ISSN: 2277-3754
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 1, Issue 4, April 2012

An Advanced OS Design for Pocket PC's based on Wince 6.0

Sidhu M.A , J.Nalini

Abstract*—The systems engineers designing Personal Communication Products face issues that require a new approach to solve the balance act between end user perceived (GUI) performance and unnecessary applications developed on their products. In this paper we approach a new trend in designing personal communication devices. The hardware is based on a 32-bit Embedded microprocessor with low-power and high performance S3C2440A, the real-time operating system is Windows CE 6.0,is used to complete the work of programming. This paper mainly introduce concept of designing unique OS and unique application development to the individual customer based on the WinCE embedded operating system which will bring a new revolution in international markets.

Index Terms— **Graphical user interface (GUI), operating system (OS), S3C2440A processor WinCE.**

I. INTRODUCTION

The Hand held Computing and Communication market has been plagued by a series of false starts with devices that delivered functionality far from end-user expectations. The market is now ready to take off with the advent of high performance/low-cost RISC processors and open software platforms such as Microsoft WinCE, enabling seamless PC functionality and easy synchronization to the desktop. Three market trends are shaping up:

i). Hand held PCs, with improved LCD s and faster data communication (V34bis speed and beyond).

ii. Personal Companions, such as limited necessary applications.

iii. Smart cellular phones, easy GUI with lower entry cost barriers due to the availability of highly integrated RISC processors.

Design engineers are now addressing the demands of the market by offering highly Optimized systems-on-silicon solutions for hand-held devices. Powered by highly-integrated MIPS based RISC processors along with high-speed soft-modem algorithms and other complementary mixed-signal ICs, Innovative new chip-sets bring to users complete solutions that serve the demands of the users highlighted earlier. Highly integrated architectures, like Philip's Semiconductors' Two Chip PIC Plus with optimized V34 soft-modem, are meeting some of these huge demands better features, price and performance. These chip-set architectures are specifically designed for hand-held computers with just the right set of peripheral blocks and memory configuration making them ideal' solutions for systems engineers minimizing their effort for system balance optimizations [1,2,3] A complete Windows CE Hardware reference design is available to help engineers bring their product to market fast. In conclusion, systems engineers designing Personal Communication Products face issues that require a new approach to solving the balance act between lowest system power consumption, system cost; end user perceived (GUI) performance and unnecessary applications developed on their products.

In the existing marketing system, the new hand held electronic gadgets such as pocket PC's Demand mobile phones introduced by the companies uses their own propitiatory OS for creating applications. These applications introduced by manufacturer are not used by the customers across many countries. And also the idea hiding behind, creating these applications are to sell the own private software products. The existing system can be studied and understood from the following classification. In earlier days the mobile phone was created using C and C++. The C and C++ developer used C coding's on basic microprocessor and released a black and white display mobile phones. These phones have application limitations and absence of graphics contents .Later with the help of JAVA tool, application developers started to write the C coding's along with JAVA which resulted little color displays [6,7,9]. Soon after the processor revolution started the introduction of new microprocessors was started in the markets .These processor had a quite large memory unit. Hence the software developers started to think, to use these memory unit for graphical contents**.** Later advanced processors were introduced in markets to address the demand needed by program developers.

Fig 1 Pocket PC

ISSN: 2277-3754
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 1, Issue 4, April 2012

The application developers made used the MMU unit in the advanced processors and satisfied the graphics demand. Unfortunately in the mean while the Linux programmer came to know about importance and features of Linux coding and started to develop hand held devices on their Linux platforms which attracted the entire market towards its side. The main advantage of Linux is, the presence of graphical contents, which are absent on devices developed on the C and C with Java. Later again the Linux developers embedded the JAVA tool along with their Linux and resulted an ultimate graphical performance on their devices. Now days these products are called as ANDEROID OS devices.

A. Disadvantages of existing system

The first and foremost drawback on these devices was limitation of user interfaces. Even though the graphical contents were adequate on these devices, GUI performance on these devices is poor. The second limitation is, in todays existing market there are many unwanted application are kept in the PDA'S and pocket-PC which are very rarely consumed by the customers. And these applications also raise the product cost to high. The third limitation is ARM 9 board. The ARM 9 has only 5 stages of pipelining which brings difficulty on graphics implementation on ARM 9 series. The IPC communication in ARM 9 is very poor, because the graphical content need proper relay of message passing during pipelining. But the ARM 9 series, gives a chance for bubble formation during IPC communication relay on pipelining which raise difficulty in touch screen implementation on devices.

i. Poor GUI performance on existing hand held devices.

ii Presence of many unwanted application on the devices which are very rarely used.

iii. Tight loop instruction are used in ARM 9 implement touch screen.

iv. ANDERIOD OS occupies more memory than the normal usage

v. Cost-sensitive of hand held devices.

II.PROPOSED SYSTEM

The main theme of the proposed system is bringing a new revolution in hand held devices design which will change the entire market trend. The Challenge is to create and develop a new application feature for hand held devices like PDA, pocket-PC etc…As the problem identification goes above, the only way to overcome the existing system is to design an individual OS and individual application features, according to customer demands. Some people may demand specific applications alone and these applications may vary from customer to customer. Hence therefore the project proposes a customized OS design for hand held devices to an individual user. And also the proposed project system focuses to make availability of advanced technology hand held devices to every one. The proposed system helps to design the hand held devices at very low cost. These devices produce good GUI performance and also results good graphic resolution than existing ANDEROID OS devices. These devices also use the MMU memory unit resources efficiently. Some Advantages of Proposed system

i. New trend is introduced in hand held devices

ii. Unwanted application were avoided

iii. Each individual customer possess their own OS design

iv. Each can create their own applications

v. An advanced 20 MHz ARM 11 is used for device creation.

vi. ARM 11 has 8 stages of pipelining which is quite enough for graphical purpose.

vii. ARM 11 has 6 cycles for IPC communication and leaves no bubble during IPC relay.

viii. Arm 11 uses OKL4 kernel.

ix. OKL4 is the fastest kernel in the earth.

III. IMPLEMENTATION OVERVIEW

BSP (Board Support Package) functions to link the hardware and the operation system, which is very similar with BIOS of PC to initialize the hardware and start the corresponding operation system. Because different operation system have different function library, different operation system also have different BSP [10, 11]. For example, just for the same CPU, although the function is the same, the BSP of WINCE and the BSP of Linux has different styles of writing, and defines of interface are totally different. Although all the ARM chips have compatible kernel, every chip has its characteristic. For the WINCE operation system, Microsoft provides a sample BSP program as a standard development board for each chip. This paper is about to design a unique OS to an individual customer whose hardware platform is based on ARM 11 structure, the device uses Ethernet interface to downloads; series port a PC and Hyper-terminal to connect the PC and Control the platform. As this platform is consulted the development board which based on S3C2440, and the developed BSP board is dumped with application supportive files created and developed using WinCE 6.0. Its low-power, simple, elegant and fully static design is particularly suitable for cost- and power-sensitive applications. The S3C2440A offers outstanding features with its CPU core, a 16/32-bit ARM920T RISC processor designed by Advanced RISC Machines, Ltd. The ARM920T implements MMU, AMBA BUS, and Harvard cache architecture with separate 16KB instruction and 16KB data caches, each with an 8-word line length.

***A.* Hardware side of device construction**

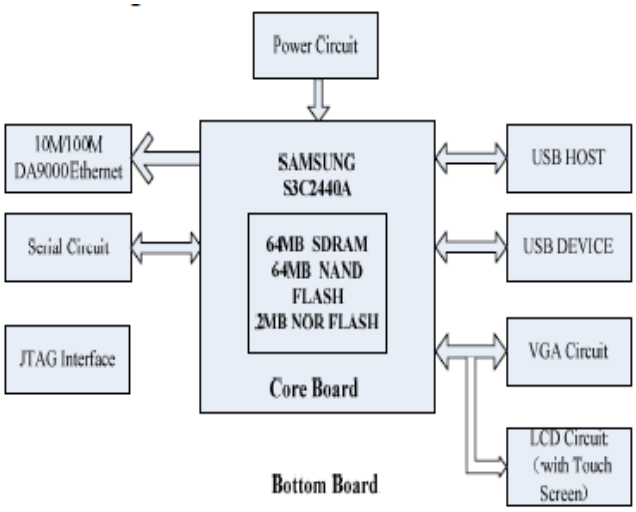
Hardware design is the basic and important task for the development of embedded system, whose quality directly affects the subsequent development.

***Hardware Platform*:** The hardware platform of system uses S3C2440A as the core. S3C2440A processor has adopted ARM1120T kernel, 0.18 um standard CMOS manufacturing process macro cell and storage unit. Its maximum operating

ISSN: 2277-3754
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 1, Issue 4, April 2012

frequency can reach 400 MHz a variety of peripheral control modules have integrated in S3C2440, which can be cut down according to the actual application. In this paper, hardware platform is based on the Core Board—— S3C2440A, which is offered by uCdragon Company Limited. On the basis of the core board, expanded the interface circuits such as JTAG interface, Serial circuit, LCD and VGA circuit, Power Supply circuit, USB Host and USB Device circuit, and 10M/100M Ethernet module. In addition, during the hardware selection process, some major factors must be considered such as the high performance, stability, compatibility, portability and low power consumption and so on. This hardware system structure contains Core Board and Bottom Board. The whole hardware structure is shown in Fig below.

Fig 2 Hardware structure



B. S3C2440A Core Board

The Core Board is integrated with S3C2440A chip, 64MB SDRAM (2xHY57V561620BT), 64MB NAND FLASH (1x K9F1208U0M), 2MB NOR FLASH (1xSST39VF1601), bus driver and reset chip and so on; It provides most of the functions and interfaces for the system, and uses Samsung's S3C2440A 16/32-bit RISC microprocessor as the core and extends the relevant memory. Samsung's S3C2440A is developed with ARM920T core, 0.13um CMOS standard cells and a memory complier.

Its low-power, simple, elegant and fully static design is particularly suitable for cost-sensitive and power-sensitive applications. It adopts a new bus architecture known as Advanced Micro controller Bus Architecture (AMBA). Its maximum operation frequency can reach 400 MHz It has a powerful real-time processing capability and rich peripheral interfaces that suit development of the embedded systems.

C. Other Modules

Serial interface is designed to be used for communication between PC and the development board; USB Host interface can connect USB devices directly; USB Device interface is mainly used for BSP (Board Support Package) to download files and applications from a PC to development platform when connected to PC and is more used in the follow-up work of debugging; Ethernet module uses a network control chip DM9000 to access network.

IV. DESIGN AND MPLEMENTATION OF SOFTWARE SIDE

After finishing test of the basic hardware, the software development is begun. In the system, software plays a very important role in maintaining the stable operation of the system.

A. WinCE Operation System

Microsoft Windows CE 6.0 is an open, scalable, 32- bit operating system (OS) that integrates reliable, real time capabilities with advanced Windows technologies. Windows CE allows you to build a wide range of innovative, small footprint devices [12, 13, 14]. A typical Windows CE–based device is designed for a specific use; often runs disconnected from other computers, and requires a small OS that has a deterministic response to interrupts. With a complete OS feature set and comprehensive development tools, Windows CE contains the functionality you need to build, debug, and deploy custom Windows CE-based devices. Platform Builder(PB) for Microsoft Windows CE 6.0 is a fully-integrated development environment (IDE) for building custom Windows CE OS's and components for embedded system devices and provides all development tools to design, create, build, test and debug a Windows CE-based platform. Embedded Visual C++ is also an embedded IDE provided by Microsoft, and mainly develops application program. Boot loader is a section of code prior to embedded operation system kernel when system boots and is responsible for hardware initialization, memory mapping. It is a bridge to connect hardware and WinCE system, and belongs to the OEM (Original Equipment Manufacturer) adaptation layer of BSP, which guides the kernel through operating board hardware. In order to build a WinCE operation platform, at first, install BSP, import CEC file——SMDK2440A.CEC, This is provided by manufacturer. Next, to create an OS, and finish the basic configuration by using the platform wizard. Second, to choose a BSP. In this system, we select "SAMSUNG SMDK2440A: ARMV4I" for the Samsung SMDK2440A Development platform, which uses the OS that is built for the ARM v4 architecture and contains the ARM instruction set with Thumb Inter-working enabled. To select "Internet Appliance", which provides the starting point for a browser-based consumer Internet appliance with a fixed display such as a CRT or LCD display and a keyboard? After completing the platform wizard, you have created an OS design for a Windows CE-based platform. You can add and reduce some modules to meet the specific demands of system.

B. Sample source coding:-

The sample WinCE coding shows how to modify the configuration files to add the device driver to target platform. Individually modify the Platform. BIB and Platform.REG,

ISSN: 2277-3754
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 1, Issue 4, April 2012

which locate in the directory $(_FLATRELEASEDIR).

```
/*****************************************/IF BSP_NOWiFi !
        IF WIFI_RT2870
        RT2870.dll
        $(_FLATRELEASEDIR)\RT2870.dll NK SH
        ENDIF
        IF WIFI_RT2571
        RT2501USB.dll
        $(_FLATRELEASEDIR)\RT2501USB.dll NK SH
        ENDIF
        ENDIF BSP_NOWiFi !

/*****************************************/Similarly the wireless network card driver file (DLL) will be added into the system kernel when compiling kernel and modify platform.reg, adding codes as follows:
/*****************************************/
        IF BSP_NOWiFi!
        IF WIFI_RT2870
        #include "$(_TARGETPLATROOT)\Files\RT2870.reg"
        ENDIF
        IF WIFI_RT2571
        #include "$(_TARGETPLATROOT)\Files\RT2501.reg"
        ENDIF
        ENDIF BSP_NOWiFi!
        /*****************************************
                                        **/
```

Fig 3 Outlook of Model Design

The above picture shows the model outlook of software simulation. The basic idea behind the design is to get the user friendly OS with advanced graphics resolution. Additionally this method of hand held devices design brings a new revolution in the future, hence any one can use hand held devices and they can create application of their own according to their demands. Hence it is possible to achieve the good advanced graphics resolution than the existing ANDEROID and also it is gives good graphical user interface GUI than existing systems.

V. CONCLUSION

Thus the proposed project system can certainly bring a new marketing trend and also it approaches a healthy way for designing hand-held devices for customers to satisfy their demands. Thus finally the embedded real-time operating system WinCE 6.0 certainly helps to overcome the existing problems in today's market.

REFERENCES

[1] Implement Push to Talk Function in WinCE Based Terminals, LUO Yongmei, JIN Zigong， ZHAO Ximan.

[2] Experiences Using WinCE PocketPCs as Computation and Data Acquisition Platforms for Ambulatory Telemonitoring.., L. Nagl1, B. Krishnamurthi2, S. Schoenig1, S. Warren1, D. Andresen2.

[3] Serial Communication between PDA and GPS Based on Windows CE.., Hongbin Ma, Dongyang Lu, Qun He, Yumei Yue, Xue Wang.

[4] Multithread Serial Communications Model Base on Windows CE.., Jing Zhou, Jianding Yu.

[5] Design and Implementation of Vehicle Monitoring and Early-warning System Based on WinCE.., LI Shiwu,TIAN Jingjing,KUI Hailin,WANG Haizheng..

[6] The Design and Implementation of Application Communication Based on Embedded net work terminal.., Ping Wang, Fuzhou, Hua He, HuaLi Jiang, and RongTai CAI.

[7] The Design of On-vehicle Digital Terminal Based on Embedded System..,Zang Weihua,Liu Mingsheng,Guo Rui.

[8] A Universal 10 Controller Based on Windows CE and C#.., WANG Haiyong, WANG Zhiyi, and LIN Haoyu.

[9] Design and Implementation for Real-Time Property of Serial Communication based on WINDOWS CE..,Xu Cheng, Zhang Lulu, and Wang ShanQin.

[10] The Hardware Design of VOD Terminal Base on Windows CE Operating System, XienYe, Zhiquan Ye,Jin Zhou.

[11] Design of ARM-based Embedded Ethernet Interface.., Zhao Ruimei, Wang Mei.

[12] Design and Development of Embedded Intelligent Public Transport Vehicular Terminal Chan sheng Zhu, Jianbo Liang, Xugang Miao , Wenyi Feng.