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Android Based Bluetooth Home Automation

[#1]Prof. N.S.Labhade, [#2]Jadhav Sheshrao Vishvanath, [#3]Nikam Suratna Sudam, [#4]Salave Priyanka Bajarang

[2]shesh.jadhav@gmail.com
[3]nikam.suratn@gmail.com
[4]salave.priyanka228@gmail.com

[#1]Prof. Department of Electronics and Telecommunication
[#234]Department of Electronics and Telecommunication

JSPM Imperial College Of Engineering. And Research, Pune.

ABSTRACT

Recently for social help for disable people or also for normal human being we develop this project. This work presents a display design home accommodation in home area network. In this project we control the home appliances from our android smart phones. This system is firstly developed for "i phone" or "i pads" but these phones are very costly therefore here we design it for android smart phone.

Keywords : Microcontroller, LCD, Sensor, Blutooth.

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I. INTRODUCTION

Focusing on the use of home area networks to improve disabled people's autonomy at home, this paper presents a display design for accessible home control. In the past years, computational devices have turned faster, smaller, connected and cheaper. It brings the "intelligent house" vision, promised for decades, closer to reality. This pervasive, intelligent home, a luxury item for many people, could have a key role in assuring the autonomy of people with disabilities. In Brazil, assistive resources and their use are relatively recent as compared to the United States, for example, where specific laws were established in 1988. In Brazil, similar regulations have existed since 2004 and establish general standards and basic criteria to promote accessibility. Thinking about users with disabilities, it is necessary to invest efforts in the research and development of accessible interfaces, through the perspective of a universal design that is easy to use and to learn how to use. The design for all, also called universal design, began focusing on physical aspects (buildings, urban spaces, transport, health, leisure), and nowadays is extended to the digital world (computer networks and communication systems). In this perspective, accessibility is defined as "a condition for autonomous and safe use of space, furniture and urban facilities, buildings, transport services and devices, systems and media and information by people with disabilities or reduced mobility." It is worth stressing that accessibility is not the creation of exclusive spaces for people with disabilities, which could be a form of discrimination, but rather of thinking of systems and environments, which can be used by everyone. The work was developed starting with an interface design proposal, based on the research on accessible interfaces state of the art. The interface was deployed targeting Tablets and Smart Phones interoperability. It was integrated to control a home gateway prototype. In order to evaluate the design, ten interviews with people with disabilities were conducted in Brazil.

This research could consolidate a feasible interface to control home area networks pointing out the main requirements for homearea networks considering a diversified group of impairments. This paper is an extended contribution to the work.

II. LITERATURE SURVEY

Existing Home Automation systems are conventional switches based systems. "i-Pad controls home" gaining popularity nowadays. But every one cannot have costly iPhones for home automation.

Most of the people uses Android phones which are not so costly as compare to iPhones or iPads. Here we are giving low cost solution as "Android based Home Automation" via Bluetooth wireless technology.

This document mainly introduces Bluetooth serial module. Bluetooth serial module is used for converting serial port to Bluetooth. These modules have two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands.

Home automation is a common field of interest for engineers, researchers and of course, consumers. Today, home automation systems are commonly found in many homes across many countries around the world.

Such systems not only offer a high level control over home appliances, but also try to reduce the wastage of electricity. Existing Home Automation Systems requires additional installation and maintenance cost.

III. PROPOSED SYSTEM

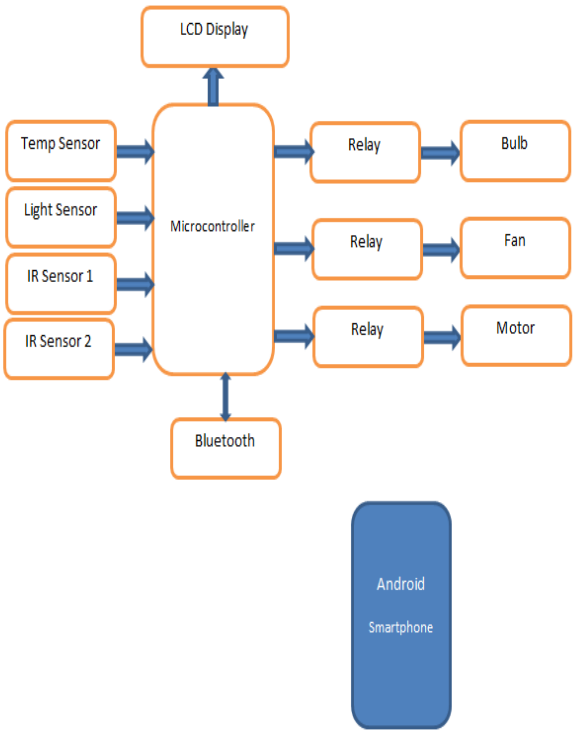

Fig 1. Block diagram of home Automation System

The idea is to have a portable touchscreen device with the proposed interface. The first menu the user has to deal with shown in Fig 2 represents all the rooms of an apartment.

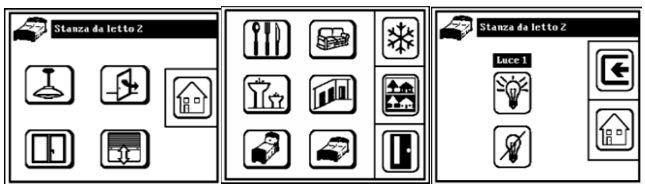

Fig 2. Three screens of a home automation interface, each one representing a different level of the interface. Screen "a" presents icons representing the rooms, screen "b" presents icons with the items to be controlled, and screen "c" presents the commands available.

When a room is selected, a new screen is presented containing all the items available to control in that room. In order to inform which room is selected at the moment (specially important to people with cognitive problems), the icon that represents the room is shown at the top of the screen, while on the right side of it is a "home" icon, that allows the user to come back to the main menu.

When an item is selected, a third and last menu level will appear showing the commands available. The icon of the selected room is maintained at the top of the screen, and the icon of the item being controlled is also presented. On the right side of the command screen, two icons are presented: the back icon at the top, that allows the user to go back to the previous level, and the home icon at the bottom, that allows going to the main menu.

The concept of using different levels of screens containing icons representing the rooms, the appliances to be controlled and the commands was utilized in our work, but as it is intended to be universal, additional requirements were needed.

Another work presented the use of touchscreen devices combined with voice control, allowing the interaction of people with limitations in their upper and/or lower limbs, replacing the standard devices (mouse and keyboard).

INTERFACE DESIGN

This work target users are people with visual, hearing, motor and cognitive disabilities. In order to develop a widespread and easy-to-use interface, a design approach based on icons was adopted, quadrants and touch screen combined with voice control.

The touchscreen choice was made based on three factors: the widespread use of this technology on mobile devices, the touchscreen intuitiveness and the possibility to include people with upper limbs impairments [7]. Considering that people with disabilities have more locomotion difficulty, the possibility to have the home control interface on a portable device such as a smartphone or a tablet is an extra advantage.

In the design, the quadrant approach was used, considering a layout with five buttons occupying the whole screen area. There is one button in each quadrant (four buttons) and one (the fifth) in the center of the screen. In order to improve the interface intuitiveness, a text label, an icon, and a color were associated to each button. An example of this approach can be seen in Figure 3.

The screens map considers three menu levels: rooms, appliances (items to be controlled) and commands. This approach is intuitive, having a fast learning process . At each level, the information on the last levels selection is presented. When a room is selected, its icon is presented at the top of the device list menu. When the device is selected, both the room and the device are presented on the screen.

The interaction mechanism was based on "touch" and "hold pressed" events. The "touch" event selects the key and a "hold pressed" event triggers the action related to the key. The action could be to send a command or to go to a next screen in the interface.

Both events generate visual and audible feedbacks. The "touch event" generates the synthetized locution of the touched key text label as audible feedback; the visual feedback is provided by the key enhancement by changing its brightness. The "hold pressed event" generates the

synthetized locution of the name of the next screen as audible feedback, or the new status of a device (if it is related to an action command); the visual feedback occurs by changing the screen to the next one or representing the new status of a device, if that is the case.

The interface proposed also has another interaction mechanism that uses speech control. The user can say the name of any screen or key in order to trigger an action.
Although our proof of concept has only one speech option to each command, it is possible and necessary to register similar or equivalent commands, in order to facilitate the voice interaction mechanism. The central button on the main menu screen activates the speech control mode.

The device that embeds the interface has keys that are used by the interface as well. These keys are for optional usage. The BACK key opens the main menu screen, no matter on which screen the interface is. The MENU key presents the configuration screen. It allows configurations related to the touch event and hold pressed event time threshold, to the speed and voice of the synthetized speech, etc.

IMPLEMENTATION

In our block diagram following blocks are shown:
1) Microcontroller:
We use a ARM7 microcontroller it is 32 bit microcontroller RISC processor core and it has a 37 pieces of 32 bit integer register.

2) LCD display:
LCD display shows the person count, light intensity and room temperature lcd used here is the 16*2 liquide crystal display it has two lines of 16 character.

3) Tempetuare sensor:
We use the LM 35 tempertuare sensor. It sense the temperature and display on the LCD display if the temp is below than 40 degree the fan is in off state. And if the temp is above 40 degree then realy is on and fan also on.

4) Light sensor:
Light sensor is use for detect the light intensity if the light intensity is above the 45 then bulb is OFF. And when light intensity is below 45 the relay ON and bulb is also ON.

5) PIR sensor:
PIR sensor is use for detect the person in the room if the person count is increase then and then only all above operation are performed.

6) Relay:
Relay is a type of switch it is used for ON/OFF condition

7) Bluetooth:
Bluetooth model is used for controlling home appliance using smart phone.

III. CONCLUSION

Despite working with a considerably varied group of users, with different needs, an interface suitable to them was achieved. Our interface integrates accessible interface ideas in a single portable interface that can contribute to people with disabilities' autonomy at home. Despite being a potential solution to improve the autonomy of people with impairments, the interviews have shown that home automation is not even considered as a possible solution to these people's reality. They consider home automation a high technology solution out of their reach. It points out to the demand for researching and developing lower cost and simpler solutions. As the next steps to this research are the improvements of the interface with the interviewees' feedback, to integrate the new explore-by-touch features available in the new tablets' operating systems libraries and the repetition of the described experiments with larger groups of users.

REFERENCES

[1] L. C. P. Costa, I. K. Ficheman, A. G. D. Correa, R. D. Lopes, M. K. Zuffo, "Accessibility in digital television: designing remote controls." IEEE Trans. Consumer Electron. vol.. 58, no.2, pp.605-611, May 2012.

[2] Brazil. "Federal Decree no 5296". December 2004.

[3] L. C. P. Costa, N. S. Almeida, M. K. Zuffo, "Accessible display design to control home area networks." IEEE International Conf. in Consumer Electron. Proceed., pp.426-427, Jan. 2013.

[4] M. Ghorbel, F. Arab, M. Monhtari, "Assistive housing: case study in a residence for elderly people." IEEE Second International Conf. on Pervasive Computing Technologies for Healthcare, pp.140-143, Jan.-Feb. 2008.

[5] X. H. B. Le, M. D. Mascolo, A. Gouin, N. Noury, "Health smart home - towards an assistant tool for automatic assessment of the dependence of elders." Proc. of the Annual International Conf. of the IEEE Eng. in Medicine and Bio. Soc., pp. 3806-3809, Aug. 2007. L. C. P. Costa et al.: Accessible Display Design to Control Home Area Networks 427

[6] A. Sleman, M. Alafandi, R. Moeller, "Integration of wireless fieldbus and wired fieldbus for health monitoring." IEEE International Conf. on Consumer Electron., pp. 1-2, Jan. 2009.

[7] E. Mainardi, "Design of a portable touchscreen interface for powerline domotic systems." IEEE Autom. Science and Eng., pp. 680-684, Aug. 2008.

[8] M. Valles, F. Manso, M. T. Arredondo, F. Del Pozo, "Multimodal environmental control system for elderly and disabled people." 18th Annual International Conf. of the IEEE in Eng. in Medicine and Biology Society, pp. 516-517, Oct.-Nov., 1996.

[9] J. Zhu, X. Gao, Y. Yang, H. Li, Z. Ai. X. Cui, "Developing a voice control system for zigbee-based home automation networks." IEEE 2nd International Conf. on Network Infrastructure and Digital Content, pp. 737-741, Sep. 2010.

[10] J. Do, H. Jang, S. H. Jung, J. Jung, Z. Bien, "Soft remote control system in the intelligent sweet home." IEEE International Conf. on Intelligent Robots and Systems, pp. 3984-3989, Aug. 2005.

