

HandiCom: Handheld Deaf and Dumb Communication Device based on Gesture to Voice and Speech to Image/Word Translation with SMS Sending and Language Teaching Ability

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Abstract

Our project aim is to build a handheld device that would help deaf and dumb people to communicate with others in every day spoken language such as English. Deaf and dumb often communicate via sign language, a kind of representation of words through hand and finger positions. But it has got serious limitations because it is not easy to understand by a normal listener on the opposite and to make things worse, not many in the world know sign language at all. Also, it is difficult to represent all the words of a plain language like English into a sign language symbol. Even if there is one, then learning and using them would be tough and cumbersome. In this paper, we will focus on the history of communication technologies that have given better access to the world for those with sensory disabilities. The areas that will be covered are communication technologies that improve or augment hearing and vision, and technologies that support alternatives strategies to communication without hearing and/or vision.

Keyword: Touch screen, GSM, and ARM Cortex-M3.

Introduction

Traditional user technology for communication, such as phones, computers, television, and radio, may not directly work for people who have sensory disabilities. Five classes of communication access technology are discussed: hearing enhancement technology, deaf technology, vision enhancement technology, blind technology, and deaf-blind technology. These technologies are discussed in the social context of the people who use the technology. Broad technical research challenges are delineated and new directions for exploration are discussed.

A touch screen is an electronic visual display that the user can control through simple or multi-touch gestures by touching the screen with one or more fingers. The first one is Gesture_to Voice translating module. It involves touch screen based gesture recognition using 65K Color Touch screen TFT_Display. The process is to understand and decode the swipe gesture made on the touch screen and then to speak out this word/alphabet/numeral in a virtual human voice through an MP3 audio decoder. The user will be able to form sentences using this process quite quickly and easily. The color display would help this process by rendering an onscreen swipe keypad layout for the user to input their gestures.

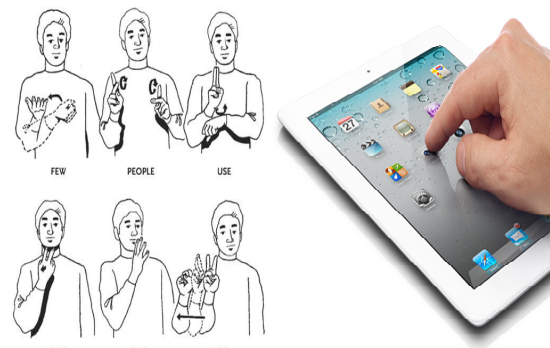


Fig.-1 Handicom

A resistive touch screen works by applying a voltage across a resistor network and measuring the change in resistance at a given point on the matrix where a screen is touched by an input stylus, pen, or finger. The change in the resistance ratio marks the location on the touch screen. When the touch panel is pressed or touched, there are two mechanisms that will affect the voltage level at the contact point of the touch panel. These two mechanisms will cause the voltage across the touch panel to “ring” (oscillate), and then slowly settle (decay) down to a stable DC value.

The two mechanisms are:

- 1) Mechanical bouncing caused by vibration of the top layer sheet of the touch panel when the panel is pressed.
- 2) Electrical ringing due to parasitic capacitance between the top and bottom layer sheets of the touch panel and at the input of ADS7843 that causes the voltage to “ring” (oscillate).

GSM Technology

The second module is the ability to send SMS to mobile phones. Even the deaf or dumb need to communicate over long distances and hence the device has an inbuilt GSM module to send SMS. Based on the touch screen display, the user can enter his text and the mobile number just like in a normal mobile phone to send SMS to others.

GSM was designed principally for voice telephony, but a range of bearer services was defined (a subset of those available for fixed line Integrated Services Digital Networks, ISDN), allowing circuit-switched data connections at up to 9600 bits/s. At the time of the original system design, this rate compared favorably to those available over fixed connections. However, with the passage of time, fixed connection data rates increased dramatically. The GSM channel structure and modulation technique did not permit faster rates, and thus the High Speed Circuit-Switched Data (HSCSD) service was introduced in the GSM Phase 2+.



Fig. - 2 Gsm Model

Speech Recognition

The second one is Speech to Image Translating module. It involves advanced Speech Recognition unit and a color display. The process is to recognize the words spoken by a normal person and to convert this voice input to an image or text and to display it on the screen of the device.

In the block diagram, the major is LPC1313 ARM Cortex-M3 processor is leading 32-bit

processor for highly deterministic real-time applications and has been specifically developed for high-performance low-cost platforms. For a broad range of devices including microcontrollers, industrial control systems, automotive body systems and wireless networking and sensors.

The processor is highly configurable enabling a wide range of implementations from those requiring memory protection and also powerful trace technology through to extremely cost sensitive devices requiring minimal area.

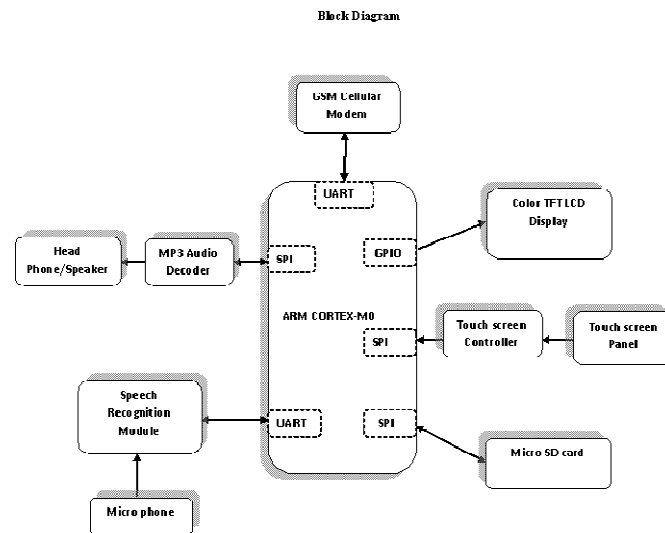


Fig. - 3 Block Diagram

ARM Cortex-M3 processor, running at frequencies of up to 72 MHz. ARM Cortex-M3 built-in Nested Vectored Interrupt Controller (NVIC), 32 kB on-chip flash programming memory, 8 kB SRAM. In-System Programming (ISP) and In-Application Programming (IAP) via on-chip boot loader software. Serial Wire Debug and Serial Wire Trace port. High-current output driver (20 mA) on one pin High-current sink drivers (20 mA) on two I2C-bus pins in Fast-mode Plus. Three reduced power modes: Sleep, Deep-sleep, and Deep power-down. Single power supply (2.0 V to 3.6 V). I2C-bus specification and Fast-mode Plus with a data rate of 1 Mbit/s with multiple address recognition and monitor mode.

A resistive touch screen works by applying a voltage across a resistor network and measuring the change in resistance at a given point on the matrix where a screen is touched by an input stylus, pen, or finger. The change in the resistance ratio marks the location on the touch screen. Here the teacher can at any moment (before or during the lecture) create a question attached to a slide by clicking on the icon for this option. The first thing to do is to def me the

type of question to create: simple selection, multiple selection, sequence definition or free format.

Serial Peripheral Interface

Serial Peripheral Interface is a simple interface which enables to communicate microcontroller and peripheral chips or intercommunicate between two or more microcontrollers. Serial Peripheral Interface bus sometimes called four wire interfaces may be used to interface such chips or devices like: LCD, sensors, memories, ADC, RTC. The range of usage is huge. SPI Bus uses synchronous protocol, where transmitting and receiving is guided by clock signal generated by master microcontroller. SPI interface allows connecting several SPI devices while master selects each of them with CS (Chip Select) signal – (Underline means that active is LOW).

Fig 4.1 speech to image conversion

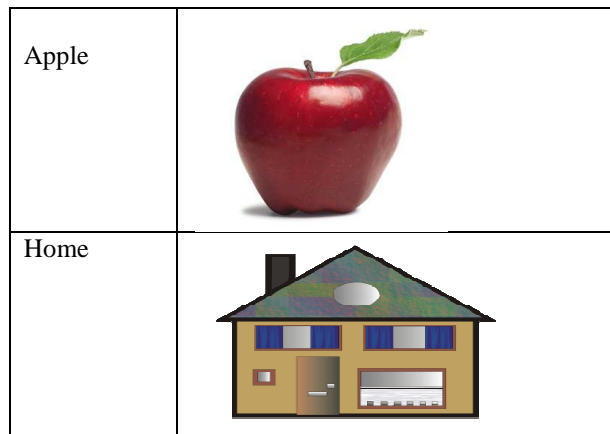


Fig 4.2 Gesture to speech translation



Conclusion

In this paper, shows how technology is used to achieve the interaction between deaf and dumb people with others. This technology used for data acquisition and transmission,. Choose low-power hardware equipment and transport protocol, add the node sleep mechanism, so that the system has low energy consumption, large communication range, high stability characteristics. Used as the mobile phone for Deaf and Dumb. Short distance as well as long distance communication is possible. Touch

screen gesture method eliminates the use of complex hand gestures. Hence removes the need for hand movement sensing systems which are quite large, complex, expensive and slower. Support for uneducated people with Image translation feature. Language learning mode helps uneducated people to learn English words through it. More advanced user can use word translation.

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