
산업용 모바일 융합단말 플랫폼 구조 설계

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Architecture Design of Smart Mobile Platform for Industry

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요 약

현재 스마트 모바일 기기들이 출시되어 융합성, 이동성, 편의성이 사용자들로부터 큰 호응을 받고 있다. 한편, 산업계에서도 처리하여야 할 정보가 점차 많아짐에 따라 복잡한 정보를 처리할 수 있는 모바일 기기가 요구되고 있다. 이에 본 논문에서는 이러한 요구사항들을 반영한 산업용 스마트 모바일 패드의 구조를 설계하고, 그 응용분야들에 대해 고찰해 본다.

ABSTRACT

At present, the smart mobile device has been big recognition in general due to fusion, mobility and convenience. On the one hand Industry also needs smart mobile device because more and complex data processing. Hereupon this thesis will study reflected industry needs smart mobile pad's design structure, and applicable area to use this device.

Keyword

smart, mobile, device, development, industry

1. Introduction

Tablet PC is not taking place into the mainstream in the division of personal computers but as a special advantage in the field had been steadily maintained its own area. The recent release of the Apple I-PAD's fusion, mobility and convenience are getting recognition from consumers and changes in the world's personal computer market. Since then wide range of device has been introduced regarding smart mobile device commercialization plans is released. According to Gartner's report on the world smart pads surpassed 200 million device in the market soon and is expected to grow to large sizes.

This is a smart pad increases in demand as a substitute for a desktop PC, the low-price, ease of use get the uptake of augmented by user because it is from big recognition from consumer.

On the other hand, primarily use mobile devices in the industry, yet many are not using a PDA. But increasingly diverse and complex forms of information processing in mobile devices have led to the desire to solve. A current PDA, it seems hard to accept. As a result, large spotlights now that the social and industrial smart pads will be used as a good alternative that can accommodate these requirements are considered.

In this thesis study about the smart mobile

pad for industry's architecture design and its applications.

II. Design concept

2.1 Design goals

Next generation mobile convergence platform for industry consist of broadcast, communication and combines cloud computing environment to adapt to next-generation mobile communications that can provide a wide range of services specifically for mobile converged services platforms and handle the information efficiently for industry needs.

Smart mobile pad is portable and capable of data processing while moving. Using the Android is an open operating system for mobile systems, so easy of developing relevant applications and facilitates mounting.

Mobile convergence services platform provide next generation mobile convergence networks and service environment for the application in needs of industry-specific, the smart mobile pad at the service platform able to provide easy access(anytime, anywhere) access service platform.

Smart mobile pad to drive the performance of the specialized services program to expedite the operation of more than 1GHz CPU with a clock is used. In addition, improving system performance by considering the future for each module is designed to be flexible.

Price comes in price performance ratio as well as a simple system as a whole when considering the maintenance costs compared to similar models so you can have a competitive edge in cost effective designs.

2.2 Design consideration

Industrial smart pad is using various environments therefore developer must consider flexibility of changes in purpose of usage. In particular, For the easy of optimization in the specific field so the function should be designed in module. In addition, developer must consider connections with other devices. When used for control, smart mobile pad is in many cases to be used as terminals. Therefore the pad should provide various interfaces.

Even in your environment, noise, vibration, and many places you can get comfortable in your hand so that equipment is necessary. Just too much to consider the aesthetic design considerations, rather than a belt grip, the

handle can be used reliably in user friendly design need to be considered. Also, have proper solidity for preventing the fatal damage when it drops.

III. Smart mobile platform architecture

3.1 Hardware Configuration

Hardware is consist of total 8 modules such as main module(include application MCU), touchable display, various communication module, interface module, Camera, Audio, and base module

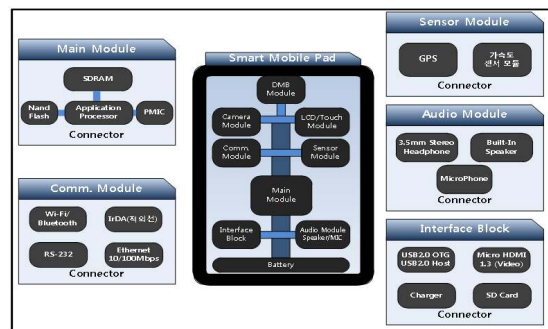


Fig 1. Hardware Configurations

Main Module

Main module consist of ARM CortexTM-A8 (V7-A: 32bit RISC application processor), power management IC and external memory. The 32bit RISC application processor capable of doing motion video, display control, and scaling. Also capable of doing MFC encoding, MPEG-1/2/4, H-263, and decoding H-264 and VC1. MFC can support PAL & NTSC mode HDMI, analog TV output and real time video conferencing. Memory system can support high bandwidth DRAM and Flash/ROM. DRAM controller can provide LPDDR1(mobile DDR), DDR2 or LPDDR2.

Flash/ROM port can provide NAND Flash, NOR Flash, One NAND, SRAM and External ROM. For overall improving functionality TFT 24bit true color LCD controller, camera interface, MIPI DSI, CSI-2, power management system, ATA Interface, four UART, 24 Channel DMA, five Timer, GPIOs, three I2S, S/PDIF, three I2C bus, two HS-SPI, USB host2.0, USB OTG 2.0, super-speed USB(USB3.0), four SD host, HSMCC, four PLLs for clock generation.

PMIC will do main battery's resource management for each module. Also provide external nand flash and DRAM for data

storage.

Touchable LCD Module

Used for showing processed information and can support up to XGA and touch screen input.

Communication Module

Support local area network such as bluetooth, Wi-Fi, 10/100Mbps ethernet, RS-232, IrDA, USB 2.0 host, USB 2.0 OTG(480Mbps), super-speed USB(USB3.0) also support LTE, ZigBee in external mode.

Sensor Module

Support accelerometer sensor, GPS(3-Axis) for find device location, navigation, game so developer can use various applications.

Interface Module

Support HDMI 1.3 for video output, SD Socket(external memory) and charger(main battery management).

Camera Module

Support ITU-R BT 601/656 Mode, MIPI DSI(CSI) mode, DMA(AXI 64bit interface).

Audio Module

Support multi-codec(three stereo DACs and 1 Stereo ADC), AMP(S/PDIF/IEC-60958-3 transceiver) base output for speaker and stereo headphone and microphone input.

Base Module

Interface between modules and battery resource management. And provide diverging port

Power Module

Providing stable power supply.

3.2 System Software Configuration

System Software design use UML2.0 base component and CASE(Computer Aided Software Engineering), also support easy of customizing and expandable framework. In addition easy of understanding conversion regulation between New and existing UML profile.

The main function for system software is capable of using hardware function in the device in Application, provide API and Execution environment.

Operating system and platform can be

differentiate but using common operation system can treat as a software.

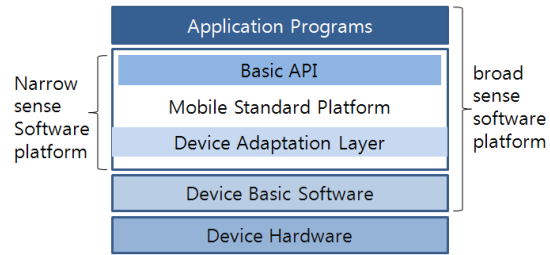


Fig 2. function of mobile software system platform

Android Architecture

Android is based on linux kernel with library(using native code), Dalvik VM, and application frame work. Developer makes application program reference to framework so it will reduce the developing load. Application program should execute Dalvik VM and Programming Language is JAVA. The main characteristic is adopt independent VM and using linux Kernel. That characteristic capable of easy of correspond to new hardware or subsidiary devices.

Android File System

Using 'Android Debug Bridge(adb)' make easy to control the Linux Shell. This can be realized the communication between emulator's 'adb' processor and PC.

From the Shell it is same as regular Linux. For example, while executing the script is stored in 'etc' directory. But if we look in detail specific file for android is stored in 'system', 'data' which we cannot find in Linux. For example, Dalvik VM's main program is in under the system directory's bin directory

There are same directory name but we can find different name in the android system. For example in Linux store program in 'usr/bin' but in android store it in 'system/bin/'.

For Shell management command 'ls' and 'mv' are located in toolbox program. Embedded Linux use BusyBox for the command.

Android API

In android application program have 'Activity', 'Service', 'Content Provider', 'Intent Receiver' UI application program use Activity. Service does not have UI, it is providing continues information. Content Provider providing data in specific condition. Intent

Receiver is active in when the event from outside. Most application use Activity.

Smart Pad GUI Configuration

Consist of booting screen, home screen, menu(home screen have menu button), etc.

IV. Applications

In this paper, the proposed platform architecture is proposed that can be applied to the following field. In addition to the proposed area in a variety of industrial applications can leverage.

Power control division (Maximum power management device)

Maximum power management is a basic tool for reduce electric usage for when national electric reserve emergency such as variable power control the goal, maximum power management system, a differential control, power management using humidity difference, building energy management system. In use of these functions will result more effective service, for example, power management in mobile device.

Medical Division (Medical Information System)

At present in Medical division adopt information technology result digital hospital. Medical information system is real time medical information inquiry and update capable system. Start from patient base information to hospital management system. for to efficiency and convenience The efficiency and convenience of medical information systems through mobile devices in order to take advantage of information systems(mobile device) is the need to spread widely.

Disaster prevention division (fire prevention system)

Fire prevention system is one of main function in home network device market(gas & fire management). It is necessary to communicate with home security management center and government disaster control system. Now wall-pad have real time surveillance but using mobile device is much effective than current system.

V. Conclusion

In this paper, the proposed platform architecture is flexible for various fields. Each function is developed in the module base so it can be optimize easily. Also proposed area this platform.

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