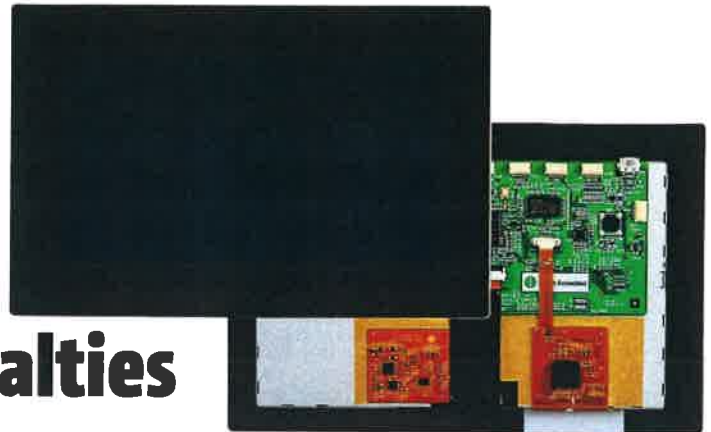


# Innovation without time-to-market penalties



Modules and EVKs bring specialised human machine interfaces (HMIs) and innovation to embedded applications, writes **Caroline Hayes**

Available from Manhattan Skyline, Smart Embedded modules made by Emerging Display Technologies are available in standard sizes from 4.3-inches to 10.1-inches.

They can be supplied with RS232, RS485, CAN, I<sup>2</sup>C, SPI, USB-OTG, GPIO interfaces to control new or existing systems and, in the case of I<sup>2</sup>C and SPI, enable connection to sensors, Bluetooth Low Energy, Wi-Fi and LoRa modules. Some models include Ethernet/PoE.

Modules have a wide power supply input range of 7V-36V for ease of integration into the power supply unit for prototyping a new product.

The USB-OTG can be used for different USB Classes. A communications device class (CDC) driver as well as a file allocation table file system (FAT FS) have been

developed, making it possible to have serial communication with a PC using a simple USB-OTG-to-USB cable.

The USB interface can also be used for a memory stick for storage or field upgrades.

## Control functions

The control boards have board-to-board connectors with Ethernet/SD card and 3.3V UART signals, so special functions can be developed for fast proof of concept without redesigning the whole board. The configuration of the signals is flexible and can include UART, pulse width modulation (PWM) and event outputs, general purpose I/O as well as analogue functions and interrupt inputs.

The add-on module board includes Bluetooth and an SD card, that snaps on to the control board. The SD card can be used for storage and/or field upgrade of the application software.

Application templates for STMicroelectronics' TouchGFX Designer have been implemented

for all on-board interfaces which reduce the software development time.

Evaluation kits are also available for use with the free-to-download TouchGFX

Graphic Framework. Included in the evaluation kit is the Smart Embedded module with

neutral black or white printed cover lens, a control board with power supply, programming adapter, connectors for power, programming and I/O cables and a USB memory stick with documentation and project examples using all interfaces.

## Display technology

The display is based on TFT technology, with high brightness and using high contrast and wide viewing angle in-plane switching (IPS) technology for use in portrait and landscape modes.

STMicroelectronics microcontrollers are used, STM32F750 (200MHz) or STM32H750 (400MHz) Cortex-M7 depending on the display resolution. FreeRTOS is used for enabling real-time control and start-up in less than 100ms. There is a choice of flash (QSPI), from 16MB-64MB, again depending on the display resolution; 16MB SDRAM is used for Framebuffer(s).

## Integration

Starting a project in TouchGFX Designer allows the engineer to select an application template for the selected Smart Embedded module. The template contains all necessary drivers and initialisation software of the chosen hardware that will be used in the application.

As well as for proof-of-concept, the kit can accelerate development of the application as all low-level drivers have already been developed.

The kits will be CE marked and there are in-house EMC test facilities for pre-compliance testing to minimise the

risk of delay in the final CE marking process, says the company.

A custom control board can be developed, in co-operation with EDT, to optimise the cost of the final product. This can optimise the memory and power supply for the application's needs. At this stage, an SD card or USB Type A can be added for field upgrade, or interfaces that are not needed can be removed to minimise the bill of materials (BoM).

The final, cost-optimised HMI can be delivered, programmed and tested to an agreed test specification, complete with warranty for the whole product. This distinguishes it from products that are based on parts from a variety of display, touch, cover lens, cabling and driver board suppliers, says the company, where added transport costs, stocking and assembly in-house or at a third party contract manufacturer can incur additional costs.

Typical applications are where the traditional Linux/Android HMI is software-, power- and memory-hungry and when instant start-up is required.

The Smart Embedded products have already been implemented in a public EV charger, customised with an RS485 interface and with added proximity and ambient light sensor; and outdoor spinning bike user interface in a complete boxed unit with ruggedised cover lens; an HMI for forensic fluid analysis equipment; monitoring battery, water and fuel levels and power distribution system in marine equipment and a fuel cell monitoring system. □

