Maximize Your Space Efficiency - When mapping out your floor plan, make sure there is a logical flow to your home design. You want to simplify life for your contractor while he builds and for your family while they live in it. Plan for Expansion - If you can't afford to build your entire dream house now, plan your home design so that expansion is not only possible, but easy. One way of doing so is to build your home in phases. Picture Interior Design - When putting together your floor plan, place furniture in the design to see how it all fits together. You can do this using graph paper, magazine clippings or by using home design software. Also, consider your lighting scheme, paint and flooring choices, and how your design will work for entertaining–planning for all your favorite activities will help you create proper seating, dining and socializing space. Don't Forget the Sun - The position of the sun can affect your home design in many ways, depending on the direction your home faces. A south facing home will be warmer in the winter, but hotter in the summer. Place windows to take advantage of natural light, which allows for better energy conservation. Beautify All Sides of Your Home Design - Remember that window placement affects the inside and outside look of your house.

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