



embeddedsoftware
solutions

emWin[®]

Any display controller

Any CPU (8/ 16 / 32 bit)

Any display

No royalties



Graphics Software and GUI in ANSI-”C ”

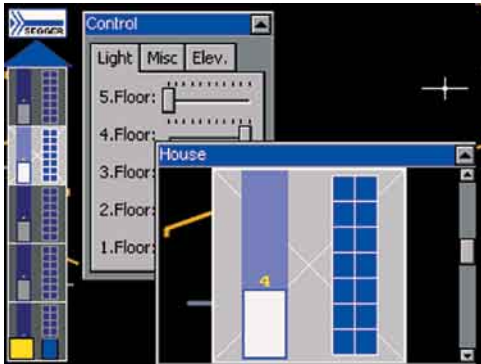
+++ 8 / 16 / 32 - bit +++

emWin[®]: graphics software and GUI

emWin is designed to provide an efficient, processor- and LCD controller-independent graphical user interface (GUI) for any application that operates with a graphical LCD. It is compatible with single-task and multitask environments, with a proprietary operating system or with any commercial RTOS. emWin is shipped as "C" source code. It may be adapted to any size physical and virtual display with any display controller and CPU.

emWin[®]

One of the most challenging aspects of many development projects is designing an attractive and useful display. Besides creating images that look exactly how you want them to appear, the implementation



Sample application: Building Automation

of windows techniques, complex drawing routines, different fonts and flicker-free updates are also expected.

The developer has to implement this complex functionality in short time periods, which can take up to months or years of development time. emWin, probably the most efficient and comprehensive embedded GUI available, helps developers beat their timelines and development costs. It is written in ANSI "C" and supports any b/w, gray-scale or color display. Drivers for all common LCD controllers are available. All types of graphical displays (STN-LCD, TFT, CRT, OLED, Plasma...) are supported.

Drivers for Display Controllers

Run-time configurable drivers can be written for all types of displays and display controllers, including monochrome, grayscale, passive and active color (TFT) displays. Drivers for all common display controllers already exist.

2D Graphic Routines

All required graphic routines, such as drawing points, lines and circles, are part of

the software. An efficient algorithm to draw arbitrary polygons is implemented. Bitmaps of any size and color depth (1 to 32 bits per pixel, usually generated by the bitmap converter) may be shown at any place on the display. Additionally emWin directly supports common bitmap formats as: GIF, JPEG, BMP and PNG.

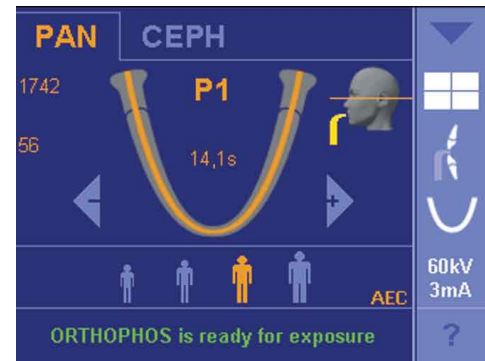
Bitmap Converter

The bitmap converter can convert any bitmap into standard "C" code or into a binary format which can be located on any media and loaded at run-time.

It supports palette conversion for palette based color modes as well as high color, true color or semi transparent images as PNGs. For efficiency, bitmaps may also be saved without palette data and in compressed form.

Fonts

A variety of fonts - in "C" code form - are shipped with the software. The default set of fonts includes quite small fonts up to fairly large fonts, mono spaced and proportional fonts, special digit fonts and framed fonts. Additional fonts can easily be generated



Typical customer application: X-ray user interface

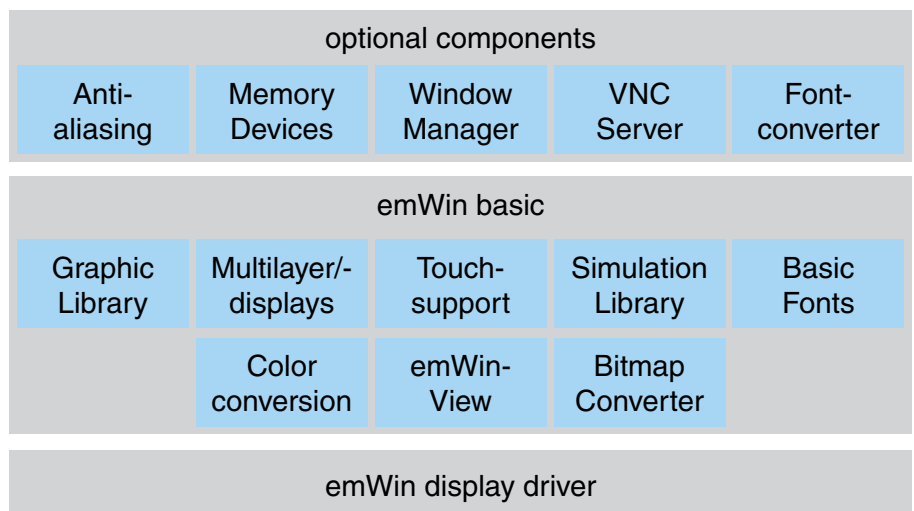
from PC fonts using FontConvert, the font converter for emWin.

Font Converter

FontConvert is a Windows program, that makes it easy to add new fonts to emWin. It can convert any installed PC font into a "C"file that can be compiled and linked with the application. Simply load a font which is installed on your system into the program, edit its appearance if necessary, and save it as a "C"file. The generated file can then be used by emWin and shown on the display like any other standard emWin font.

Color Management

emWin features an integrated, very efficient color management system. This system allows conversion of logical colors (RGB



Components overview

for b/w, grayscale and color displays

Features of FontConvert include:

- Support for proportional fonts and fonts for foreign languages.
- Generation of fonts in standard or 2/4-bit antialiased modes (to give fonts a smoother appearance).
- Complete Unicode support. Fonts may be encoded in Unicode, ASCII + ISO 8859 or Shift JIS.
- Binary font formats which can be located on any media outside the addressable area of the CPU and loaded at run-time
- Easy-to-use interface that allows optional editing of fonts before conversion. Individual characters may be modified pixel by pixel; the width of characters or the height of entire fonts can be adjusted.
- Generation of pattern files (font files with particular set of characters), typically used to create the most efficient font file possible for a specific text.
- Uconvert – a simple tool that converts Unicode into "C"files – is included.

format) into physical colors, which can be displayed at run time. As a result, your application does not really need to be too concerned with the available colors, and displays can easily be interchanged.

Virtual Screen Support

The virtual screen feature supports display areas greater than the physical size of the display. It allows switching between different screens even on slow CPUs.

Window Manager/Widgets

The window manager allows creation of windows of arbitrary size at any point of the display. It is an optional component, which is fully integrated into the software. Child windows and the exchange of messages between windows and their children/parents are supported.

The sophisticated window manager allows windows to be transparent and overlapping. Windows can freely move and resize. Additionally the window manager allows fading in and out.

All functions of the graphic software can be used with the window manager, which performs any necessary clipping. If callback routines are used, it also manages the redrawing of invalidated areas.

The following list shows an excerpt of the widgets provided by the window manager:

- Button
- Checkbox
- Dropdown
- Edit (single-line, multi-line)
- Framed Window
- Graph
- Iconview
- Listbox
- Listview
- Listwheel
- Menu
- Multi-Page (tab-style)
- Progress bar
- Radio button
- Scrollbar
- Slider
- Treeview

Mouse and Touch Screen Support

Touch screen support is available. A driver for analog touch panels, which handles the analog input (from an AD-converter), debouncing and calibration of the touch screen is included.

The window manager deals with touch messages and widgets such as button objects. It takes no more than one line of code to create a button or another widget, which then automatically handles touch messages and reacts accordingly. Cursors can be displayed and a variety of standard cursors is included as part of the software. Additional cursors can also be added.

Touch Screen Simulation

The touch screen simulation is integrated into the emWin simulation. Mouse events are used to simulate the touch screen. The simulation can be used to write the user interface of your



Listwheel Sample

application. It can be sent as a simple .exe file to anybody for discussion, demonstration or verification,

Flicker-free Real-Time Animation/Antialiasing

More hightech applications require animation. emWin supports flicker-free animation with or without antialiasing which is useful in a variety of ways. They allow the presentation of classic dial indicators, which can easily be displayed in any size, form or style, on any color or monochrome display.

Multi layer/Multi Display Support

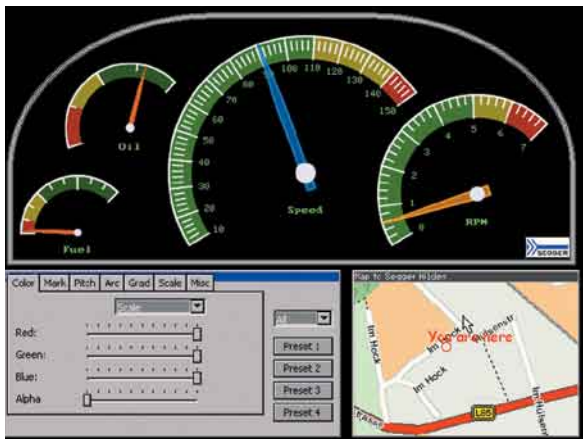
emWin is capable of controlling multiple displays or display controllers with multiple layers. Different displays may have different resolutions, color formats and display controllers. Multi layer/multi display is fully integrated into the simulation. If multiple layers are simulated, the individual layers can be viewed as well as the contents of the display.

Sprites

A 'sprite' is an image which can be shown above all other graphics on the screen. A sprite preserves the screen area it covers. It can be moved or removed at any time, fully



Memory Device Sample: Washing machine



Sample application: dash board

restoring the screen content. Animation by use of multiple images is possible.

Free Rotation and Scaling of Images

With memory devices, the user can freely rotate and scale any image or window on the screen. Both operations can be performed either optimized for fast animation (speed) or for high quality.

Memory requirements*

The memory requirements vary depending on which parts of the software are used and how efficient your target compiler is. Because emWin is modular, only the necessary functions are linked into the application program. It is therefore not possible to specify precise values, but the following applies to typical systems.

Small systems

(no window manager)

- RAM: 200 bytes
- Stack: 500 bytes
- ROM: 6-25 kb

Big systems

(including window manager and widgets)

- RAM: 20-60 kb
- Stack: 1200-1800 bytes
- ROM: 30-60 kb

*Precise values depend on the functionality used. ROM requirement will increase if your application use many fonts. Values are measured on a specific target system and will be different for other systems.

Alpha-Blending

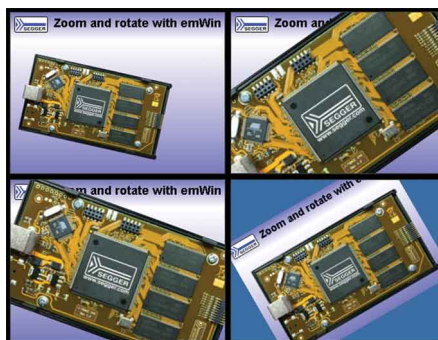
emWin has a very fast alpha-blending algorithm. With the alpha-blending feature graphical objects appear to be translucent and show the content underneath.

VNC Server

The emWin VNC server can be used for administration of the embedded target and a variety of other purposes. It supports compressed (hexitle) encoding.

VNC stands for 'Virtual Network Computing'. It is a client server system based on a simple display protocol, which allows

the user to view and control a computing 'desktop' environment from anywhere on the Internet and from a wide variety of machine architectures, communicating via TCP/ IP. In other words: The display contents of the embedded device are visible on the screen of the machine running the client (e.g. your PC); your mouse and keyboard can be used to control the target.



emWin Demo: Zoom and Rotate

Multitasking Support

emWin has been designed from the beginning to be compatible with different types of execution models. It works in single and multitask environments, and most common RTOS are supported. Support for any RTOS can easily be added, even by the user.

Features

- ISO/ANSI C source code
- Low resource usage
- Alpha-Blending
- Anti-Aliased drawing
- Anti-Aliased fonts
- Multi-Language-Support
- Multi-Layer-Support
- Memory devices for flicker-free animation
- Free rotation and scaling
- Run-time-configurable drivers
- Start/test applications supplied
- No royalties
- Any 8/16/32-bit CPU; only an ANSI "C" compiler is required
- Any (monochrome, grayscale or color) LCD with any controller supported (if the right driver is available)
- May work without LCD controller on smaller displays
- Any interface supported using configuration macros
- Display-size configurable
- Characters and bitmaps may be written at any point on the LCD, not just on even-numbered byte addresses
- Routines are optimized for both size and speed
- Compile time switches allow for different optimizations
- LCD can be cached in memory, reducing access to a minimum and resulting in very high speed
- Clear structure
- Virtual display support; the virtual display can be larger than the actual display
- Board support packages for common evaluation boards

High performance

emWin works very efficiently. With small displays, hardware access can be minimized by using a cache. Written in pure "C" and highly optimized, the performance of the software is excellent.

SEGGER offers ready-to-use trial versions for common evaluation boards