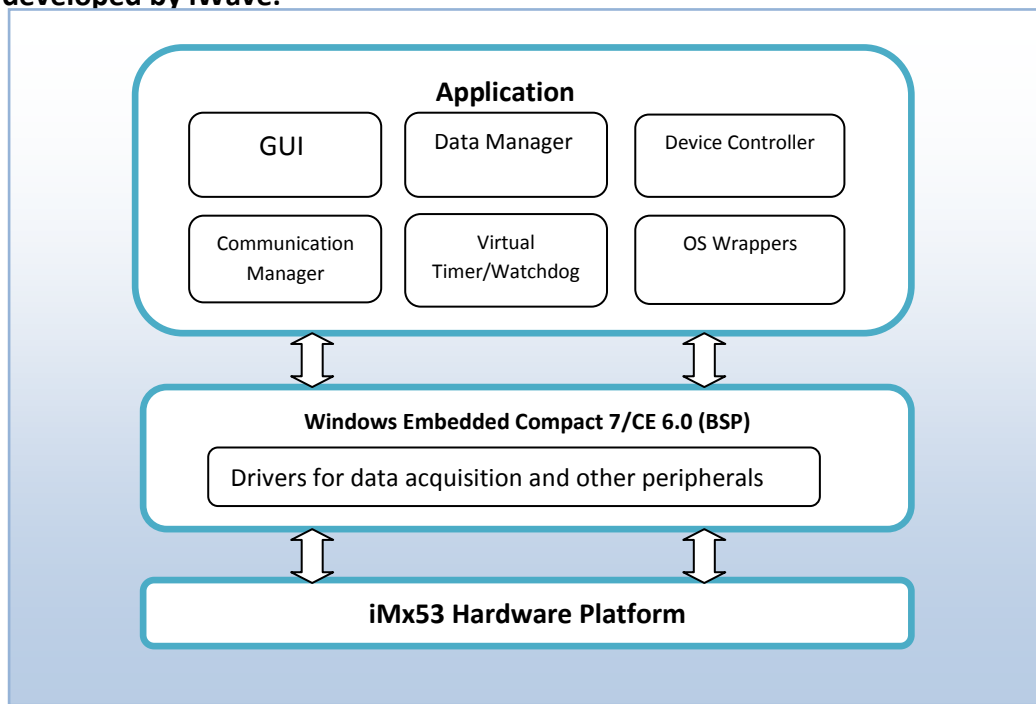


## **iWave System's Medical application expertise with Windows Embedded Compact 7 and Windows CE 6.0 showcased on iMx series platforms**

*Innovations in the Health care domain have been remarkable due to the increasing need of high performance and portable medical solutions. iWave Systems has showcased a complex medical application on Windows Embedded Compact 7 and Windows CE 6.0 with its custom developed iMx53 and iMx27 processor platforms with high level of optimization. Windows CE has provided the architectural base for meeting the real time requirements and a rich User Interface experience is achieved with Microsoft Silverlight 3.0 framework.*

Breakthrough innovations in the processor technologies and the ease of developing the complex applications with ready to use real time operating systems (RTOS) such as Windows Embedded series has made the OEM's like iWave systems to develop the medical applications to cater the need of future health care solutions.

**Below is the architectural overview of the Hardware Platform, BSP and Application Interface developed by iWave:**



The above application showcases the iWave's expertise in building a medical device, which includes designing of the hardware platform, porting the Windows CE RTOS and the development of end application on top of the RTOS.

Application is developed in Microsoft Visual C++ with Object Oriented Analysis and Design (OOAD) concepts. Microsoft Silverlight 3.0 is used for GUI layout designs of the complete application.

As shown in the architectural diagram, patient's real time medical parameters and system events are captured by the Windows CE BSP Interface layer from the underlying hardware. These parameters and events are then provided to the upper application layer for further processing and display in the GUI.

The overall Application/BSP development uses a host of Windows development tools such as

1. Windows CE Platform builder Integrated with Microsoft Visual Studio for Building the OS.
2. Microsoft Visual Studio for C/C++ application development with a SDK (Software Development Kit) build for a particular processor.
3. Microsoft Expression Blend for designing the graphical user interface (GUI) with Silverlight 2.0/3.0 framework.
4. Remote monitoring tools supported in Visual Studio such as Kernel tracker, Performance monitor, Registry editor etc.
5. Visual studio debugger tools to debug the application.

#### **Hardware Platform:**

iWave's iMx53 Development Platform with Windows Embedded Compact 7:



Following are the features of the platform used for the application:

- **CPU:** iMx536 @ 800MHz ARM Cortex A8 CPU Core
- **Memory:** RAM 512MB DDR2, ROM 8 GB eMMC Flash, 16MB SPI Flash
- **Graphics Engine:** OpenGL 3D & OpenVG 2D Graphics Processing Unit (GPU)
- **Communication Interfaces:** 10/100 Ethernet ports, USB 2.0 Host, RS232 and CAN ports.
- **Display:** 7" WVGA TFT LCD with resistive touch screen
- **Expansion Connector:** UART, SPI, I2C, GPIOs

### **Custom Driver development:**

A medical device needs to support a wide range of peripherals ranging from a Serial Peripheral Interface (SPI) driver for real time data capture to Ethernet/Serial support for remote system monitoring. A large number of drivers with performance oriented designs are implemented to support the various peripherals.

Data Acquisition can be considered as the most critical component in a medical system as it captures the real time medical parameters of the patient from different sensors. The accuracy in the data capture demonstrates the quality of the end application. The data acquisition driver developed for the application captures numerous parameters at the interval of every 1ms and pushes it to upper layer for processing or for display in the GUI.

Board Support Packages (BSP) for iMx series of processors are provided by the hardware vendors for Windows CE 6.0 and Embedded Compact 7 which intern accelerates the development of the application to meet any delivery time constraints.

### **Graphical User Interface (GUI) design with Silverlight 3.0 and Expression Blend:**



Microsoft Silverlight 3.0 framework full fills the need of an advance medical system which requires rich user interaction with the application on a touch screen and which can be further enhanced by the presence of accelerated hardware rendering.

Silverlight framework is used for designing graphical user interfaces (GUI) of the application with customized layouts. The overall user interface experience is again boosted by the 2D and 3D hardware graphics accelerator supported in the iWave's iMx53 platform. These two features have provided a perfect blend for the graphical requirements of the application.

Microsoft expression blend tool is used for designing the GUI layouts of the application on Silverlight 3.0 framework.

### **Communication Interfaces:**

The application provides feature of communicating with remote monitoring system through various interfaces such as Ethernet/Serial. The customized platform supports 10/100 Ethernet and RS232 Serial ports which makes the application flexible enough for interacting with other devices.

### **Every memory bit and CPU cycle counts!**

A medical system is an embedded device, which is always tightly bounded by the factors such as number of CPU cycles (CPU frequency) or the Program Memory (RAM) available on the platform. Optimizing the application is the key factor in bringing the best out of the available resources.

Microsoft tools such as Performance monitor, Kernel tracker etc provides the means to the developers to optimize the application. The application showcased here is optimized to the maximum level with a thorough analysis of CPU and Memory Utilization.

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