Simplifying Medical System Design to Help Transform Healthcare

Intel® technology Enabling Mindray® to Build the Next-Generation of Black and White Ultrasound Systems

The Intel® Atom™ processor with its high performance, low power design allowed Mindray to exceed the requirements of next generation black and white ultrasound system. The Intel Atom platform is highly integrated, with simplified on-board circuitry and supports development tools like Intel® Boot Loader Development Kit, which has helped to shorten Mindray’s time to market and ensure that we reach the market with a high value end solution. The Intel Atom processor with its desired target at the entry level market has allowed Mindray to successfully deliver an ultrasound solution into the value segment, and help us to retain our competitive edge by delivering a high quality product to the market. We believe that the end ultrasound system will looked upon favorably by both the hospital end users and the general public at large.

The Chinese medical device market has been witnessing substantial growth over the last number of years particularly in the area of ultrasound imaging. Much of this growth can be attributed to China’s ongoing healthcare reform and remarkable economic growth. The demand for ultrasound equipment has been greatly assisted thanks in no small part to the government’s policy of upgrading medical devices in thousands of rural hospitals.

Nowadays with the latest advancements in technology reliable, convenient and quality medical devices are widely accessible to more and more people. In particular, rural medical institutions in developing countries can now get access to the best in class medical devices at competitive prices for their patient base ensuring that even people in remote and disadvantaged areas have access to the most up to date medical facilities.

Meanwhile, numerous medical device and equipment manufacturers are eyeing up opportunities in these markets. Mindray’s mission is to “Improve healthcare by optimizing and sharing medical technologies with the world,” and they have been adhering to this philosophy by delivering advanced and affordable products to address the ever changing demands of the market. As a result they have been to the forefront in providing end users with a series of advanced medical devices at cost effective prices.

In the field of ultrasound equipment, Mindray® has been exploring new technologies and products. Mindray believes that going forward with the proliferation of more advanced rural medical institutions and the ever-increasing clinical demands for ultrasound systems, healthcare practitioner’s will unquestioningly have higher demands for portable ultrasound equipment. Therefore, Mindray is determined to deliver a series of highly integrated ultrasound systems with smaller size, lighter weight and better performance to cope with these emerging demands. Through technology cooperation with Intel, Mindray combined Intel’s leading edge embedded processor technology with its industry experience in the field of ultrasound systems, and jointly developed the next-generation DP series portable black and white ultrasound systems.

Challenges

• **Demand for Portable Ultrasound Equipment:** Thanks largely to the dramatic increase in per capita healthcare expenditure the government has mandated and taken efforts to upgrade the existing outmoded medical devices in thousands of hospitals across the country. There are opportunities from smaller rural medical institutions/hospitals in developing countries for the sale of black and white ultrasound equipment which often lack funding to purchase higher end equipment. As a result there is great demand for portable ultrasound imaging equipment. Mindray, having long been committed to finding better channels and offering enhanced products to serve their end customers, are determined to bring superior and more portable ultrasound equipment to their customer base.

Solutions

• **DP Series Portable Black and White Ultrasound Equipment:** With an experienced R&D team and thanks to the collaboration with Intel, Mindray released the next-generation DP series portable black and white ultrasound system. Following on Mindray’s rich tradition in the medical device market, the new DP ultrasound series will further extend Mindray’s international reach in the field of medical devices and equipment, but this range of equipment will also help foster affordable medical services, benefiting more patients who need assistance of quality medical equipment.
With the support of its technology partner Intel, Mindray* architected the lastestembedded Intel® Atom™ Processor into its next-generation DP series portable black and white ultrasound systems. This has resulted great success by offering various highly integrated ultrasound devices with smaller size, lighter weight and better performance to grass-root medical institutions in many developing countries.

- **Technology Support from Intel**
  - **Technology:** To help Mindray further improve the brand image of its low-end ultrasound systems and build the next-generation of quality black and white ultrasound systems, Intel delivered a best in class computing platform based on Intel® Atom™ Processor. Mindray’s DP ultrasound series utilizes the superior processing performance and graphics processing capability from Intel while keeping power consumption and heat generation to a minimum. As a result the eplaatform contributes to the portability and mobility features of new Mindray products with lower power consumption.

- **Use Technology to Provide More People with Access to Quality Medical Services:** Leveraging its technology collaboration with Intel, Mindray adhered to its long term philosophy for its next-generation medical devices by developing innovative cost effective products that will not only further elevate the Mindray medical device in ultrasound systems, but also in extending the reach of their low cost and high quality medical and health devices to more people.

- **One Day about Mindray DP-30 Ultrasound Scanner**
  - **9:06**
    - Dr. Daniel begins another busy day in his small community hospital. Today, his first patient is an expectant mother. The doctor turns on Mindray DP-30 Ultrasound Scanner which is placed on a trolley beside him to perform a series of prenatal ultrasound examinations. As he skillfully operates the machine, the DP-30 Ultrasound Scanner clearly displays an image on the screen of the fetus growing in the mother’s womb. The doctor explains the images on the screen to the mother-to-be while operating the machine.

  - Obstetric ultrasounds are performed for a variety of reasons including confirming pregnancy and assisting with determining the date of conception. These ultrasound scan may also be used to detect multiple births and even ectopic pregnancies. These prenatal scans are also important in detecting abnormalities or signs of congenital diseases, particularly if the female is high risk due to age or medical history so this type of an examination is really an important part of entire pregnancy.

  - The various proprietary technologies integrated into Mindray DP-30 Ultrasound Scanner deliver a performance close to that of high-end color Doppler ultrasound scanner. This is particularly apparent when it comes to images as some high-end color Doppler imaging technologies are migrated to DP-30 iClear Speckle and Noise Suppression, Tissue Harmonic Imaging (THI) and iTouch One-key Auto Image Optimization Technologies. Mindray’s DP-30 Ultrasound scanner has managed to realize these imaging enhancement technologies thanks to latest embedded Intel® Atom™ Processor from Intel.

  - The CPU (Central Processing Unit) is the “brain” of the Mindray DP-30 Ultrasound Scanner and in this case it leverages the best in class embedded platform based on Intel® Atom™ Processor. The platform based on Intel® Atom™ Processor provides outstanding graphic processing capability thanks to the embedded graphic chipset in the processor which can boost the graphic performance by 50% and is responsible for enabling Mindray DP-30 Ultrasound Scanner’s excellent graphic display performance.

  - Note: Dr. Daniel is a fictional character

  - **10:50**
    - Dr. Daniel answered a call from a remote patient in the community who has mobility difficulties and who would like the doctor to provide a door-to-door service. In cases where the patient is unable to go to the nearest clinic or hospital, it makes sense to allow mobile healthcare practitioners travel to where the patients live when they need care thereby bringing access to a broad set of medical resources. Putting down the phone, Dr. Daniel immediately packs up the Mindray DP-30 Ultrasound Scanner and takes it to the senior citizen’s home for a comprehensive physical checkup.

    - Compared with classical ultrasound equipment, Mindray DP-30 portable black and white series ultrasound also are highly portable and mobile. For example, Mindray DP-30 Ultrasound Scanner has a small form factor and weighs only 5.5 kilograms allowing any doctor to carry it around to various medical institutions or patients’ locations easily.

    - The portability and mobility of Mindray DP-30 series portable black and white ultrasound systems are largely attributable to the low power consumption of the embedded Intel® Atom™ Processor. As a System-on-a-chip (SoC) solution based on Intel Atom processors, the platform based on Intel® Atom™ Processor consumes less than 3W (TDP – Thermal Design Power) while ensuring high performance which greatly extends the battery life of Mindray DP-30 series portable black and white ultrasound systems. For instance, Mindray DP-30 Ultrasound Scanner can continuously run on one battery charge for one and a half hours. In addition, the low power design is consistent with Mindray’s long-term philosophy of building environmentally friendly products.

  - **12:32**
    - When Dr. Daniel is having launch with his colleagues, an emergency patient is arrives to the emergency room. The doctor leaves the dining room and heads straight to the emergency room. Fortunately, the Mindray DP-30 Ultrasound Scanner boots to screen in less than 17 seconds, so Dr. Daniel can examine the patient in a timely manner and save precious time for making an informed diagnosis.

    - Mindray DP-30 Ultrasound Scanner relies on various technologies to achieve fast boot, saving precious time for doctors. Using Intel® Boot Loader Development Kit, Mindray DP-30 Ultrasound Scanner greatly reduces the system start time while ensuring higher system reliability and lower product cost. With a third-party UEFI, the system only takes 10 seconds to boot up before entering the OS. In comparison, a system based on Intel Boot Loader Development Kit needs only 3 seconds to start. At the same time, the third-party UEFI will impact product reliability and added product cost due to the additional cost needed for customized development. With a system based on Intel Boot Loader Development Kit, all functions are tested and validated by Intel which effectively improves product reliability and reduces product cost.

    - **14:45**
      - Dr. Daniel needs to attend a group consultation in the afternoon. He has to pull the patient reports and images of examination results stored in DP-30 Sation and send these results via USB or over the network to the patient database for storing, archiving, reviewing and indexing, to enable him to discuss the patients symptoms with other doctors.

      - Another advantage of Mindray DP-30 Ultrasound Scanner is scalability. Doctors can use various devices and interfaces that come with the scanner to diagnose and treat patients. This advantage closely correlates to the introduction Intel® Atom™ Processor into the system architecture. The strong scalability of the platform based on Intel® Atom™ Processor provides flexible I/O interfaces, allowing Mindray DP-30 Ultrasound Scanner to attach various software and hardware devices and helps to provide an end ultrasound system that can better help patients.