Automated Department Information System Application using UTLP Kit

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Abstract— The paper aims in designing completely automated department information system with the help of touch screen sensor and a graphical LCD to control and provide a user friendly environment. The college information is organized to give easy access to the user. Touch screens provide fast access to any and all types of digital media, with no text-bound interface getting in the way. Faster input can mean better service. Using a touch interface it can effectively increase operator accuracy, reducing training time and improve overall operational efficiencies, a properly designed touch interface can improve each operator's accuracy. Touch screens are practical in automation, which has become even simpler with touch screen technology.

Key words: digital, LCD, Electronics, UTLP

I. INTRODUCTION

Information system plays a very essential role in a modern life style. Providing the clear information about any institution, hotels, companies etc. are very important. In the initial days, getting the information of these sections were not so easy. In most of the cases one has to depend on others to get such kind of information. So, here is the challenge to provide the information on the finger tip to the user. In the modern technological era, this is made possible. Using the touch screen device we can achieve this requirement. Here is the outline giving the information of the electronics department of Mangalore University which includes the information regarding faculty, lab, research information etc [1-5]. All this basic information is arranged in a simple manner so that getting information become easy to both unknown and known user. Also, user can go for the detailed information or the particular information. Finally, the present work is made to get the information in a user friendly environment [6-11].

II. METHODOLOGY & IMPLEMENTATION

- Getting details about the different information and collected information are sorted according to our convenient.
- Creating images to be displayed on the GLCD. First jpg/ jpeg images of resolution 320X240 are created. The images are later stored in .bmp format. These .bmp images are converted to hex files; the hex file contains the pixel values of all the 76800 pixels of the respective .bmp image. This conversion is done by using the bmp_to_hex executable file.
- Finding the pixel co-ordinates of the area to be touched in each image, based on which suitable process must take place. That is, the x and y co-ordinate values of each pixel at the four corners of the area to be touched is to be found out.
- Hardware connections: Ethernet cable is connected between the CPU of the host PC, and the UTLP kit, that is nothing but the client. UTLP kit is connected to power supply using AC-DC adapter (Output is 5V DC). The kit works in Normal Mode.
- Software implementation: The main program is written in Eclipse IDE. Suitable header files are added and linked with the main program. The program is compiled and errors are corrected. By using the ULK control panel, connection is established between the host PC and UTLP. The program is loaded, and executed.

The department catalogue is implemented using UTLP Kit. Unified Technology Learning Platform (UTLP) is based on Texas instruments OMAP3530 application processor and Spartan-6 FPGA. OMAP3530 has a Microprocessor unit subsystem based on the ARM Cortex-A8 microprocessor. This application software supports interfaces such as Touch screen LCD, character LCD, Ethernet, Keypad, Bluetooth and modem connector. The Spartan-6 FPGA supports interfaces such as SDRAM, ADC, DAC, character LCD. The input to the system is given through the touch screen which provides faster access. The touch screen analog signals from the external LCD will be interfaced with touch screen controller TSC2046 to the OMAP3530 processor. The images will be displayed on the Graphics LCD. The 24bit RGB Out signals and LCD control signals of OMAP3530 processor is taken out to interface with 3.5inch LCD. Since voltage levels of these signals are 1.8V, level translators are used to convert the 1.8V level signals to 3.3V level signals. The information about selected book is displayed on the character LCD. The 16x2 character LCD is connected through the I2C interface as shown in fig.1.

An ARM processor interfaces with the input and output modules. It acts as an intermediate medium between input and output. So the processor can be termed as a control unit. The software is implemented using the Eclipse tool. The processor (CPU) loads the program onto the memory on board (SDRAM).

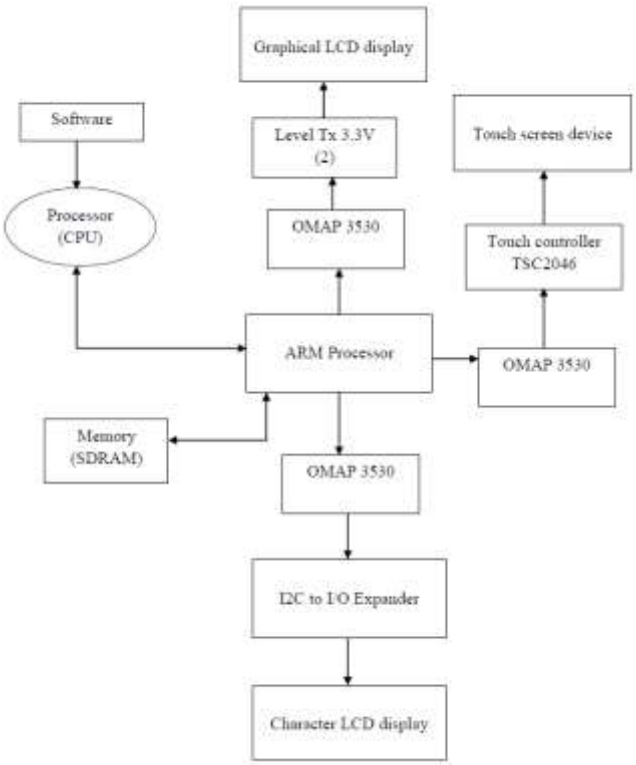

Fig. 1: Block diagram

III. HARDWARE AND SOFTWARE REQUIREMENTS

UTLP (Unified Technology Learning Platform) is an ardent facilitator for aiding engineers gain hand-on, learn and understand complex and advance technologies simply. UTLP is based on Texas Instruments OMAP3530 application processor & Spartan-6 FPGA. The OMAP3530 processor supports interfaces such as Mobile DDR, NAND Flash, Audio in & out, TV out, Touch screen LCD, VGA out, Ethernet, Keypad, USB OTG, 2 SD cards & external interface connectors such as Control sensor header, I/O expansion connector, I2C Header for GPS, Bluetooth & Modem Connector, Simple Digital interface connector, IrDA Connector, Camera Connector & LCD connector. The Spartan-6 FPGA supports interfaces such as DDR2 SDRAM, Ethernet, ADC, DAC, character LCD & external interfaces such as 70-pin IO expansion connector. Fig. 2 shows the image of UTLP kit. OMAP (Open Multimedia Applications Platform) is a series of image/video processors developed by Texas Instruments. OMAP devices generally include a general-purpose ARM architecture processor core plus one or more specialized co-processors.

Fig. 2: Utlp Kit

A. Spartan-6 Fpga Features:

Spartan-6 FPGAs offer the ideal combination of performance and flexibility to address requirements for high resolution, video analytics, and increased channels in video surveillance system as shown in fig.3. Reduce power consumption, simplify thermal management, increase reliability, and reduce cost with high-capacity, low-power FPGAs.

Fig. 3: Xilinx Spartan-6 FPGA

B. Arm Cortex-A8 Processor:

An ARM processor is one of a family of CPUs based on the RISC (reduced instruction set computer) architecture developed by Advanced RISC Machines (ARM). ARM makes 32-bit and 64-bit RISC multi-core processors. UTLP kit supports the ARM Cortex-A8 designed by ARM Holdings. The ARM Cortex-A8 is a 32-bit processor; the Cortex-A8 is a dual-issue superscalar design, achieving roughly twice the instruction executed per cycle. The cortex-A8 was the first Cortex design to be adopted on a large scale for use in computer devices. The ARM Cortex-A8 processor is highly-optimized by ARM for performance and power efficiency. With the ability to scale in speed from 275MHz to 1.35GHz, the ARM Cortex-A8 processor can meet the requirements for power optimized devices with a power budget of less than 300mW and enables performance-optimized consumer applications requiring greater than 2500 Dhrystone MIPS. Compared to the ARM11 core, the Cortex-A8 processor is a dual – issue superscalar, achieving twice the instructions executed per cycle at 2 DMIPS/MHz.

C. Graphics Lcd:

The graphical LCDs are used to display customized characters and images. The graphics LCD has a resolution of 320x240. The 24bit RGB Out signals and LCD control signals of OMAP3530 processor is taken out to interface with 3.5inch LCD. Since voltage levels of these signals are 1.8V, level translators are used to convert the 1.8V level signals to 3.3V level signals. The 3.5 inch graphics LCD is connected as shown in fig. 4.

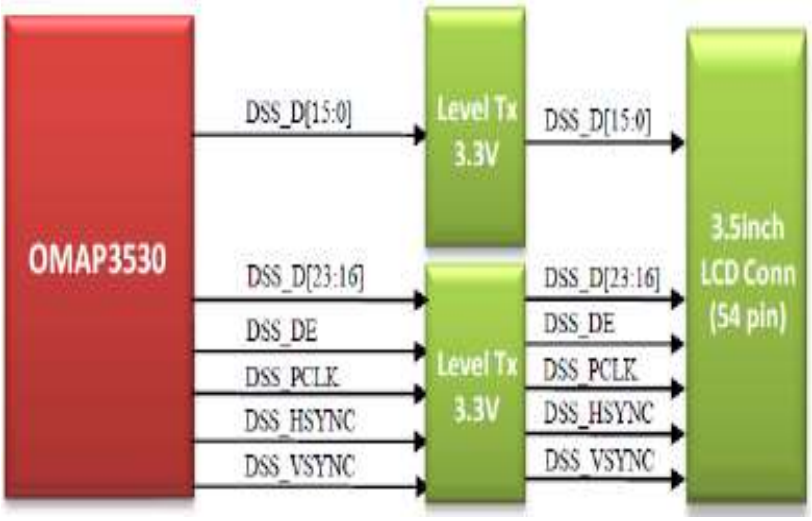

Fig. 4: Block diagram of GLCD interface with the processor

IV. TOUCH PANEL

The touch screen analog signals from the external LCD will be interfaced with touch screen controller through 4 pin 2.54mm pitch header. The touch screen analog signals from the 3.5inch LCD will be interfaced with touch screen controller through the 54 pin LCD connector itself. The 4-wire, 12bit resolution, low voltage touch screen controller TSC2046IPWR from TI is used. The OMAP3530 interface with touch panel controller is shown in fig. 5.

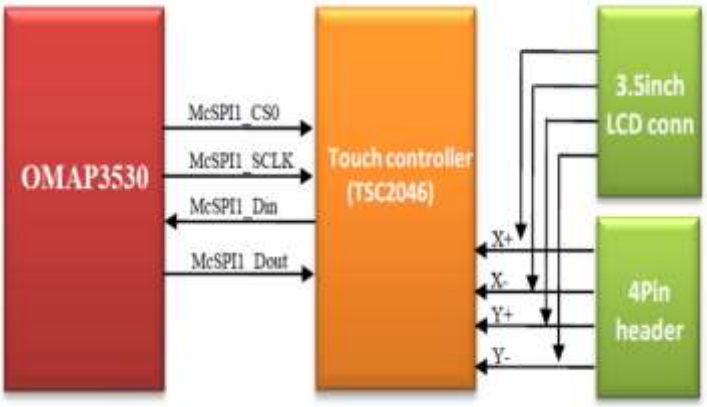

Fig. 5: Block diagram of OMAP3530 interface with touch panel controller

A. Software: ECLIPSE:

Eclipse is a multi-language software development environment tool comprising an integrated development environment (IDE). The Eclipse IDE can be extended with additional software components. These software components are called plug-ins. It is the leading development environment for Java with a market share of approximately 65%.

Eclipse started as a proprietary IBM product (IBM Visual Age for Smalltalk/Java). It is general purpose open platform that facilitates and encourages the development of third party plug-ins. This IDE provides tools for coding, building, running, debugging applications. It is originally designed for Java, now supports many other languages. It provides good support for C, C++, Python, PHP, Ruby, Ada, COBOL, FORTRAN, Haskell, Perl etc. Eclipse is supported in both Windows and LINUX. Eclipse IDE is used for developing applications based on C language for UTLP in the LINUX environment.

V. RESULTS & DISCUSSION

Figures 6-13 shows the various results as the information which s displayed on the screen of UTLP kit. Figure 6 shows the enter screen, figure 7 shows the home screen, figure 8 shows the Dept. profile screen on kit, fig. 9 shows the Dept. Info. screen on kit, fig. 10 shows the Dept. Project info screen on kit, fig. 11 shows the Dept. student Info. screen on kit, fig. 12 shows the Dept. Faculty Info. Screen on kit, fig. 13 shows the Dept. Lab profile screen on kit,.

Fig. 6: Enter screen on KIT

Fig. 7: Home screen on KIT

Fig. 8: Dept. profile screen on KIT

Fig. 10: Dept. Project Info screen on KIT

Fig. 11: Dept. student Info. screen on KIT

Fig. 12: Dept. Faculty Info. Screen on KIT

Fig. 13: Dept. Lab profile screen on KIT

VI. CONCLUSION

The proposed and developed system provides a user-friendly department information system. The system is developed in such a way that the information can be made available for the user easily. The user interacts with the touch panel to get the required information.

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