Touch Pressure in an Optical Touch System

The selection of a touchscreen technology is often reduced to selecting the product that has the primary characteristic you need for your application and then working around the undesirable baggage that came along with your choice. Until the arrival of ShadowSense, if you needed pressure activation, then you had to deal with a fragile resistive screen that significantly reduced your display brightness and scratched within minutes of being used. If you wanted bare finger activation, then capacitive was your selection and you had to deal with the fallout from casual scratches and incidental EMI. If you didn't want users to take off their gloves, then SAW might have been your choice, until a piece of gum or bird debris stuck to the screen and rendered the touchscreen useless. Optical systems feature "Any Object" and "Zero Force" touch detection, but hovering and incidental touches plagued your applications.

Baanto ShadowSense touch technology is an innovative and patented optical position sensing technology using high performance sensors operating in the analog domain to provide innovative features and unprecedented performance, stability and accuracy. Featuring an efficient sensor architecture coupled with elegant position detection algorithms, ShadowSense touchscreens report not just the position of a touch object, but also the size of the touch object.

Baanto has coupled the touch size information with a configuration application called Dashboard, that allows customers to capture the outstanding user experience and reliability that optical systems offer with a methodology to enforce a positive finger style touch requirement.

Consider the biomechanics of a finger touching the protective glass of a touchscreen. When a fingertip is barely in contact with the glass, there is modest deformation of the finger tip with a resulting touch area of approximately 6 mm^2 to 9 mm^2. With a "Zero Force" optical touchscreen, this touch is reported as a valid touch. This is illustrated in *Figure 1* below where the measured area of a light finger press is 8.6 mm^2.

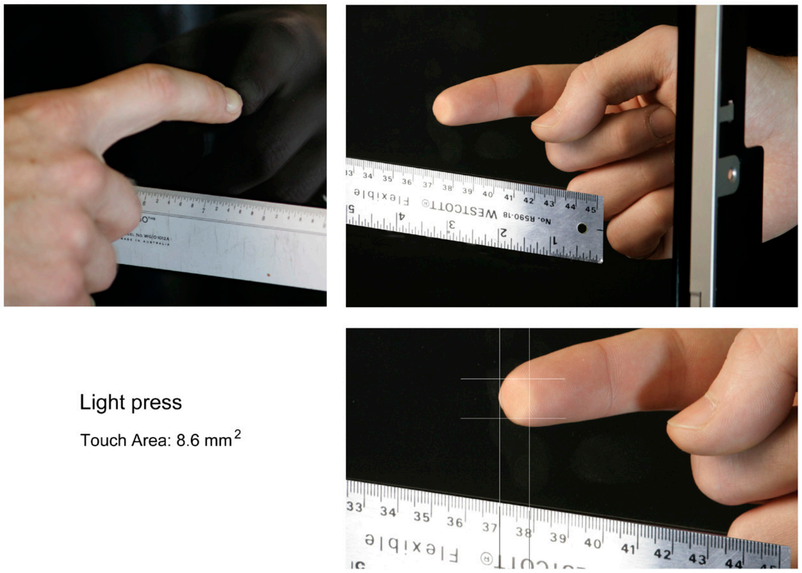

Figure 1: Light Press

Now consider the natural user reaction if a light touch doesn't result in a response. Due to the long history of resistive and SAW touch technologies in these applications, the user will typically and instinctively push harder, causing a more significant flattening of the fingertip with a resulting increase in touch area between approximately 9 mm^2 to 11 mm^2. This is shown in *Figure 2* where the measured area of a medium finger press is 10.7 mm^2.

Continuing to ignore the touch, the user then pushes even harder and the finger will not only continue to flatten, but it will also start to bend at the first joint which dramatically increases the touch area to a range of approximately 12 mm^2 to 15 mm^2. This is shown in *Figure 3* where the measured area of a hard finger press is 14.2 mm^2.

From this series of examples, it is clear that there is a relationship between the touch area and the amount of finger pressure that is applied to the screen. The more force a user applies to the screen the larger the area produced by the touch point.

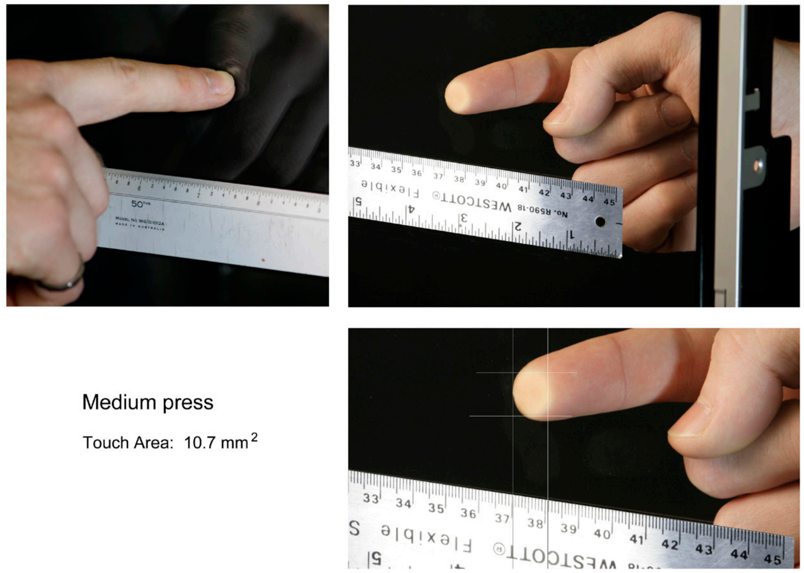

Figure 2: Medium Press

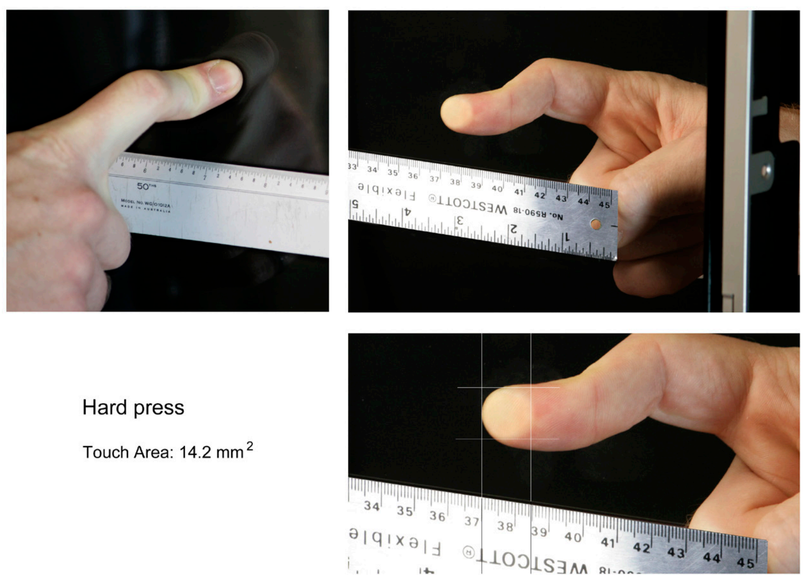

Figure 3: Hard Press

Baanto simplifies a user's ability to simulate finger pressure through Dashboard by exploiting this relationship. By simply adjusting the minimum touch area to a desired point the finger pressure required to activate a touch can be easily and simply emulated. This is shown in *Figure 4*.

An additional parameter to further enhance finger enforcement is the dwell time before a new touch is acknowledged and reported to the host PC. Also controlled by Dashboard, the "New Touch Delay" feature, shown in *Figure 5*, allows an application developer to control the number of frames a touch object must be present before reporting a valid touch event.

The combination of Touch Area Detection and New Touch Delay provides users unprecedented control over the performance of a Baanto ShadowSense touchscreen. It also gives designers and developers the opportunity to utilize force touch in their touch applications.

The results of this innovation are products featuring some of the highest performance, most robust, multi-touch capabilities available in the market today.

For more information about ShadowSense, please contact a member of our sales team at **sales@baanto.com**.

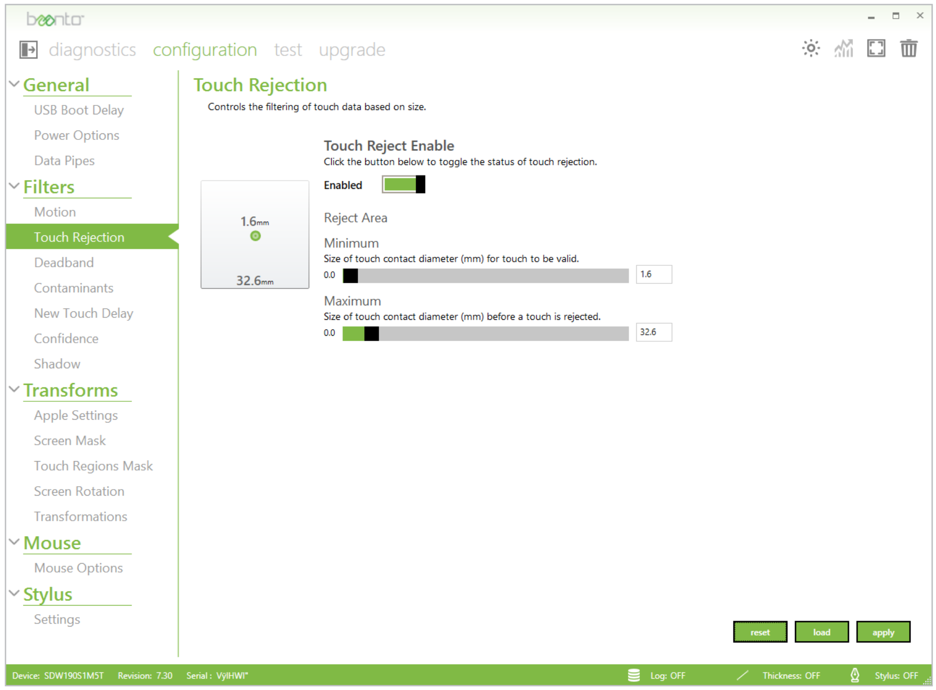

Figure 4: Using Dashboard to enable touch rejection

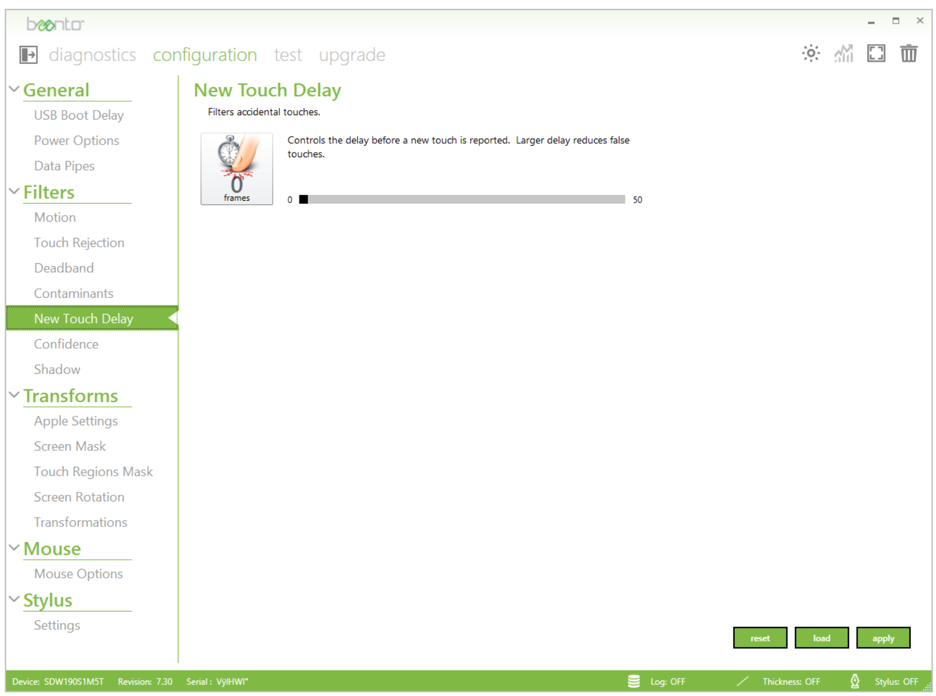

Figure 5: Using Dashboard to change new touch delay