



Capacitive Sensing Shaping UI for Mobile

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Director of Marketing – TrueTouch

Cypress – Leading the Market



Cypress Semiconductor Corporation

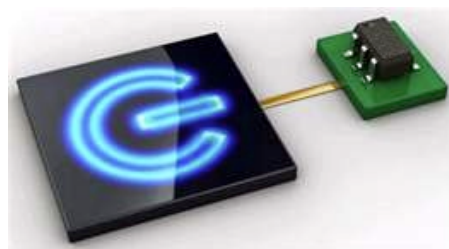
- Headquartered in San Jose, CA, USA
- Founded in 1982 · Listed on the NASDAQ
- 3700 employees · 2011 Revenue: \$995M

TrueTouch®



- Multi-Finger Locations
- Broadest Touchscreen Portfolio 2" – 14"
- Highest Performance
- Thinnest Solutions
- Lowest Power

CapSense®



- Keypad, Volume or Navigation Control
- Discrete or Matrixed Sensors
- Proximity Sensing

TrackPad



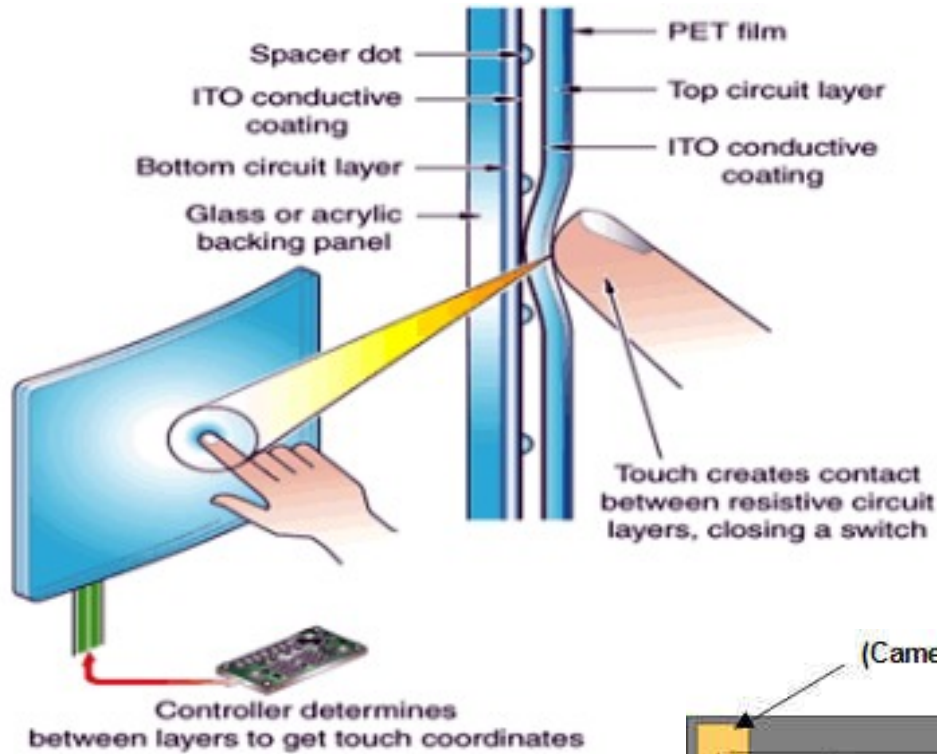
- Multi-Touch for your PC
- Character Recognition
- Keypad Replacement
 - Text Entry
 - Dynamic Buttons

Finger Nav



- Cypress Innovative OptiCheck™ sensor
- End user programmable
- Immune to environmental lighting conditions

Competing Technologies

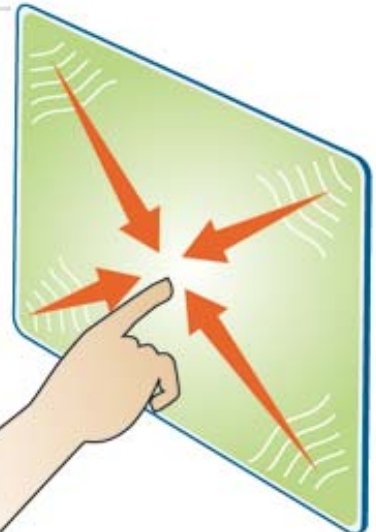


Resistive

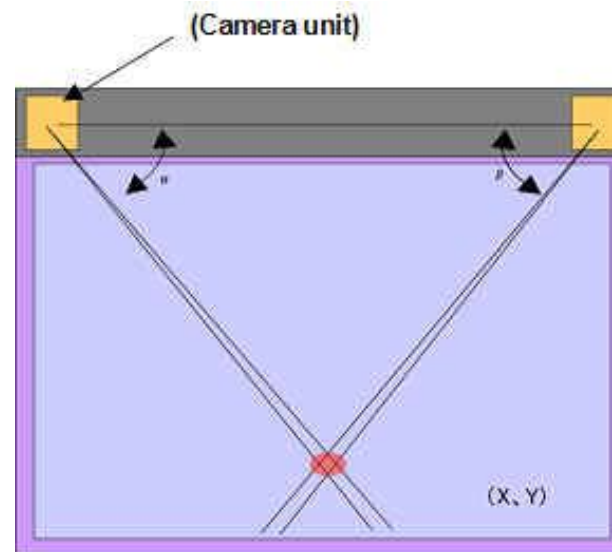
Surface Capacitive

Small amount of voltage is applied to the four corners of the touch screen.

A finger touches the screen and draws a minute amount of current to the point of contact, creating a voltage drop.



The x,y location of the point of contact is calculated by the controller and transmitted to the PC.

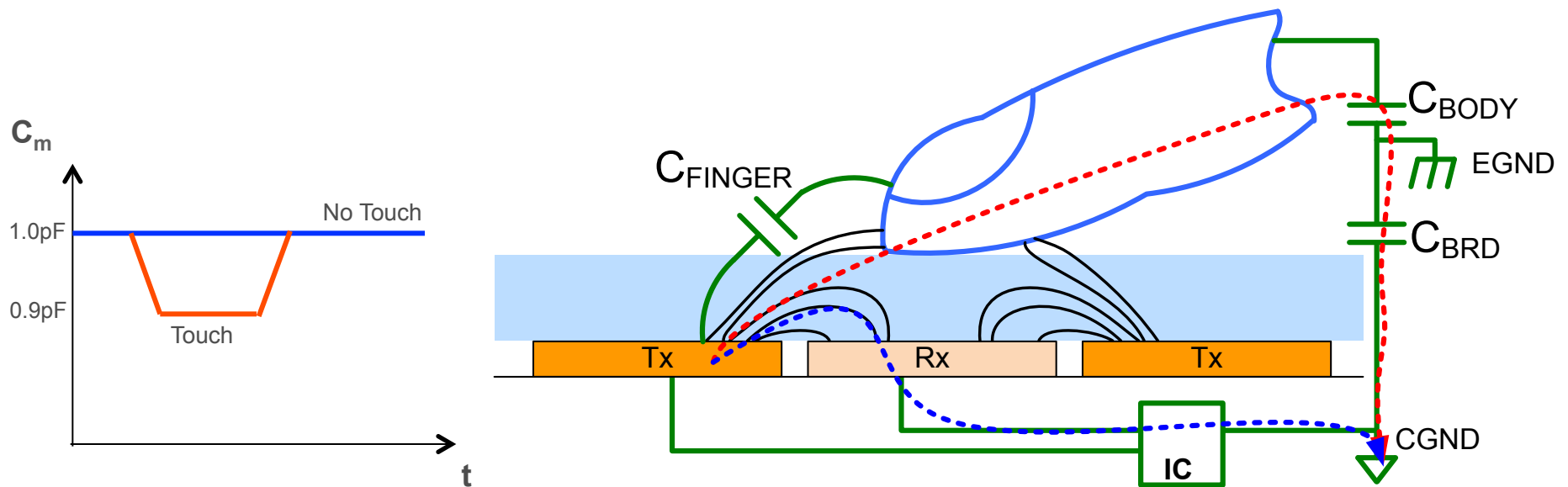


Optical

How does PCAP work

Measure coupled charge between transmitter and receiver electrodes

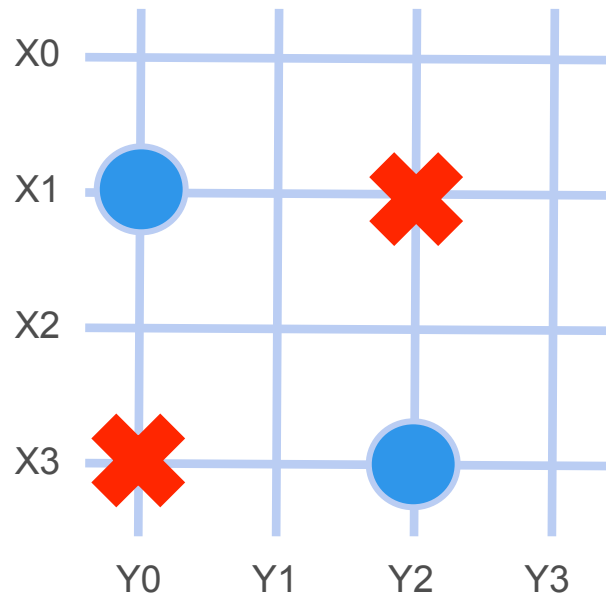
- When no finger is present the coupled charge is at the baseline level and the effective capacitance is 1-3pF
- When a finger is present the coupled charge is smaller because some charge is shunted to earth ground
- The effective change in capacitance due to a finger (Signal) is 50-200fF
- Finger coupling and board-to-earth ground capacitance (C_{BRD}) generate the largest variation in signal



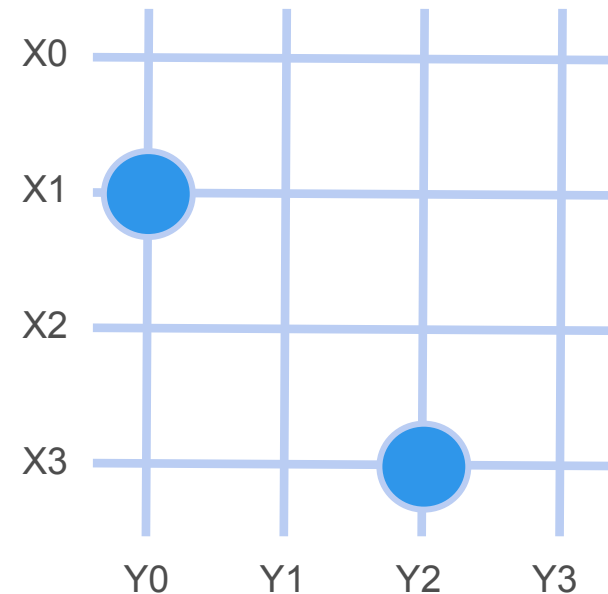
PCAP: Self vs. Mutual Capacitance



Self Capacitance



Mutual Capacitance



- Each X or Y line is an capacitive sensor
 - Total sensors = $X + Y$
 - The large sensor creates lots of signal
- When a touch is present the nearest sensor lines are activated (X1, Y0)
- If two touches are present, ghosting occurs as (X1, X3, Y0, Y2) are all active, yet the combination is unknown
- Large Signal due to large sensor size

- Intersections of X & Y lines form parallel plate capacitive sensors
 - Total sensors = $X * Y$
 - Intersections are small, thus capacitive signal is small
- When a touch is present the nearest intersection is activated (X1, Y0)
- Multi-touch is truly supported
- Smaller signal due to small cross-sectional sensor size

Introducing Gen4



World's First touchscreen controller manufacturer to provide:

- 32-bit ARM Cortex family of touchscreen devices
- 10V Tx with Tx-Boost™ for the best in-application SNR
- Display Armor™ to eliminate display noise
- 400 Hz refresh rate, 1 kHz scan rate
- 2 mW average power consumption

Cypress is still the only touchscreen supplier to offer these advanced features:

- Self + Mutual Capacitance
- Charger Armor™ to eliminate charger noise
- CSP for world's smallest packages
- Assisted Tuning to make your touchscreen design a snap!

The advertisement features a dark blue background with four panels showing people interacting with touchscreens. The top-left panel shows a man in a suit with the word "RISE" overlaid. The top-right panel shows a woman in a white shirt with the word "ABOVE" overlaid. The bottom-left panel shows a hand holding a smartphone with the word "THE" overlaid. The bottom-right panel shows a woman in a red dress with the word "NOISE" overlaid. Below the panels, the text reads: "INTRODUCING THE REVOLUTIONARY TRUETOUCH GEN4 TOUCH SENSORS. NOW YOU CAN ELIMINATE DISPLAY NOISE AND ACCELERATE PERFORMANCE." At the bottom, there are logos for TrueTouch Gen4 and Cypress Perform.

Capacitive Sensing Advanced Features



Waterproofing

- IP67 Compliant Products
- Full water rejection
- Wet Finger Tracking
- Sweat, Condensation, Water Film



0.8mm Passive Stylus

- 150 Hz refresh rate
- Passive conductive stylus
- Accuracy and linearity < 1.0mm
- Works with gloves
- Rivals size of resistive stylus
- Supports both multi-touch and stylus



Hover

- TrueGlove™
- Mouseover and magnify capabilities
- Advanced gaming functions
- Keyboard applications
- 20mm accurate finger tracking
- Can sense both hover and direct input



Enabled by Patented Self + Mutual Capacitance Scanning