Azoteq

World Leader in Capacitive Proximity Sensing

Capacitive Solutions for Wearable Devices

Smart, connected wearable devices have become the new trend. Fitness Trackers to keep count of how many calories users have burned and even monitor sleep patterns. Smart Watches let users know when they have new text or social media messages. Wireless headsets and headphones can detect when they are worn.

Typical Characteristics

These wearable smart devices make life easier for the user. Wearable devices are usually light and small. Typical Characteristics include:

- Small Displays (LED or LCD)
- Limited Space for User Interface
- Need to be Easy to Access
- Have Low Power Requirements
- Need to be Low in Cost

Content

Azoteq enables next generation user interfaces for users to interact naturally with products through capacitive proximity and touch

Pieter Pretorius
Chief Operating Officer

Pieter Pretorius joined Azoteq in 2004 from Nanoteq where he was a Divisional Manager - Security Solutions. During the period 1999 until 2001 Mr. Pretorius played a key role in the establishment of a European presence for Nanoteq's Security Solutions as the VP for Security Solutions at Comparex Security Solutions in Germany. He is currently the Chief Operations Officer at Azoteq.

Prior to this Mr. Pretorius was also part of the original Keeloq development team at Nanoteq. In 1995 he became Nanoteq's Manager for Security Services with focus on providing IT Security Solutions into the commercial market.

Mr. Pretorius holds a Bachelor's Degree and a Master's Degree (Cum Laude) in Electronic Engineering from the University of Pretoria.

Pieter Pretorius

For more information, email info@azoteq.com.

Azoteq Sales Offices

Azoteq has distribution and sales representatives around the globe. But there are three main sales offices that can help assist designers with their capacitive sensing needs. Sales offices and contacts are as follows:

- North America
  - Kobus Marneweck – VP Marketing
- International
  - Jean Viljoen – VP Marketing: Europe & Asia
- Hong Kong
  - Eric Tsang

Sales contact information can be found here!

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Many wearable devices have clunky click buttons for the user interface. Some devices have only one button to turn on the display and click through many options.

Applications

Touch interface can provide a more intuitive user interface. Wearables with small displays can incorporate a touchscreen for gestures or a swipe interface. Power consumption can be reduced by incorporating capacitive sensor to only turn on when worn. Touchpads on headphones can be used for gestures to implement an intuitive user interface. Figure 1 below illustrates using a trackpad within a headset.

Figure1: Placing a Trackpad within a headset can add a modern look to the aesthetics

Capacitive Proximity Sensing can be used to wake the device from sleep and to light up the user interface.

Azoteq offers devices that run below 2.5 µA in Low Power Mode.

Azoteq Devices for each Application

Azoteq has a wide array of devices for different applications.

- Single Channel Devices: IQS227, IQS229, IQS211
  a. Proximity Wake Up
    b. Wear Detection
    c. Single Button Activation

- Multi-Channel Devices: IQS213, IQS263, IQS333
  a. Swipe Activation (as illustrated in Figure 2)
  b. Slider/Scroll Wheel
  c. Multiple Buttons

- Trackpad/Touch Screen Devices: IQS360, IQS525, IQS572, IQS550
  a. XY Coordinate Finger Tracking
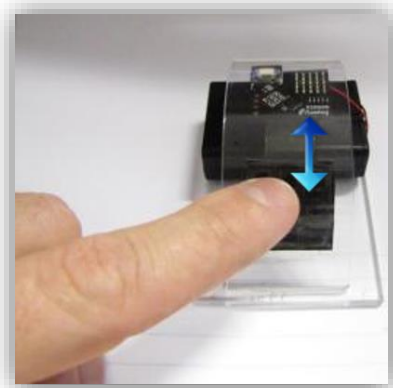 b. Swipe Activation
  c. Button/Finger Tracking Combination

Figure 2: Azoteq Device with Swipe Activation

Advantages

Advantages of using Capacitive Sensors in Wearable Devices are:

- Improved User Interface
- Aesthetics
- Modern Design
- No Look Navigation
- Improved Battery Life
- Wear Detection

For more information please email info@azoteq.com

The Effect of Large Floating Metal on ProxSense® Technology

In general, having any floating metal around the sense antennas of ProxSense® IC's is strongly discouraged. As floating metal in close proximity has a tendency to store and discharge charge at irregular intervals, floating metal is normally associated with erratic behavior.

However, when the floating metal surrounding the sense antennas is large enough, the amplitude of the influence on ProxSense® IC's is reduced. Typically, when the floating metal is large enough, such as for television screen frames or stove tops; the erratic behavior (stuck conditions, large jumps in current samples in both directions, etc.) can be reduced to small false proximity events, which can be removed by the correct threshold implementation.

Noise

The second problem with floating metal (even if made very large), is the effect of noise coupling into the IC. Depending on the level of the current samples and the compensation of the touch channel, the AC noise on a particular channel could be +-200 counts when in contact with the metal while making the touch event.

Depending on the thresholds used, this could have the adverse effect of a touch output toggle while the user hand remains fixed.

Solutions

There are two possible solutions to stabilize the touch output for ProxSense® devices operating in close proximity to large floating metal planes. The solutions can be used together or independently of each other.

Filtering

If possible, select an IC from the ProxSense® family which deploys an AC filter.

However, if the chosen IC for the application does not filter its touch channel(s), a custom FIR filter can be implemented on the MCU (when using ProxSense® IC's in data streaming mode).

Large pieces of metal will have a detrimental effect on touch sensors if left floating

Full Application Note can be found here.

Azoteq Demonstration Videos

Azoteq has many videos that demonstrate how our ICs can help your product. These videos are located on Azoteq's website under the Technology Tab.

These videos are also available on Azoteq's YouTube channel at www.youtube.com/azoteqweb.

List of Available Videos:

Corporate	Air Slider
Water Immunity	Keyboard Track pad
Edge Touch for Appliances	RF Noise Immunity
Metal Touch	Remote Control
Auto Tuning	Cell Phone Applications
Air Gestures	Air Button
Wearable	Touchscreens

Azoteq's Videos help you visualize just some of the many applications that ProxSense® can enhance

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