

# Top Three Reasons to Include Proximity Sensing in Your Human Interface Design

---



Jarrod Krebs

One of the benefits of automating control systems within buildings is the ability to customize services and personalize a user's environment; the human machine interface (HMI) is the gateway to such controls. The addition of proximity sensing is an underutilized improvement to many interfaces in an automated building ecosystem, including thermostats, security-system keypads, monitors and elevator call buttons. Proximity sensors can improve the user experience, decrease power consumption, and increase the life of the liquid crystal display (LCD) and backlight.

## Improving the User Experience

Proximity sensing improves screen wake-up times by enabling the HMI to know when the user is in front of a thermostat or other interface. The system can wake up, greet them as they approach, and be ready to accept commands as they touch the screen or button. If the user is making decisions that take a bit of time, the screen or backlight can sometimes time out. But with proximity sensing, the HMI knows that the user is still nearby and will remain awake.



**Figure 1. Proximity Sensing Keeps the Screen on While the User Is in Range**

Proximity sensing can also fix that annoyance of trying to find a thermostat or other device in the dark. Everyone has blindly moved their hand across a wall in hope of finding the thermostat or light switch in the middle of the night! Proximity sensing enables the LCD backlight to turn on when the user is nearby, thus making it easier to find that security keypad or thermostat when coming home late.

## Decreasing Power Consumption

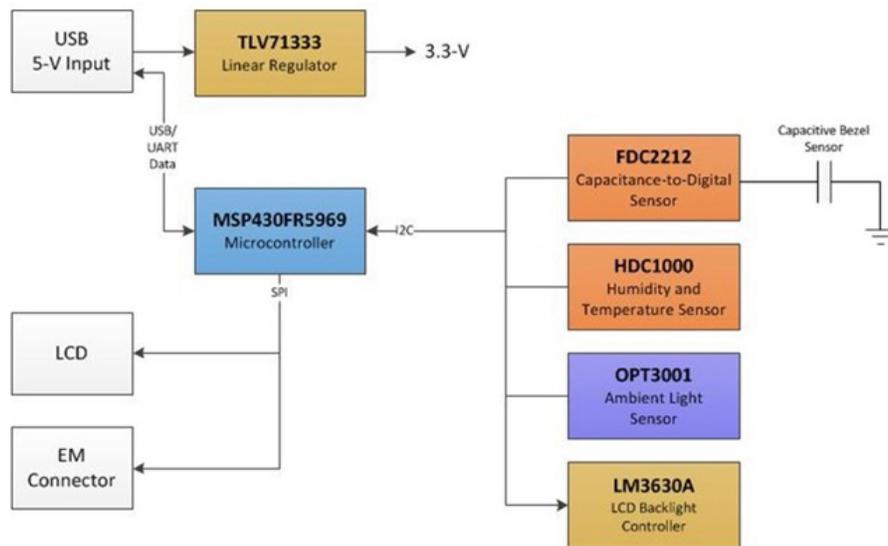
Proximity detection can also decrease power consumption. The HMI device can be kept in a low power state until the user approaches and then wake up in time for them to use the device. In the past, backlit keypads or low backlight settings on security panels helped users easily find the device, but HMI enables these interfaces to remain off until the user comes closer.

## Increasing LCD and Backlight Life

The average life span of a thermostat is 10 years; LCD panels and backlights usually don't last that long, however. The issue is that LCDs and backlights lose contrast and brightness the more they are used. By limiting the amount of time both are on, the LCD and backlight can last longer. Proximity sensing can enable longer LCD/backlight life through shorter timeout settings, because the screen only stays on for the amount of time that the user is in front of the unit.

## Useful Resources

You may be wondering how hard it is to add proximity sensing to a design, or what a proximity detection system looks like. The [TI Designs Backlight and Smart Lighting Control by Ambient Light and Proximity Sensor Reference Design](#) demonstrates this technology. [Figure 2](#) shows the block diagram from the design. The capacitance-to-digital converter technology enables the use of a copper bezel around the edge of the board to sense the user.



**Figure 2. TI Designs Backlight and Smart Lighting Control by Ambient Light and Proximity Sensor Reference Design Block Diagram**

Take a look at this design and see what else Texas Instruments has to offer at [ti.com](http://ti.com)! TI also has a couple of evaluation modules (EVMs) that offer a simple solution to proximity detection. Now that you have heard some reasons to implement proximity sensing and how easy it is to add human detection to your HMI device, can you think of other uses for this type of sensing?

## Additional Resources

- Purchase the EVM for the [Noise-Immune Capacitive Proximity Sensor System Reference Design](#).
- Review the [Backlight & Smart Lighting Control by Ambient Light & Noise-Immune Proximity Sensor Reference Design](#).
- Read this discussion about [capacitive-proximity sensing using the FDC2x1y](#).
- Consider the [FDC2212 capacitance-to-digital converter](#) for your next design.
- Learn about TI's [capacitive sensing portfolio](#).

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2023, Texas Instruments Incorporated