A CASE IN POINT:
ALTIA AND THE NEW STAR TRAC INTERFACE

Star Trac's innovative Altia HMI lets your fingers do the walking

Star Trac, one of the fastest-growing privately held fitness companies in the world, has a mission to develop exciting and innovative products that promote lifelong habits for health and fitness. With a complete line of both commercial and consumer strength and cardio equipment, Star Trac remains committed to providing the best-in-class products that meet the needs of a diverse marketplace.

Combining Exercise with High-Tech Entertainment

In its efforts to continually redefine the fitness experience for its customers, Star Trac wanted to offer an easy-to-use line of products with the most complete entertainment options available on the market. They wanted to engage their customers with an embedded touch screen that offered a compelling graphical user interface and integrated HD video.

Star Trac partnered with a leading industrial design firm to solidify their vision. Their resulting design concept was a significant leap forward in features and usability – but also a significant increase in programming and engineering complexity. The new product HMI needed to offer high fidelity graphics with dynamic, information rich screens while using very little CPU in order to maintain system availability for the software-based HD video player.

The final critical factor was that Star Trac needed to develop this solution against a rapidly-approaching deadline. They were committed to showcasing their new line of products at an upcoming industry tradeshow.

With a winning design concept for this new series of equipment, a detailed list of requirements ready and a compressed timeline for development, Star Trac contacted Altia.

Minimal CPU = Maximum Benefit

The Altia engineering team began their work with Star Trac by addressing concerns about CPU requirements for the human-machine interface (HMI) graphics of Star Trac's new product. The separation of the HD player from the HMI application was very important for maintaining the best user experience for Star Trac's HMI. A user input or display of workout data could not interfere with the HD player – and vice versa. The HMI must still immedi-

ately respond to all of the standard system inputs and outputs.

Altia set out to verify that Altia-generated code for this interface would operate with the minimal CPU usage necessary for the system to handle the burden of streaming HD. Screens reflecting the most demanding aspects of the concept were created in Altia Design. Code for the Altia HMI was generated by Deep-Screen using the X11 target. This generated code runs on UNIX systems, making drawing calls to the standard X11 graphics framework. The Altia-generated graphics code was then run on Star Trac's production-intent Linux platform. When the system was idle, the Altia code required 0% of the system's CPU. When a user interacted with the test system, the Altia code used CPU of only a single digit percentage.

As a result of this proof of concept, Star Trac and Altia together were confident that Altia-generated graphics code was light enough to run the HMI and place a minimal CPU burden on the system.

Although these results were quite good, the software HD decoder was known to be very resource intensive. Anything that could be done to optimize the system should be considered. Altia recommended using a frame buffer target (altiaGL) with Linux for even better performance for this application. altiaGL is small, lightweight, saves tens of megabytes of memory and offers significant performance improvements over using standard frameworks such as X11. With Altia's HMI development suite at their disposal, Star Trac could quickly and easily try the different code generator targets.

HMI Innovation at Work

Star Trac wanted to create a sleek and state-of-the art HMI that would run on their general purpose Linux platform. Early in the project planning phases, Star Trac had architected how to operate the new equipment and handle data. This underlying logic would serve as the brain behind the attractive new face of Star Trac's products. Of course, they also needed a system that would allow them to showcase the integrated HD video.

Star Trac utilized the Altia HMI development suite combined with Altia Services to achieve all of these goals. They quickly got up to speed with the Altia Design editor and began creating the HMI as defined in their design document. Connecting the

interface to the logic was straightforward. In short order, they were using a prototype interface to drive the actual motors and monitor sensors.

Greg Wallace, Star Trac's Director of Systems, said, "Altia's products and services allowed us to meet our very stringent deadlines. We had preliminary user interfaces running on hardware in hours … instead of weeks."

During the HMI development process, Star Trac used Altia's DeepScreen code generator to generate graphics code that could be deployed onto the final product. Based on the findings that resulted from the proof of concept phase, Altia's DeepScreen altiaGL Linux frame buffer target was chosen as the optimal solution.

The Altia engineering team worked closely with Star Trac to see this project to successful fruition. Altia's engineering team supported Star Trac's software development efforts to launch the open source mplayer HD video player as its own process and control it from the HMI application process. Altia also supplied software development to improve the stability of the mplayer HD video player and customize it to reserve areas of the frame buffer for HMI graphics, which allows for the simultaneous display of HD content and HMI graphics. Furthermore, Altia provided software development to dynamically change text for support of multiple languages. Star Trac was able to create a single interface and then utilize the software to display any one of a number of foreign languages on the final HMI. With this piece of technology, Star Trac was able to develop a single, highly interactive product that could appeal to the global marketplace.

Star Trac Maximizes Efficiency with Altia

Star Trac wanted to extend the entertainment and usability innovations in this new interface across several different types of machines. Rather than develop a separate Altia Design file for each variety of machine, Star Trac designed in customizations of the same Altia Design file for each of their entertainment series

> ## "WE WERE ABLE TO HIT THE GROUND RUNNING IN OUR EFFORTS TO CREATE A HIGH-FIDELITY USER INTERFACE."

products. Some of the display screens are the same for these machines, while others are different. Star Trac has multiplied the benefit of their Altia HMI by developing those common screens only once. Custom screens for each type of equipment remain in the master Design file, but are only called by the product when needed. Star Trac only manages and maintains one application file.

Star Trac's Vision — Delivered

Star Trac set out to develop a series of products that would offer their customers the most engaging entertainment options available on the market. The company cleverly overcame the engineering challenges that accompanied the new, high-tech features, calling on Altia's user interface engineering tools and services.

Wallace added, "We were able to hit the ground running in our efforts to create a high-fidelity user interface. We imported Photoshop assets from a 3rd party design firm directly into the Altia product. Altia made it possible for us to bridge the gap between UI designers and the actual code needed to run on the embedded target."

Altia Services worked with Star Trac's team from the beginning to confirm that the CPU requirements for the embedded HMI were low enough to run successfully alongside the streaming HD video. Altia's engineering team also tested the HMI with various graphics libraries, recommending altiaGL for Star Trac's preselected Linux platform. Altia also provided software development services later in the project, providing Star Trac with the capability to support multiple languages on the same machine. Star Trac maximized the value of their HMI development effort, as well, by building a single Altia design file and reusing it for different products.

With their eSpinner® and E-TRxe Treadmill, Star Trac delivered a new family of products that offered exciting new entertainment options and the same high quality exercise equipment that Star Trac is known to deliver. Through a successful collaboration with the Altia Services team and use of the Altia HMI development tools suite, Star Trac successfully realized their vision, adding a series of compelling, first class exercise equipment to their already impressive catalog of products — and again proving to the industry that Star Trac is the Innovator of Fitness.

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