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Digital Signature Based Fax Machine Using ARM9 and Linux

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***Abstract* – In this method we are having the S3C2240A (ARM9) Board which is ported with Linux in it. And this ARM9 board with Linux will be connected to the Touch Screen device. This ARM9 board intern will be connected to the LAN network (Ethernet). To design this fax machine we are using two Arm controller boards. One Arm board will keep at fax Transmission side and another board will keep at fax receiving side. By using the Ethernet we will send and receive the fax, for that we are using TCP/IP server and TCP/IP client. In this fax machine we have too many options on touch screen of arm like retrieve, sign, send, save etc. By selecting the retrieve option we can see the received text data on touch screen. If we want to transmit text data, we can select send option, then the fax will sent to the destination. On the receiving side, the received fax will be displayed on LCD touch screen. If necessary, we can sign directly on the touch panel by selecting the sign option. If we want to retransmit that signed document, we should active server. In this way bidirectional transmission and reception is possible.**

***Keywords* – ARM 9(S3C2440), Ethernet and Touch Screen.**

I. INTRODUCTION

The general method of sending the information, means sending the documents to the remote location through Postal/courier which takes long time for reaching information to the destination location. At present we are using fax technologies, the normal usage of the Fax machine will not be useful efficiently when need to send the fax we need to use the papers both sides and every time this we need to do. The general method of sending the information, means sending the documents to the remote location through Postal/courier which takes long time for reaching information to the destination location. At present we are using fax technologies, the normal usage of the Fax machine will not be useful efficiently when need to send the fax we need to use the papers both sides and every time this we need to do. But this proposed system which is based on the touch screen we are using it for the Fax machine which doesn't use the papers, using the touch screen only we need to write the data *to* that soft paper and finally we can send it back to the destination location.

In this project we are going to use the ARM9 based microcontroller, which is the current dominant microcontroller in mobile based products and software development Tool as Keil, flash magic for loading the hex file in to the microcontroller.

II. PROPOSED METHOD

A. Digital Signature Based Fax Machine –

In this method we are having the S3C2240A (ARM9) Board which is ported with Linux in it. And this ARM9 board with Linux will be connected to the Touch Screen device. This ARM9 board intern will be connected to the LAN network (Ethernet). This Ethernet facility will be useful for sending the data to the remote location through wirelessly. The output can be observed at both locations, one is at the ARM9 board and another one is at the remote client location.

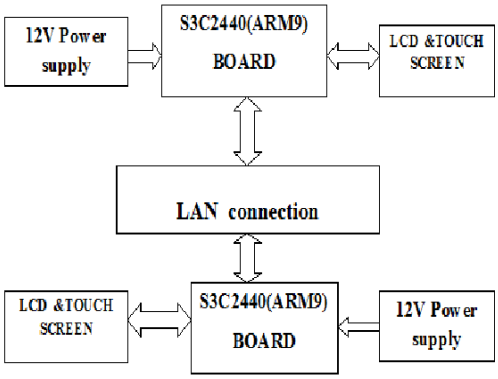

Fig.1. Block diagram

To design this fax machine we are using two Arm controller boards. One Arm board will keep at fax Transmission side and another board will keep at fax receiving side. By using the Ethernet we will send and receive the fax.

Mini2440 Development Board:

Mini24440 is a practical low-cost ARM9 development board, is currently the highest in a cost-effective learning board. It is for the Samsung S3C2440 processor and the use of professional power stable core CPU chip to chip and reset security permit system stability. The mini2440 Immersion Gold PCB using the 4-layer board design process, professional, such as long-wiring to ensure that the key signal lines of signal integrity, the production of SMT machine, mass production; the factory have been a strict quality control, with very detailed in this manual can help you quickly master the development of embedded Linux and WinCE process, as long as there is C language based on the general entry to two weeks.

Features:

CPU Processor

- Samsung S3C2440A, frequency 400 MHz, the highest 533 MHz

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SDRAM Memory
- On-board 64MB SDRAM
- 32-bit data bus
- SDRAM clock frequency up to 100 MHz

FLASH Memory
- On-board 64 MB NAND flash, Power-down non-volatile.
- On-board 2 MB NOR flash, Power-down non-volatile, BIOS has been installed.

LCD Display
- On-board integrated 4-wire resistive touch screen interface, you can directly connect 4-wire resistive touch screen
- Support for black and white, 4 gray-scale, 16 gray-scale, 256-color, 4096-color STN LCD screen size from 3.5; to 12.1; 1024x768 pixels screen resolution can be achieved
- Support for black and white, 4 gray-scale, 16 gray-scale, 256-color, 64K-color, True Color TFT LCD screen size from 3.5; to 12.1;, 1024x768 pixels screen resolution can be Achieved.
- Standard configuration for the NEC 256K-color 240x320/3.5; TFT True Color LCD Screen with touch screen.
- Leads to a 12 V power supply on-board interface, for the large-size TFT LCD 12 V CCFL backlight module (inverting) power supply.

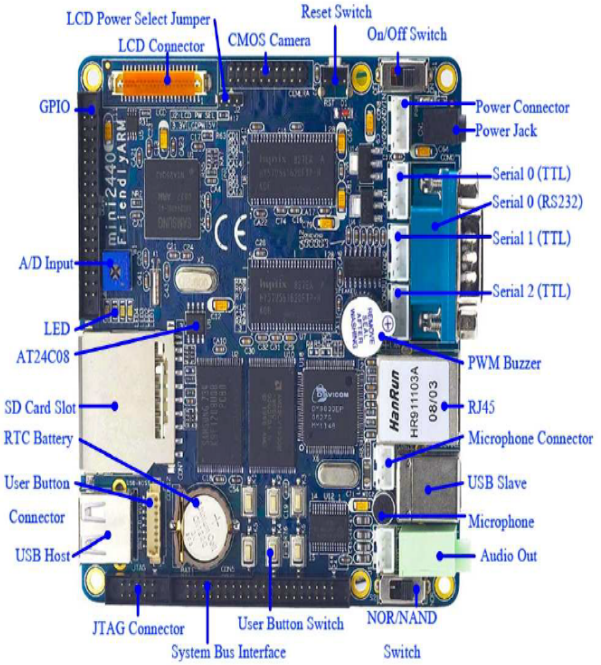

Fig.2. Mini2440 interface layout

Mini2440 interface layout is shown below it in a very compact area of 100 mm x 100 mm delicate arrangement of open made from a variety of commonly used interface, and also leads to the need for development and testing of the surplus of the I/O ports and bus interfaces. We cannot get S3C2440 microcontroller individually. We will get it in the form of Friendly ARM board else, we can call it as MINI 2440 board.

B. Digital Signature Based Fax Machine flow chart –

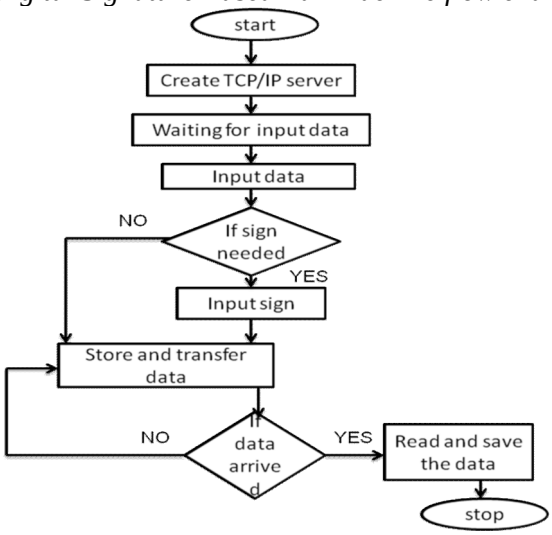

Fig.3. Flow chart

Working Principle:

The main objective of this project is to design **"**Digital Signature Based Fax Machine**"**. This fax machine replace all traditional devices like scanner and printer with touch screen, and this fax machine purely eliminates the paper usage.

To design this fax machine we are using two Arm controller boards. One Arm board will keep at fax Transmission side and another board will keep at fax receiving side. By using the Ethernet we will send and receive the fax, for that we are using TCP/IP server. In this project we need two TCP/IP servers and two TCP/IP clients, one TCP/IP server and client for text data transmission and another for image transmission. In the transmission side and receiving side, server C always will keep in active state to listen the client requests. By using server C we can transmit text data only. If we want to transmit images like signature we should activate server S.

In this fax machine we have too many options on touch screen of arm like retrieve, sign, send, save etc. By using this fax machine client C will send fax (only text document) to server C. By selecting the retrieve option we can see the received text data on touch screen. If we want to transmit text data, we can select send option, then the fax will sent to the destination. On the receiving side, the received fax will be displayed on LCD touch screen. If necessary, we can sign directly on the touch panel by selecting the sign option. If we want to retransmit that signed document, we should active server S. In this way bidirectional transmission and reception is possible.

C. Resolution of Touch Panels-

A single-touch panel is composed of two major parts, an LCD screen for displaying and a thin touch layer for inputs. Although the touch layer resides atop the LCD screen, the ways to define resolutions of these two parts are different. The resolution of an LCD screen is specified explicitly by enumerating the number of pixels both in width and height. However, since a touch panel digitizes the analog readings by using ADCs, the resolution of the touch panel is determined by the number of bits used in

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the ADCs adopted. There are two ADCs used in a touch panel, one for horizontal and the other for vertical direction respectively. For example, if a 10-bit ADC is used in one direction, the resolution would be 1024 in that direction. Practically, the resolution of the touch panel is higher than that of the LCD screen.

D. Pressures and Strokes

The single-touch panel detects and responses one location at a time, even though there is actually an area of the panel is being touched. In order to reconstruct the different stroke thickness as that in a real signature, the pressure data collected are analyzed. To simplify the implementation, only positive pressures are considered valid.

III. Conclusion

In the experiments, a touch panel computer was used to implement and test the proposed paperless fax machine. The touch panel computer equipped with a 3.5” 320×240 (QVGA) resolution LCD screen, a 5-wire resistive single-touch panel and ARM 9 board. The sampled signals of the planar resistor on the touch panel were digitized by two 12-bit ADCs. Theoretically, the resolutions of the touch panel should be 4096×4096. Practically, two least significant bits were treated as noise bits and ignored, so the real resolutions turned out to be 1024×1024, which was enough to be used on a 320×240 LCD screen.

Besides, the typical resolutions of an A4 scan page on a Group 3 fax machine is 1728 pixels/line and 1145 lines/page. The transmitting document can be compressed to accelerate transmission. In this case, a decompress process is needed in the receiving end. These compress-and-decompress processes were achieved by the on-board processor in the modem module. In this work, under a LCD screen with a resolution of 320×240, to view a 1145×1728 document wouldn’t be a problem, if it is scaled down properly.

A text document will be entered directly on LCD screen which is equipped with the ARM9 board which is at the transmission side and save it by selecting "save" widget and send it by selecting "send" widget by using Ethernet. A received fax can be displayed directly on the LCD screen equipped with another ARM9 board by selecting "retrieve" widget which is at receiving side. we can attach a signature to that text document by signing on the LCD screen directly and save it. And we can send the signed document by using the Ethernet to the destination location from the source by selecting "send" widget.

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