ARM Processor Based Multiple Languages E-Dictionary for Blind People

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Abstract

There is great need to ensure that innovative technology enabled assessment are accessible for students with visual disabilities (ranging from low vision to complete blindness), would encounter in accessing of learning research system. So there is a need in market to come up with the utility equipments and gadgets for blind people to just try and add comfort to their lives. To fulfil the above necessities, the aim of this paper is to come up with a unique concept of designing an electronic dictionary for the blind people.

1. Introduction

We live in a world where everything can be controlled and operated automatically, but there are few important sectors in our country where embedded system has not been adopted because of several reasons, one such reason is cost. The attempt in this thought is one of its kinds and effort in this forte is fun and a challenging experience. Development of prototype say dictionary can be more than useful as it will be portable, light weight and easy to carry.

2. High-level System Description

The project is basically divided into four main parts:-

- Power Supply
- ARM processor based PCB
- SD card and Connector
- Braille or Normal Keyboard

2.1. Power supply

The power supply used will be a 12 volt adapter supply taken in from the mains. The supply is distributed among ARM7, SD card and an audio amplifier (if required). The nominal supply voltage for ARM7 is 3.3V at room temperature. If an audio amplifier is connected it would require 9V. Therefore a voltage regulator IC is used which separates 3.3V from the supply for ARM and SD card.

2.2. ARM7

ARM is a 32-bit reduced instruction set computer (RISC) instruction set architecture (ISA) developed by ARM Holdings. It was named the Advanced RISC Machine, and before that, the Acorn RISC Machine. The ARM architecture is the most widely used 32-bit ISA in numbers produced. ARM cores are used in a number of products, particularly various smart phones. Some computing examples are the Acorn Archimedes, Apple iPad and ASUS Eee Pad Transformer. The ARM processor has been specifically designed to be small to reduce power consumption and extend battery Operation essential for applications such as mobile phones and personal digital assistants (PDAs). High code density is another major requirement since embedded systems have limited memory due to cost and/or physical size restrictions. High code density is useful for applications that have limited on-board memory, such as mobile phones and mass storage devices.

In addition, embedded systems are price sensitive and use slow and low-cost memory devices. For high-volume applications like digital cameras, every cent has to be accounted for in the design. The ability to use low-cost memory devices produces substantial savings. Another important requirement is to reduce the area of the die taken up by the embedded processor. For a single-chip solution, the smaller the area used by the embedded processor, the more available space for specialized peripherals. This in turn reduces the cost of the design and manufacturing since fewer discrete chips are required for the end product. ARM has incorporated hardware debug technology within the processor so that software engineers can view what is happening while the processor is executing code. In today's systems the key is not raw processor speed but total effective system performance and power consumption. The ARM core is not a pure RISC architecture because of the constraints of its primary application—the embedded system [5].It can be used to build a multiple function device for people with disabilities [6].

2.3. SD card and Connector

The SD (Secure Digital) Memory Card is a highly-sophisticated memory device about the size of a postage stamp [7]. Micro SD card is flash based memory card and designed to meet the security capacity, performance and environment requirements inherent to use in emerging audio and video electronic devices. All cards incorporate DRM copy-protection. User is not authorized to use some memory portion of SD card, approx 10% of storage space, which is known as a "Protected Area", but is used by the on-card processor to verify the identity of an application program that it then allows to read protected content. The micro SD card communication is based on an advance 8 pin interface and the micro SD card host interface supports regular multimedia card operation as well[5]. Operational voltage range 3.1 to 3.5 volts. This is used to store the narrations for meanings of words in different languages.

2.4. Braille or Normal Keyboard

A Braille keyboard is a device for the blind to type Braille characters. Braille keyboards are more complicated than conventional keyboards because up to six keys could be pressed at the same time [9]. Keyboard for blind people comprising a body carrying a plurality of keys and interface means for its connection to an external unit, wherein said keys have a number of portions each having associated a function of the key and having represented such function in Braille characters thereon[5].Braille technology allows blind or visually impaired people to do common tasks such as writing, browsing the Internet, typing in Braille & printing in text, engaging in chat, downloading files, music, using electronic mail, burning music, & reading documents. Braille computer keyboards are extremely rare.

BLOCK DIAGRAM OF THE PAPER PROPOSED:

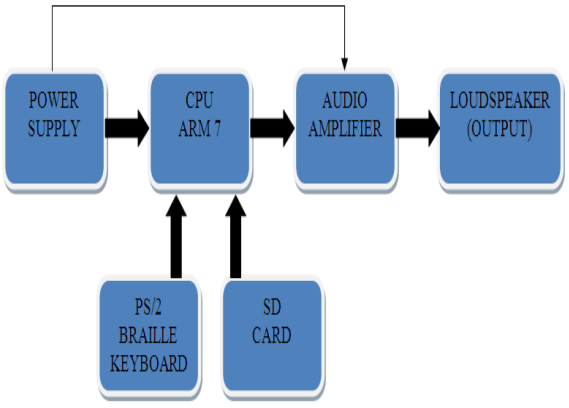

FIGURE I: Block Diagram of the System

Loudspeaker or an ear phone can be used to get the output.
A RS-232 channel is used to communicate with a personal computer[3].

3. Operation of the proposed system

The design was implemented and tested. In the proposed paper the gadget works completely fine. The schematic for ARM processor based e-dictionary is shown below in Figure II.

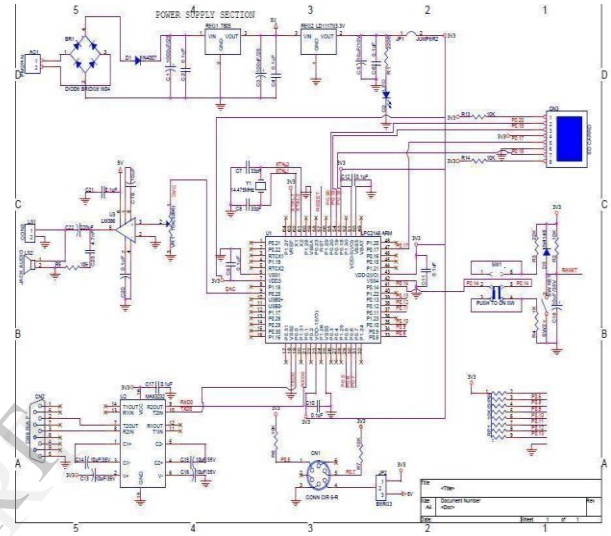

FIGURE II: Circuit Schematic.

The working operation of proposed system is as follows:

- A RS232 channel is used to communicate with the personal computer.
- Braille or a normal keyboard is used for entering the word by the user.
- After entering the word the ARM processor chooses the typed word from the SD card (memory device), and let user have its meaning in multiple languages through loud speaker or an ear phone.
- ARM processor is coded to serve the desired purpose.
- SD card is used as an external memory device where meanings of different words are stored in multiple languages.

4. Results

In this circuit Braille keyboard, Normal keyboard and SD card of larger memory capacity can be interfaced easily. Here ARM processor acts as a very important part of the proposed model.

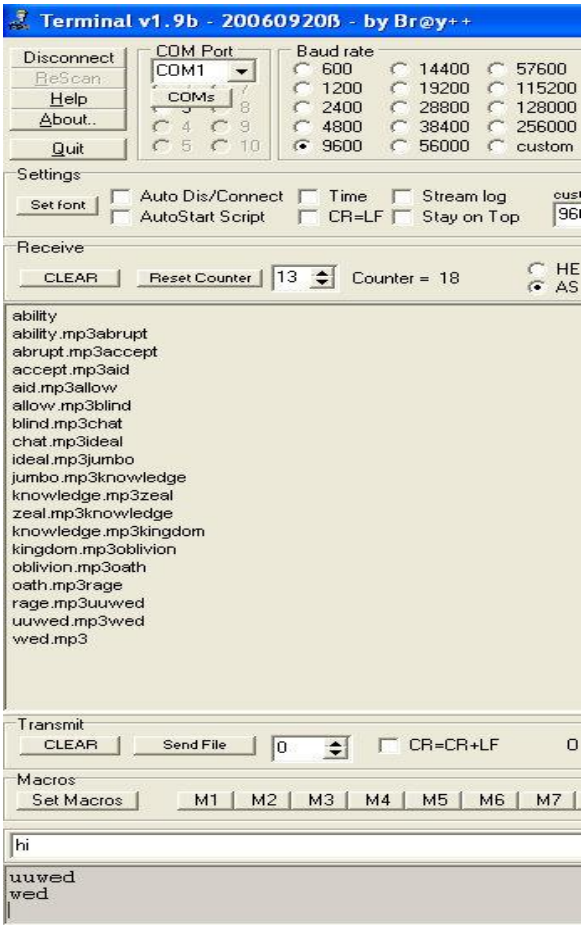

FIGURE III: Output Diagram.

.From the above Figure it is clearly shown that whatever word is typed got converted into its .mp3 format, narrating the meaning of the word. Last word searched was "wed" in the lowest bar and, as told earlier, its meaningful "wed.mp3" format is shown above.

5. Conclusion and Future Work

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The e-dictionary is partially automated so it reduces the human effort. The e-dictionary uses ARM processor, as it's a very advanced processor so certain advantages of it are Simple instruction set, less power consumption, inbuilt features such as DAC, Ethernet, CAN etc, are very useful and easy to use. The Multiple language e-dictionary for visually impaired or blind people uses English, Hindi, Marathi languages to serve the purpose of narrating meaning of words to the visually impaired and blind persons. Hence it is portable system, cost efficient, having expandable memory and User friendly as editing and deleting of any word is easily possible. So this dictionary can be expanded with different words and its meaning in any required language as per need. For the ease of visually impaired and blind persons to carry it anywhere, the above circuit (Fig. II) is implemented over a dual layer PCB, which makes it compact and less bulky.

6. References

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