SMART HOME AUTOMATION USING GOOGLE ASSISTANT FOR HANDICAPPED

Google assistant artificial intelligence based voice command service

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Smart home automation system is increasingly used due to the wide manufacturer brands and various available technologies. From a social point of view, residents are admitted to smart homes for comfort, luxury, improving quality of live, and for providing security against intrusion and burglars. Secondly, home automation is achieved using a single controller, monitoring and the controlling many interconnected appliances such as lights, power plugs, HVAC system, humidity and temperature sensors, gas, smoke and fire detectors, audio, video and home theatre as well as security and emergency systems. Smart homes are cheap, low-power, cost effective, efficient, and realize the automation of a variety of domestic appliances using user-friendly interface as remote control or any other handheld devices. Elderly, handicapped patients, and people with disabilities who have problems with locomotion difficulty can benefit from this smart home to totally operate, with high performance, all appliances and devices from anywhere in the house. When a resident is living alone, the ubiquitous access becomes very important and it is realized by using transceivers that maintain RF wireless communication between the remote control and the master control panel board .It is used for controlling fans, switches and lights.

Elderly people are an important and growing segment in the world population. The statistics show that the percentage of older people is continuously growing due to many reasons, in particular, the declining of birth rates and the reduction of women fertility. In the United States, the proportion of population 65 years and over has increased from 12.4% in 2000 to 13.3% in 2011 and it is expected to grow to reach 21% of the population by 2040. Moreover, the current social life style, modern medicine, and the easy access to medical care have increased life expectancy. A United Nations report estimated that the life expectancy was 65 years in 1950, and 78 years in 2010 and it will continue to rise to 83 years in 2045. On the other hand, it was reported that 35% of people age 65+ in 2011 had some type of disability. Some of them require assistance to meet important personal needs. Frail older adults prefer living independently and self managing in their own home which promote the feelings of competency and reduce the vulnerability to depression. In fact, from economic point of view, the cost of living at home with monitoring devices and intelligent appliances is less expensive and more beneficial than attending medical centers and being supervised by nurses. However, the implementation of smart home systems with remote monitor controls and health care capabilities will reduce the expense of assistance aid at home.

The aim of this project is to propose a wireless remote control that permits elderly people with physical challenges, in particular, handicapped and disabled people, to command their desired devices without moving around to the nearest control point. Indeed, the local control is not excluded but alternative additional controls are achieved using a remote control supported by XBee communication transceivers. The remote control includes laser-engraved backlit buttons customized to the special needs of elderly users as well as Braille interface for blind persons.

Smart homes : Smart homes, intelligent homes, home automation, domestics and others are all synonyms that describe, according to the Smart Home Automation of Netherlands, the "integration of technology and services through home networking for a better quality of living". The UK Department of Trade and Industry defines the smart house as "a dwelling incorporating a communications network that connects the key electrical appliances and services, and allows them to be remotely controlled, monitored, or accessed". The smart home system is not a new science terminology but it is still away from people's vision. In fact, the majority of home appliances are somehow automated but the integration of these technologies, the inter-corporation of automated various appliances in an affordable design, and the ease of deployment due to distant communication provides peace of mind and convenience. These systems are feasible, low-power consumption, secure, efficient, flexible and scalable, cost-saving, characterized by ubiquitous access, and finally supported by easy-to-use familiar interface.

Smart homes involve different areas of electronics, architecture, computing, and communications. A smart home achieves a complete and total control of unlimited number of appliances. It commands the On/Off order of domestic devices such as fridge, TV, washing, cooking, and cleaning machines, as well as electrical devices as motors, pumps in order to water the houseplants using humidity and soil moisture. It governs the environmental system such as HVAC (Heating, Ventilation, and Air Conditioning), and fans. It also masters the lamps arrangement as switching, dimming lights, and making ambiance for different events. It has the capability to control windows blinds and curtains to maximize natural lighting. Moreover, it enables multiple levels of security by implementing gas, smoke, and fire sensors connected to sirens, and by using intrusion detectors and automatic motion detectors outside homes that differentiate pets from intruders. It employs glass breaking detectors, surveillance and camera systems as well as monitoring home structure systems for detecting vibrations and earthquakes using 3D accelerometer sensors. In addition, the home theater and the entertainment system acquire high degree of conformability and permit the users to give the admittance for visitors using video door phone and fulfills regular visitor entry option. Furthermore, the home theater authorizes the diffusion of the favorite audio and video, the broadcasting of music in any part of the building, and the realization of video communication between different rooms. Finally, smart homes are of great interest since they are water and power saving systems, since their power consumption could be managed using smart meters, temperature auto control, and battery supervising levels.

Moreover, it can be supported by solar tracking and wind green energy systems to reduce the pollution injection. Furthermore, smart homes can be configured by scheduling tasks for automatic control settings in order to accomplish more rational use of energy. At the end, the functionality with biometric sensors allows elderly and disabled people to be virtually monitored.

dedicated health progress programs. The appropriate biometric devices measure the irregular heart rhythms, respiration rate, blood pressure, and skin temperature; notify medication periods and doctors meetings, and alerts hospital in case of emergency.

- Smart Home Technologies have been proposed in the literature and depend on the way the control signal is spread from the end-user remote control to reach the target appliances through master control panel boards. The first technology is the Power-line Carrier system where the control coded signals propagate through the household existing electrical power wiring. While the power line transmits AC signal of frequency 50 Hz or 60 Hz, the command signals are used in the range of 24 kHz to 500 kHz. The major drawbacks are the propagation problems and the electronic interference where noisy signals can be interpreted in a wrong manner. The second technology pursues the home appliances using landline telephone system (analog telephone service). The procedure is simple: when a dial-up connection is established and maintained for limited time duration, additional digits are dialed up for various controls . Each combination of numbers is associated to a specific appliance or equipment. This mechanism does not require internet connection. Its drawback resides in the unattainable capability to inspect the status of appliances. technologies However, the digital phone service often called VoIP (voice over IP) carries the digital signals over a broadband connection as DSL (digital subscriber line) and cable modem. This technology holds the transmission of voice for voice control [17, 19, 21] as well as e-mails and IM (instant messages). Indeed, the received message is analyzed, treated, and the mnemonic keywords are evolved in order to execute the commands.

The infrared light, which is invisible to the human eye, is mainly used in home remote controls to issue unidirectional commands from a distance. The infrared pulses generated by the remote control handset should be expedited to the device through a short and direct line-of-sight. This approach is limited for the case when the transmitter and the receiver are located in short range distance or disposed in the same site. In contrast, the Bluetooth technology achieves the data exchange over short distances but the broadcasting of this wireless signal does not require that the controller and the device are facing each other. The range of Bluetooth depends on class of radio used in the implementation. In fact, the most commonly commercially used radio is of class 2 of power 2.5 mw that enables a range of 10m. The Bluetooth main advantages over the other wireless modalities are that PC, mobile phone, android, and i-devices are supporting it. Moreover, the implementation of the Bluetooth module at the control main board provides a soft access and allows the control of appliances. The SMS (Short Message Service) control requires generally mobile communication systems. The proposed appliances are controlled by a main control board that has the capability to identify the specified number from which the SMS is sent, and therefore classify the mobile numbers that have the priority to access to the automated system. The GSM (Global System for Mobile communication) model is a hardware circuit involved by a SIM (Subscriber Identify Model) card that receives the text massages. Usually, the message is decoded, transmitted to the processing unit based on microcontroller that, in turn, activates the relays in order to toggle the current states of the appliances' switches.

The Web method requires a Web server PC connected to microcontroller or PLC (Programmable Logic Controller) . The operations are done from a far distance through TCP/IP (Transmission Control Protocol/Internet Protocol) connection. The system can be mastered from handheld devices or mobile phones with android applications. The great advantages of similar approach are the susceptibility to recognize and to have knowledge about the circumstance of the appliances but the internet connection should be constantly maintained. An alternative manner to realize home control via internet is by sending electronic mail

Security and Home System Improvements The mentioned approaches represent the major categories of techniques adopted in practice as well as those proposed in recent researches. However, many variants were continuously suggested with diversified alternatives to solve many technical problems or to improve failure or insufficiency of others. The control by voice, the security authentication for accessing approved by biometric physiology [6] such as fingerprint, hand geometry, iris, and voice recognition; the protection against hackers for web server control way by equipping sophisticated firewalls and installing dedicated antivirus programs are all examples of upgrading. For domestic security control, smoke, fire and gas detectors realize the home safety as well as intruder detection. Indeed, home systems can be easily connected to the police station, fire fighter, hospitals, health care stations, and emergency agencies. Moreover, the wiring assemblage can be planned in a way to isolate appliances against power failure prone or disconnect specific actuator when dysfunction work is remarked. Inspite of the advantage of WIFI technologies concerning the range and the security the internet connection should always be retained . The hardware control is interfaced with wifi module that carries out full communication between pc and hardware components upto distance range of 20 meters.

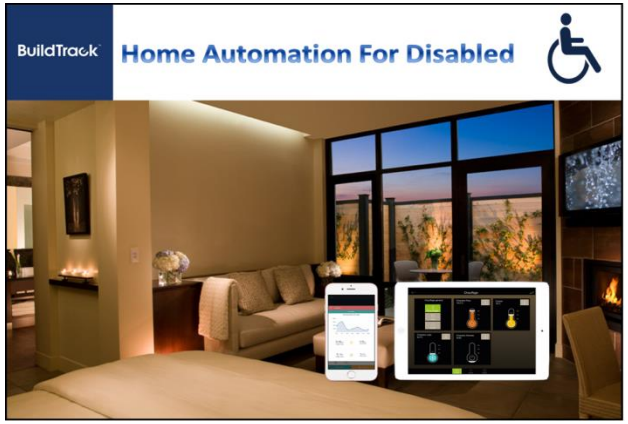
```
if (bluetooth.available())
   {
    value = bluetooth.readString();

    if (value == "all LED turn on"){
    digitalWrite(2, HIGH);
    digitalWrite(3, HIGH);
      }

    if (value == "all LED turn off"){
      digitalWrite(2, LOW);
      digitalWrite(3, LOW);
      }

    if (value == "turn on Red LED"){
    digitalWrite(2, HIGH);
      }

    if (value == "turn on green LED"){
      digitalWrite(3, HIGH);
      }

    if (value == "turn off red LED"){
    digitalWrite(2, LOW);
      }

    if (value == "turn off green LED"){
      digitalWrite(3, LOW);
      }
 }
```

Conclusion and Future Perspectives

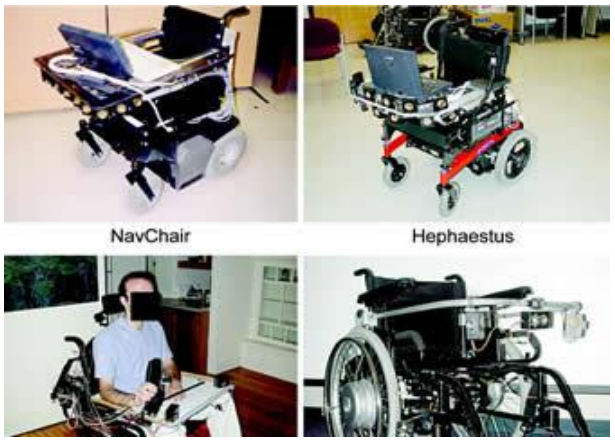
Home automation systems had progressively developed as an important field of control systems. The implementation of such systems continuously increased especially with the tendency to standardize their processes.

The proposed home automation system is dedicated for elderly, people with disabilities, handicapped persons and others. It consists of remote control supported by command buttons and provided by alert LEDs and a LCD for showing messages. The unique master board toggles the ON/OFF switches of the appliance.

In spite of designing our system for individuals that may require load efforts to move, it can be scalable for other users with the ability of appending multiple functionalities and various modalities. However, it can be also adopted in hospitals, health care centers .


BuildTrack
Home Automation For Disabled


Screen2
CONNECTED
Bluetooth
LIGHT 1: ON OFF
LIGHT 2: ON OFF
FAN : ON OFF
ALL DEVICES: ON OFF
VOICE COMMAND :
For Details click here


NavChair
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Google Assistant with ESP8266
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