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AN INTERACTIVE IMPLEMENTATION ON A SMART PHONE FOR DISABLED PERSONS TO ACCESS HOME APPLICATIONS

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ABSTRACT: *The main objective of this work is to present a display design for accessible interaction in home area networks. Recently the social inclusion and technical aid to assure autonomy to people with disabilities are getting attention all over the world. The interface was implemented over a Tablet that controls domestic devices through a home network controller prototype In order to evaluate the design, a research was conducted, interviewing people with disabilities in Brazil. This research consolidated a feasible interface to control home area networks. The system is cheap, reasonably easy to configure and run. It consumes very low power. Wireless home automation system is used for speech command. Voice recognition is used to support for blind people. Objective of the project is to help the disabled people. Simulation of the project is done by IAR embedded work bench which is implemented in MSP430 microcontroller. Home appliances are controlled by voice using MSP 430 microcontroller. HM2007 is a voice recognition system that has two modules. The first module contains the mike through which voice input is given that is then stored in the HM2007 voice recognition system. The voice recognition system transfers the voice command to the next module with the help of Zigbee which acts as the transmitter during transfer..*

1.INTRODUCTION

Home automation refers to the use of computer and information technology to control home appliances and features (such as windows or lighting). Systems can range from simple remote control of lighting through to complex computer/micro-controller based networks with varying degrees of intelligence and automation. Home automation is adopted for reasons of easy, security and energy efficiency. Much software is needed while we are operating in tablet. This provides inconvenience to the persons who are physically challenged. So through voice recognition home automation is achieved. Using this voice recognition technique physically challenged persons can operate the home appliances more easily.

The objective of the work is to provide home automation for the physically challenged persons. Home automation provides controlling of the home appliances. Home automation is adopted for security and energy efficiency. This provides a voice recognition method which is easily operated by physically challenged persons. The interface was implemented over the tablet that control domestic through a home network controller prototype. Home automation can also provide a remote interface to home appliances or the automation system itself, via telephone line, wireless transmission or the internet, to provide control and monitoring via smartphone or Web browser .This will be effective to the normal persons. But physically challenged persons may face problem with this. To overcome its problem voice recognition is added to control the home appliances.

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2.SYSTEM DESIGN AND IMPLEMENTATION

2.1 INTRODUCTION ABOUT MSP430

The Texas InstrumentsMSP430 family of ultra-low power microcontrollers consists of several devices featuring different sets of peripherals targeted for various applications. The architecture, combined with five low-power modes, is optimized to achieve extended battery life in portable measurement applications. The device features a powerful 16-bit RISC CPU, 16-bit registers, and constant generators that contribute to maximum code efficiency. The calibrated digitally controlled oscillator (DCO) allows wake-up from low-power modes to active mode in less than 1 µs.

The MSP430F23x/24x (1)/2410 series are microcontroller configurations with two built-in 16-bit timers, a fast 12-bit A/D converter (not MSP430F24x1), a comparator, four (two in MSP430F23x) universal serial communication interface (USCI) modules, and up to 48 I/O pins. The MSP430F24x1 devices are identical to the MSP430F24x devices, with the exception that the ADC12 module is not implemented. The MSP430F23x devices are identical to theMSP430F24x devices with the exception that a reduced Timer B, one USCI module, and less RAM is integrated. Typical applications include sensor systems, industrial control applications, hand-held meters, etc.

2.2 BLOCK DIAGRAM

The figure 3.2 MSP430G2231 shows the internal block diagram that explains various peripherals in the architecture of the microcontroller.

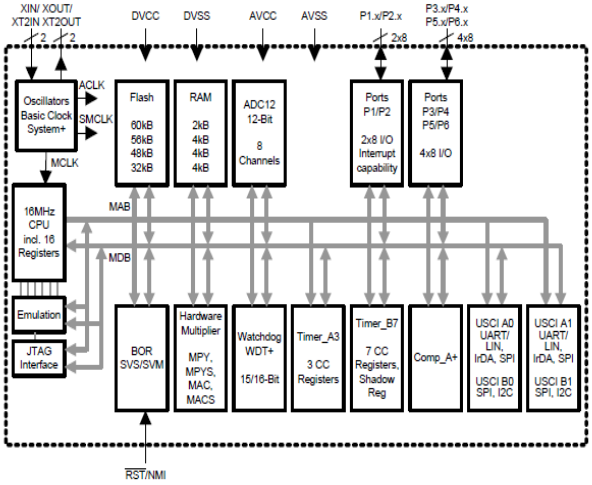

Figure 2.1 Block Diagram of MSP430G2231

2.3 SPEECH RECOGNITION SYSTEM

Speech recognition will become the method of choice for controlling appliances, toys, tools and computers. At its most basic level, speech controlled appliances and tools allow the user to perform parallel tasks (i.e. hands and eyes are busy elsewhere) while working with the tool or appliance .The heart of the circuit is the HM2007 speech recognition IC. The IC can recognize 20 words, each word a length of 1.92 seconds.

The speech recognition system is a completely assembled and easy to use programmable speech recognition circuit. Programmable, in the sense that you train the words (or vocal utterances) you want the circuit to recognize. This board allows you to experiment with many facets of speech recognition technology. It has 8 bit data out which can be interfaced with any microcontroller for further development. Some of interfacing applications which can be made are controlling home appliances, robotics movements, Speech Assisted technologies, Speech to text translation, and many more. Speech recognition will become the method of choice for controlling appliances, toys, tools and computers. At its most basic level, speech controlled appliances and tools allow the user to perform parallel tasks (i.e. hands and eyes are busy elsewhere) while working with the tool or appliance. The heart of the circuit is the HM2007 speech recognition IC. The IC can recognize 20 words, each word a length of 1.92 seconds.

2.4 TRAINING WORDS FOR RECOGNITION

Press “1” (display will show “01” and the LED will turn off) on the keypad, then press the TRAIN key (the LED will turn on) to place circuit in training mode, for word one. Say the target word into the onboard microphone (near LED) clearly. The circuit signals acceptance of the voice input by blinking the LED off then on. The word (or utterance) is now identified as the “01” word. If the LED did not flash, start over by pressing “1” and then “TRAIN” key.

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You may continue training new words in the circuit. Press "2" then TRN to train the second word and so on. The circuit will accept and recognize up to 20 words (numbers 1 through 20). It is not necessary to train all word spaces. If you only require 10 target words that are all you need to train.

2.5 CHANGING & ERASING WORDS

Trained words can easily be changed by overwriting the original word. For instances suppose word six was the word "Capital" and you want to change it to the word "State". Simply retrain the word space by pressing "6" then the TRAIN key and saying the word "State" into the microphone. If one wishes to erase the word without replacing it with another word press the word number (in this case six) then press the CLR key .Word six is now erased.

2.6 SIMULATED INDEPENDENT RECOGNITION

The speech recognition system is speaker dependent, meaning that the voice that trained the system has the highest recognition accuracy. But you can simulate independent speech recognition.

To make the recognition system simulate speaker independence one uses more than one word space for each target word. Now we use four word spaces per target word. Therefore we obtain four different enunciations of each target word (Speaker independent). The words spaces 01, 02, 03 and 04 are allocated to the first target word. We continue do this for the remaining word space. For instance, the second target word will use the word spaces 05, 06, 07 and 08. We continue in this manner until all the words are programmed. If you are experimenting with speaker independence use different people when training a target word. This will enable the system to recognize different voices, inflections and enunciations of the target word. The more system resources that are allocated for independent recognition the more robust the circuit will become. If you are experimenting with designing the most robust and accurate system possible, train target words using one voice with different inflections and enunciation's of the target word.

2.7 THE VOICE WITH STRESS & EXCITEMENT

Stress and excitement alters ones voice. This affects the accuracy of the circuit's recognition. For instance assume you are sitting at your workbench and you program the target words like fire, left, right, forward, etc., into the circuit. Then you use the circuit to control a flight simulator game, Doom or Duke Nuked. Well, when you're playing the game you'll likely be yelling "FIRE! …Fire! …FIRE!!…LEFT …go RIGHT!". In the heat of the action you're voice will sound much different than when you were sitting down relaxed and programming the circuit. To achieve higher accuracy word recognition one needs to mimic the excitement in one's voice when programming the circuit. These factors should be kept in mind to achieve the high accuracy possible from the circuit. This becomes increasingly important when the speech recognition circuit is taken out of the lab and put to work in the outside world.

2.8 VOICE SECURITY SYSTEM

This circuit isn't designed for a voice security system in a commercial application, but that should not prevent anyone from experimenting with it for that purpose. A common approach is to use three or four keywords that must be spoken and recognized in sequence in order to open a lock or allow entry.

The ability to listen to one person speak among several at a party is beyond the capabilities of today's speech recognition systems. Speech recognition systems cannot (as of yet) separate and filter out what should be considered extraneous noise. Speech recognition does not understand speech. Understanding the meaning of words is a higher intellectual function. Because a circuit can respond to a vocal command doesn't mean it understands the command spoken. In the future 4.1, voice recognition systems may have the ability to distinguish nuances of speech and meanings of words, to "Do what I mean, not what I say!".

Speech recognition is divided into two broad processing categories; speaker dependent and speaker independent. Speaker dependent systems are trained by the individual who will be using the system. These systems are capable of achieving a high command count and better than 95% accuracy for word recognition.

The drawback to this approach is that the system only responds accurately only to the individual who trained the system. This is the most common approach employed in software for personal computers. Speaker independent is a system trained to respond to a word regardless of who speaks. Therefore the system must respond to a large variety of speech patterns, inflections and enunciation's of the target word. The command word count is usually lower than the speaker dependent however high accuracy can still be maintain within processing limits. Industrial applications more often require speaker independent voice recognition systems.

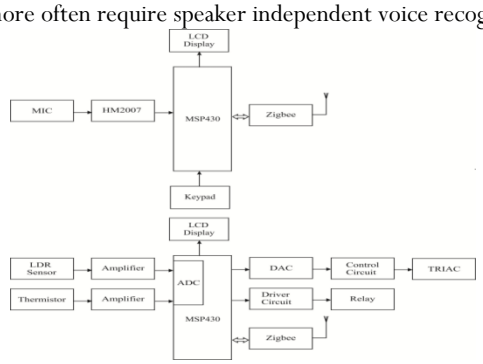

Figure 2.2 block diagram

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The first module contains the mike through which voice input is given that is then stored in the hm2007 voice recognition system. The voice recognition system transfers the voice command to the next module with the help of Zigbee which acts as the transmitter during transfer.

In the second module receives the voice signals along with the keyboard text input. Here the Zigbee acts as the receiver and the signals are converted from analog to digital and vice versa using respective convertors. The light on and off options depends upon the temperature of the room.

2.8 LIGHT DEPENDENT RESISTOR – LDR

Figure 2.3 Light Dependent Resistors

Two cadmium supplied photoconductive cells with spectral responses similar to that of the human eye. The cell resistance falls with increasing light intensity. Applications include smoke detection, automatic lighting control, and batch counting and burglar alarm systems. Figure 2.3 is light dependent resistors. Intensity of the light is varies depends on temperature value.

3. RESULTS AND DISCUSSIONS

3.1 Communication between MSP430 and hm2007

The voice command send trough the voice recognition of hm2007 to msp430 microcontroller UART communication unit from there the data's are send to the voice through zigbee module. MSP430 provides the main part of the project. Both receiver and sender side contains MSP430. HM2007 is used. The voice received from the HM2007 is stored in MSP430. The voice signal is then transferred to receiver side through zigbee.

This project consists of keyboard. Keyboard consists 5 butoons that are used for giving different commands. The various instructions are relayon, light on, light off, bright, dim. HM2007 is used to recognize the vioce signal that is stored in MSP430.

4. CONCLUSION

The proposed system proposes methodology that is more efficient than the existing system that uses design display. The existing system has the disadvantages dealing with the software. The proposed system defines a effective speech recognition system efficiently store the voice input and has extended memory that increases the performance of the system. The proposed system would be more helpful for the disabled people to more than that of the existing System since touching design would lead to more software error problem. The proposed system overcomes all the disadvantages of the existing system and helps the disabled people more effectively.

5. FUTURE WORK

Single home appliance is used to implement the project. Many home appliances with advanced microcontroller will be implemented in the future work. Blind people can be used to implement the project as the future work. many different voices will be stored in the speech recognition. Voice quality accuracy is achieved.

accurately track the time scale. Each output sample from the QRS discriminator is compared against a set threshold to detect the presence of a beat. Pulse period is incremented by one during every sample period. Because each sample occurs every 1/512 second, it is easy to track the time scale based

REFERENCES

1. Alexandrov, A., (2010) **"**Characteristics of single-item measures in Likert scale format**"**, The Electron Journal of Business Research Methods. **V**ol.**N**o. 8, pp.1 -12.
2. Costa, L. C. P., Almeida N. S., Correa, A. G. D., Lopes, R. D. and Zuffo, M. K., (2012), **"**Accessible Display Design to Control Home Area Networks**"**, IEEE Transactions on Consumer Electronics, **V**ol. 59, **N**o. 2.
3. Costa, L.C.P., Ficheman, I. K., Correa, A. G. D., Lopes, R. D. and Zuffo, M. K., (2012), **"**Accessibility in digital television: designing remote controls**"**, IEEE Transaction on Consumer Electronics, **V**ol. 58, **N**o.2, pp.605-611.
4. Casey, D. E., (1992) **"**Descriptive research: techniques and procedures." In: R. Colwell (Ed.). Handbook of research on music teaching. Schirmer: New York, pp. 115-123.
5. Do, J., Jang, H., Jung, S. H., Jung, J. and Bien, Z., (2005), **"**Soft remote control system in the intelligent sweet home**"**, IEEE International Conf. on Intelligent Robots and Systems, pp. 3984-3989.

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6. Ghorbel, M., Arab, F., Monhtari, M., (2008) **"**Assistive housing: case study in a residence for elderly people**"**, IEEE Second International Conf. on Pervasive Computing Technologies for Healthcare, pp.140-143.
7. Urokohara, H., Tanaka, K., Furuta, K., Kurosu, M., (2000),**"**NEM: Novice Expert ratio Method. A usability evaluation method to generate a new performance measure**"**, Extended Abstracts of ACM Conference on Human Factors in Computing Systems, pp. 185–186.
8. Valles, M., Manso, F., Arredondo, M. T. and Del Pozo, F., (1996), **"**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.
9. Vogel, B., Kurti, A., Milrad, M., Kerren, A., (2010) **"**An Interactive web-based visualization tool in action: user testing and usability aspects**"**, IEEE International Conf. on Computer and Information Technology, pp. 403-408.
10. Xianmei, W., Lingyan L.,Ti, D., Zhiliang, W.,(2010) **"**Smart home control system for the disabled using the head and the mouth movement**"**. IEEE 29th Chinese Control Conf., pp. 3527-3530
11. Zhu, J., Gao, X., Yang, Y., Li, H. and Cui, Z. A. X., (2010), **"**Developing a voice control system for zigbee-based home automation networks**"**, IEEE 2nd International Conf. on Network Infrastructure and Digital Content, pp. 737-741.

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