Transmission of Message between PC and ARM9 Board with Digital Signature using Touch Screen

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***Abstract*—This paper deals with the Transmission of message between ARM9 board and Personal Computer. This system can be used as a paperless fax machine. The main advantage of this paper is to create a paperless office and to store the fax for future references. Here, a PC is used as first fax machine and ARM9 board is used as second fax machine. The message is typed in the System and sent to ARM9 board. The user can read the message on the touch-screen and do the digital Signature using Stylus, if required and send back to the PC. A copy of the message as well as the Signature is stored in the pen-drive connected to USB of ARM9 board for future references. The processor used is S3C2440 and Qtopia is the cross-compiler used. Various widgets are created in Qtopia using CPP as the programming language. Firstly, Porting is done in order to load the Bootloader, Kernel and Root File System. Then various widgets are created in Qtopia. Ethernet cable is used to connect the PC and the ARM9 board. Linux Operating System is used.**

***Index Terms*—ARM9, Qtopia, Porting**

I. INTRODUCTION

Samsung S3C2440A is a 16/32-bit RISC microprocessor. Samsung S3C2440A is designed to provide hand-held devices and general applications with low-power, and high-performance micro-controller solution in small die size. The ARM processor is a Reduced Instruction Set Computer (RISC). The S3C2440 is a 32 bit microcontroller that internally integrates ARM920T of the ARM Company [9]. ARM920T implements 5-stage pipeline architecture and separate 16KB Instruction cache and 16KB Data cache which are used for faster performance. The S3C2440 have some integrated on-chip functions such as LCD controller, RAM controller, 3 paths UART, 4 paths DMA, 4 path with PWM of Timer, parallel I/O port, 8 channels of 10-bit ADC, the interface of touch screen, I2C interface, two USB interface controllers, two channels SPI, the main frequency of S3C2440 up to 400MHz [4]. The Figure below shows the MINI2440 on-board peripherals layout. The Transmission of Message with Digital Signature on Touch Screen using ARM9 application is implemented in ARM9 board using QT.

The proposed model consists of S3C2440, PC, Touch Screen and Ethernet cable. The transmission of data between S3C2440 and PC is done through this Ethernet cable.

ARM9 board is considered as one fax machine and PC as another. The message or fax is sent from PC to board. The user can do the signature on touch screen of the board and should click on the save option. A copy of the message as well as the signature is saved in the pen-drive for future reference. Single touch panel added to conventional fax machine-replaces the scanning and printing units. Touch panel acts as an input device as well as displaying device, which can detect the location being touched. Handwriting reconstruction algorithm is used internally in the board itself to turn a user's signing act into a digital signature, close to the original as much as possible. The document containing the message as well as the signature is sent back to PC and is seen by typing the IP address of the board in URL of the web-browser.

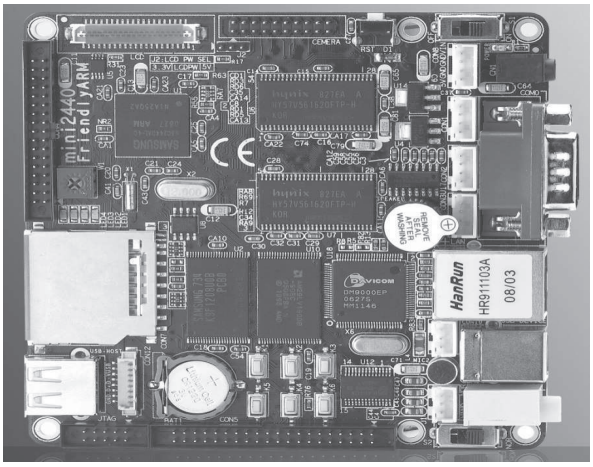

Figure 1: Mini2440 Development Board

Qtopia is used to create various components on the touch screen such as widgets. The operating System used is Linux and programming is done using CPP.

The procedure for implementing this project is as follows:

- The First step is porting of boot loader , kernel , root file system into S3C2440 board.
- The next step is to develop the application in QT using CPP.
- Then the output can be seen by typing the message to be transmitted in hyper terminal of personal computer. Then the message is displayed on the

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Touch Screen of ARM9 board. Digital Signature is done using Stylus and a copy of Signature and message is stored in the pen drive.

- The message is again sent back and retrieved on PC by giving the IP address of board in the URL of web-browser.

Qtopia is used for set of applications with GUI running on desktop environment and general application based on interface. It supports cross compilation for all multiple boards (open source GUI environment). Qtopia 2.2.0 controls embedded related devices on target board and compatible with Fedora 9 and ubuntu.

- Qt_Embedded is a C++ toolkit for GUI and application development for embedded devices. It runs on a variety of processors, usually with Embedded Linux.
- Qt_Embedded based applications write to the Linux frame buffer directly and includes several tools to speedup and ease in development in testing and debugging of applications.
- Applications targeted for Embedded Linux can be developed using standard Qt tools, including Qt Designer for visual form design, and with tools specifically tailored to the embedded environment.

II. RESULTS

1) Load the files of bootloader, kernel and file system into the board by switching the board on, in NOR flash.

2) After loading the above files switch to NAND flash mode.

3) Restart the board and calibrate the touch screen.

4) Open the port terminal using Debug Port.

5) Open the hyperterminal. Select com1 Port and set the Baud rate to 115200.

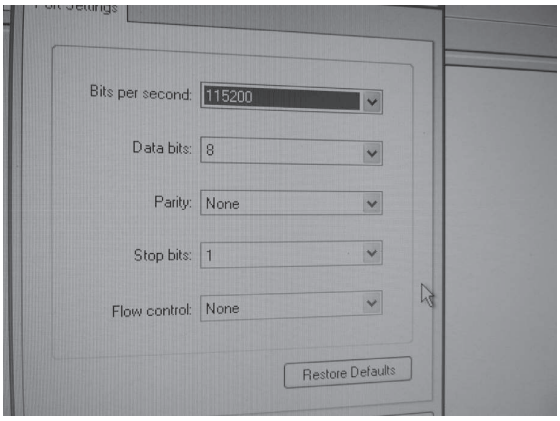

Figure 2: Entering 11,5200 as baud rate

On the Personal Computer we need to enter the message which has to be transferred to the board.

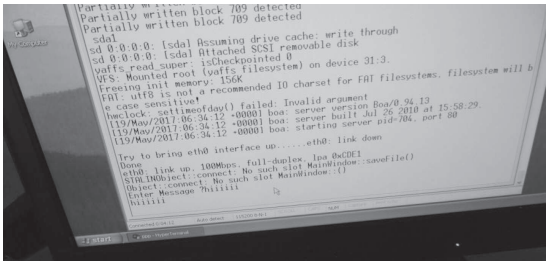

Figure 3: Entering message on PC
Digital signature is done in the space provided

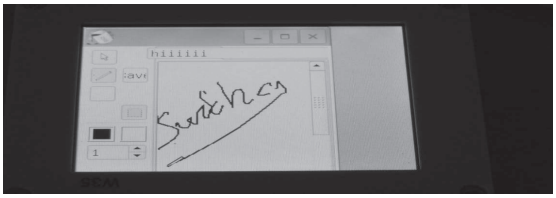

Figure 4 : Digital Signature done in widget provided
Saving the message as well as the signature by pressing save on widget in the touch screen.

Figure 5 : Clicking the save option to save a copy of image in the pen drive

The message as well as the signature is sent back to the PC. It is observed by typing the IP address of the kit in the URL of the web-browser.

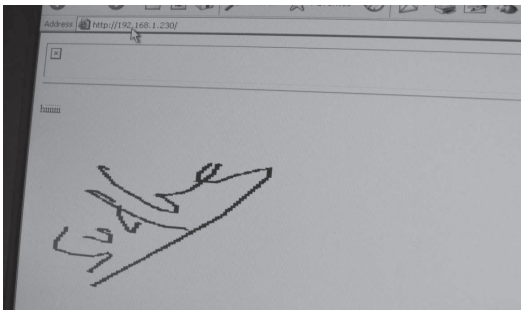

Figure 6: Retrieval of message as well as digital signature on PC

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III. Conclusion

The model "Transmission of Message with Digital Signature on Touch Screen using ARM9" has been successfully designed and tested.

It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

Secondly, using highly advanced ARM9 board and with the help of growing technology the project has been successfully implemented.

IV. Future Scope

In the future scope we can go with the usage of touch screen monitor PC's where the ARM board can be directly interfaced to the PC's. Here in this we are going to reduce the extra touch screen panel connected to the ARM board by using touch screen monitors where we can read the received data and we can do the necessary modifications require and can send the modified data and keep the copy of the data inside the memory.

We can also have alert message to your mobiles whenever a new fax is received and also can have alert message with voice by using voice play back recorder circuit like "You received a new FAX ". In this way we are reducing the cost and complexity of the circuit. Here in this concept we are totally eradicating the usage of paper which reduces the environmental pollution.

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