

Tactile Touch-Screen Technology for Improving Man-Machine Interface

Introduction

Current commercial touch-screen applications rely solely on visual cues for positive confirmation of an intended task. This required visual interaction with the system draws the operator's focus away from the primary task at hand, i.e. control of a machine or instrument. The added workload on an operator compromises the benefits provided by the application of the touch-screen.



In an effort to improve man-machine interaction, Interface has developed a touch-screen display with tactile feedback. This restores the sensory combination of both visual and tactile feedback typically provided by an electromechanical pushbutton. The combination of tactile response and touch-screen technologies allows the full benefit of a multi-function display to be realized and reduces overall operator workload.

Design Concept

The design for a tactile touch-screen display unit utilizes a COTS Active Matrix Liquid Crystal Display (AMLCD) with touch-screen overlay. Actuators are incorporated in the design to provide tactile feedback. The layout of function switches or touch keys, and their position and dimensions, is accomplished through

software. An added feature in the software includes reverse contrast to exhibit an extra visual signal that the switch is electronically actuated. Another design feature, coincident with the tactile-forced feedback, is an audible click that is comparable to a click from a mechanical switch.

A completed unit comprises of a COTS AMLCD with touch-screen overlay with controller board, actuators and driver board, and single-board computer in a ruggedized package. In addition, field programmable software allows for reconfiguring touch keys without changing hardware, thus, building flexibility.

Benefits of Tactile Touch-Screen Displays

- Sensory combination of visual and tactile feel
- Reliability >500,000 actuations
- Increased viewing angles
- Improved human interface through eye workload reduction
- Configurable and programmable for a variety of mission profiles
- Adaptable to a variety of display sizes
- No electromechanical switches or bezel assembly

