Case Study
Intel® Core™ i5 Processor-based Ultrabooks
Intel® Atom™ Processor-based Tablet Computers
Digital Medical Solution
Mobile Doctor Ward Rounds System

Mobile Applications Accelerate Digital Healthcare

--Touch Device-based Mobile Medical Solution

TIAN JIAN

'Touch-enabled Ultrabook and tablet PCs based on Intel® architecture and Windows 8/ Windows Embedded 8 operating system provide the ideal deployment platform for Tianjian mobile medical solutions. The perfect integration of software and hardware will provide our hospital customers with the best mobile medical application experiences and allow our healthcare workers to provide better and more efficient healthcare services for patients.'

Xiaoqing Zhou
CPO, Wireless Product Division of Tianjian

Company Profile

As one of the earliest specialized R&D enterprises in medical information system area in China, Tianjian Technology Group provides software products, system integration and operation services for digital hospitals and the informatization of local medical and healthcare services. The popular topic that Tianjian Technology Group focuses on in the medical informatization area is Tianjian Mobile Doctor Ward Rounds System –a digital medical solution developed based on wireless network technology and mobile devices.

Challenges

Tianjian Mobile Doctor Ward Rounds System is deployed on the mobile terminals distributed to medical staffs, which requires the mobile terminals to have distinct advantages in terms of performance, portability and battery life, and be compatible with current and future mainstream operating systems, while enhancing user experiences with more flexible and interactive touch operation mode.

Solutions

Tianjian and Intel worked together to comprehensively optimize Tianjian mobile medical applications on Intel® architecture-based Ultrabooks, tablets and other customized mobile terminals in the hope of enabling the successful deployment of mobile applications in different medical scenarios.

Benefits

The seamless integration of the optimized Tianjian Mobile Doctor Ward Rounds System, the Intel® platform and Windows 8/ Windows Embedded 8 system allows the mobile terminals to look slim and light but still pack powerful features to fully meet the needs of medical institutions for the transformation to the mobile service model, thereby laying the technical foundation for the great-leap-forward development of medical institutions; meanwhile, the Intel® processor-based mobile terminals can be seamlessly

Windows 8

Windows Embedded 8

DT Research
www.dtresearch.com

integrated into the existing computing environment of medical institutions to effectively protect IT investments and reduce TCO.

Project Background

In China, improving the efficiency of medical resources utilization and medical service capability has become the common challenges in the healthcare industry as well as a major trend in the "new medical reform" due to the relative shortage and uneven distribution of medical resources; Meanwhile, at the hospital level, the traditional means of health information acquisition are greatly constrained by time and locations so that doctors often waste a lot of time, which makes it difficult to improve the efficiency of medical services and sometimes results in delay of treatment - medical institutions need more technical means of getting patient information across time and locations, truly realizing the transition to the "people-oriented" medical model. The mobile medical service model has become a general trend.

Given the international trend of the hospital information management, going mobile and wireless is also a new popular topic in medical informatization area and an important trend in the future. Not limited by fixed locations like the traditional healthcare, mobile technology will greatly improve healthcare quality and efficiency, and enhance the service ability and competitiveness of medical institutions. It represents a significant opportunity for leapfrog development of medical institutions.

Tianjian Mobile Doctor Ward Rounds System

As one of the earliest specialized R&D enterprises in medical information system area in China, Tianjian Technology Group provides software products, system integration and operation services for digital hospitals and the informatization of local medical and health care services. Developed by Tianjian Technology Group, targeting mobile healthcare area, Tianjian Mobile Doctor Ward Rounds System relies on wireless network and connects mobile solutions to the mobile terminal through wireless network so that doctors and nurses can work in a wireless, mobile and real-time manner.

Tianjian Mobile Doctor Ward Rounds System is composed of several functional modules such as medical records, examination, test, medical advice, body temperature chart, and voice record. Using the mobile terminals for Tianjian Mobile Doctor Ward Rounds System, the medical staff can input and query medical advices covering all kinds of prescriptions, examinations, surgeries, consultations, diagnosis as well as related applications; input, query and modify the basic information of patients and doctor's advice and collect vital signs in real time at the bedside; and quickly retrieve report information of clinical examinations with regard to patient care, nutrition, examination, test, etc. Nurses are now able to complete the work that would have to be done at the nurse's workstation, by the patient's side which includes things like viewing the doctor's advices and recording the temperature of the patient. And doctors can now complete the work that would have to be done at the doctor's workstation, at the patient's bedside, such as giving doctor's advice, issuing examination application form, and writing electronic medical records, so as to ensure the patients receive the most timely, accurate and reliable treatments.

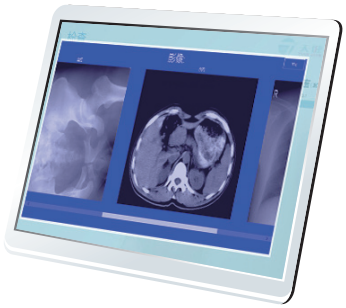
Intel® Platform-based Touch Devices Make Mobile Healthcare Possible

In the Tianjian Mobile Doctor Ward Rounds System, mobile terminal is an important part of the entire system unit. It is seamlessly integrated with the entire medical system application to form a healthcare management and service system that is ultra-portable, easy-to-operate and supports information acquisition across time and locations. To give full play to the advantages of the Mobile Doctor Ward Rounds System, the most appropriate solution platform must be equipped for specific scenarios. According to the characteristics of medical institutions and the job characteristics of medical personnel, Tianjian teamed up with Intel to deploy the platform solutions respectively for three scenarios - doctors, nurses and medical mobile carts:

Ultrabook™: Extreme Performance Delivered On-Demand

Doctors constitute the core layer of medical services of any medical institutions, whose routine includes not only waiting for patients, inquiry and other work at a fixed location (clinic room), but also tasks involving extensive moving across different locations, such as inpatient ward rounds. Therefore, it is preferable that the equipment used could provide the same high performance and efficiency as the traditional full-size computer, while delivering incredible portability and maintaining battery life, which facilitate immediate mobile usage.

Ultrabook™ devices based on the 3rd generation Intel® Core™ processors solved this problem perfectly. When making inquiries at the desk, doctors may use the Ultrabook™ in PC mode for efficient operations that make full use of the extreme performance of the 3rd-generation intelligent Intel® Core™ processors and the powerful capabilities offered by Tianjian Mobile Doctor Ward Rounds System to quickly build, retrieve, view and update medical records, and arrange for subsequent examination and consultation according to the patient's condition; During ward rounds consultations or meetings, Ultrabook™ can instantly switch from the desktop mode to the touch-enabled portable tablet mode to follow the doctor into the wards and other places and allow the doctor to retrieve medical records, update information and improve medical advice through Tianjian Mobile Doctor Ward Rounds System. With this device, the doctor is able to compare the patent's real-time examination data with the medical record and get an instant grasp of the latest progress of the patient's condition so as to make a quick and



Bring up Test Result in Touch Mode

Desktop Mode

accurate diagnosis even at the bedside, vastly improving the efficiency and accuracy of medical services.

The Windows 8/ Windows Embedded 8 system-based Ultrabook™ platform solution demonstrates outstanding features of "extremely slim & light, extremely powerful, and extremely long-lasting". The computer is ready right out of the box. It only takes a few seconds to open the device, wake up the system, and load the Tianjian Mobile Doctor Ward Rounds system. The processing capabilities of the device fully satisfies the needs for medical data processing and background computing. Being slim and thin, the Ultrabook™ device is thinner than 18mm. It can be used continuously for 5~8 hours in battery-only state and can stand by for a whole week in dormant state, all of which make it easier for doctors to carry the device during the ward rounds . At the same time, the seamless integration of the Windows 8/ Windows Embedded 8 operating system, which delivers better performance, higher security and stability than the previous versions of operating system, with the Ultrabook™ platform equips the device with excellent hardware and software compatibility for easy connection to a variety of office peripherals. In addition, the flexible switching from desktop to touch mode sets the device completely free, enhances portability while improving the experience of touch performance.

The 3rd generation Intel® Core™ i5 processor delivers top performance specifically for Ultrabooks ™ , integrated or standard PCs. It offers the following features:

- **Higher performance.** Based on the latest 22-nanometer 3-D tri-gate transistor design, great progress has been made in performance compared to the previous generation: more than 30% increase in performance for low voltages, or nearly 50% reduction in energy consumption given the same performance; a number of cutting-edge technologies including Intel® Hyper-Threading Technology and Intel® Turbo Boost Technology match performance with applications and workloads to substantially increase performance and energy efficiency.
- **Security and manageability.** Hardware enhanced security and manageability features help protect important medical data and can also be used together with the IT security policy of medical institutions for efficient IT management.
- **Lower power consumption.** The latest process technology also consumes less power and generates less heat, thus the system is more sustained and stable; Supporting low-voltage DDR3 greatly extended battery life of the mobile terminal.

Intel® Atom™ Processor-based Tablet PCs : Offer Powerful Computing Capabilities Wherever It Takes You.

In comparison to doctors, nurses have greater mobility in their daily work and therefore need mobile devices with superior flexibility, portability, performance and extended battery life. In response to this demand, Tianjian and Intel optimized the mobile applications on Intel® Atom™ processor-based tablets.

Based on 32-nanometer process technology, Intel® Atom™ processor Z2760 (codenamed Clover Trail) supports the thinnest and lightest tablet PCs based on Intel® architecture - as thin as 8.5 mm and as light as 1.5 pounds; a dual-core four-thread System-on-Chip (SoC) designed for Windows 8/ Windows Embedded 8 offers outstanding battery life. It promises over three weeks of connected standby and more than 10 hours of battery life[1].

Intel® Atom™ processor Z2760 incorporated a number of performance and response technologies optimized specifically for mobile technology and high-density computing, including Intel® Hyper-Threading Technology and Intel® Burst Technology, which match performance with applications and workloads so as to improve performance and energy efficiency. Compared to the previous generations of products, another important change of Intel® Atom™ processor Z2760 is that the I/O interface becomes more energy-efficient. GPIO, I2C, UART, and standard USB 2.0 interfaces now consume less power when interacting with wireless communications and touch screen. Connected standby, a Ready mode added in Windows 8/ Windows Embedded 8 system, features lower power consumption, faster recovery and continuous network connection that help effectively extend battery life and make Always On possible.

During tests, the Tianjian mobile medical application deployed on Intel® Atom™ processor-based tablet PCs running Windows 8/ Windows Embedded 8 has shown outstanding performance in application load time, system stability, compatibility, portability, and user experiences. The extremely intuitive and smooth touch operations make medical staffs to quickly grasp the skills and apply them to actual medical practices.

Intelligent Core™: Integrated PC, Flexible Customization

The mobile medical carts are widely used in hospital inpatient wards and ICU/CUU. Therefore, large screen and high-performance integrated design are needed and can be used together with other medical testing equipment and sensors, etc. In response to this demand, DT Research, Inc. launched Intel® Core™ processor-based integrated PC - DT590 Medical Cart Computer. Headquartered in Silicon Valley, USA, DT Research has more than ten years of rich experiences in the field of mobile and embedded systems, providing industrial grade high performance information appliances and solutions for a wide range of vertical markets, including healthcare, education, retail, finance, transportation and manufacturing.

The DT590 Medical Cart Computer not only offers intelligent performance and responsiveness based on the new generation Core™ processor, but is completely compatible with the Windows 8/Windows Embedded 8 system that supports touch operations. The 19-inch large-size IR LCD touch screen is IP65 rated (waterproof and dustproof), applied with anti-bacterial coating to meet the strict requirements of

the healthcare industry in terms of usage and cleanness. With built-in wireless and Bluetooth features, the device gets rid of the physical network cables and enables more timely data transfer. It also offers the choice of smart card reader and front-facing camera. Through the DT590 Medical Cart Computer, medical staff can use Tianjian Mobile Doctor Ward Rounds System by touching the screen with wireless capability for real-time query, entry, updating, modification and other operations, thereby greatly improving the efficiency and accuracy of data recording and transmission.

For more information about Ultrabooks™, visit:
http://www.intel.com/content/www/us/en/sponsors-of-tomorrow/ultrabook.html

For more information about the 3rd generation Intel® Core™ i5 processors, visit:
http://www.intel.com/content/www/us/en/processors/core/core-i5-processor.html

For more information about Intel® Atom™ processors, visit:
http://www.intel.com/content/www/us/en/processors/atom/atom-processor.html

Benefits and Values:

Perfectly integrated with Windows 8/ Windows Embedded 8, Ultrabook™/ integrated PCs based on the 3rd generation Intel® Core™ processor, and Intel® Atom™ processor-based tablet PCs has outstanding performance, responsiveness, portability and user experiences as well as met the requirements of deploying Tianjian Mobile Doctor Ward Rounds System in different scenarios, which made the successful implementation of the mobile application possible.

The optimized Tianjian Mobile Doctor Ward Rounds System enables seamless connections between different computing platforms, applications and peripherals; the more intuitive and natural touch operations help medical staff quickly grasp and use; relying on the wireless network technologies and mobile devices, medical institutions manage to deliver efficient point-to-point services and fine-grained management to extend the service to the bedside. Meanwhile, Intel® processor-based devices can be seamlessly integrated into the existing computing environments of medical institutions to effectively protect IT investments and reduce TCO.

[1]: Based on the 10-inch Intel Reference Design, with Wi-Fi on and a 27WHr battery installed.