HOME

Reaching out to a touch screen with a microcontroller

May 4, 2012 By Mike Szczys ▪ 19 Comments

We love capacitive touch screens. They're much more robust than resistive touch screens and if the UI is programmed well they produce a great user experience. But getting your electronics project to interact with one is a bit tough. [RobB] has been experimenting in that area, and managed to build a simple touchscreen actuator for microcontroller use.

In the video after the break you can see his proof of concept. He's using an Arduino to enter the number 2 on an ~~Android~~ iOS calculator app once every second. It doesn't take much to pull off this trick, [RopB] just taped a piece of tin foil to the screen and connected it to the Arduino with a jumper wire. The pin is left floating until a screen tap is needed, at which point it is pulled to ground.

A custom app operating at slow speeds could use this as an input technique. Two pieces of foil (one acting as clock, the other data) would provide a rudimentary serial transfer system.

http://www.youtube.com/watch?v=JDgDMBquBw0

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onaclov2000 says:
May 4, 2012 at 9:15 am

I sent in a project that uses bluetooth to communicate to the phone but that controls the phone rather then the other way around (I.E. the arduino device can control music volume). If anyone is interested this is the link.

http://blog.onaclovtech.com/2012/04/introducing-proof-of-concept-music.html

Reply

doomstalk says:
May 4, 2012 at 9:23 am

Not to be pedantic, but that looks like iOS, not Android (note the "iPod" in the upper left corner).

Reply

parkerlreed says:
May 4, 2012 at 10:16 am

By the looks of the size it looks like an iPad.

Reply

fartface says:
May 4, 2012 at 10:17 am

You mean iPad.

Reply

Martin says:
May 4, 2012 at 10:29 am

You mean iPood.

Reply

me says:
May 4, 2012 at 11:01 am

But it should work on Android just the same

Reply

fightcube says:
May 4, 2012 at 12:17 pm

Hmm, I can just see someone in the future making a conductive GRID to AUTOMATE high scores on touchpads ;-)

Should be ~~easy to do~~ doable for games that have simple button inputs.

Reply

Mike Szczys says:
May 4, 2012 at 1:22 pm

I just spent 45 minutes playing around with this. You can get it to work. But it's SUPER touchy and not practical. I even made a post with video about my failure: http://jumptuck.com/2012/05/04/android-app-binary-coded-ascii-characters/

Reply

RobB says:
May 4, 2012 at 1:40 pm

Hey Mike, thanks for posting this.

First, I did mention in my blog that it was very fragile and using two pads did not work. I do believe it could be made much more reliable with the right circuitry behind it, I'm just not sure what that is yet.

Second, You don't need two pads to communicate. A clock is not strictly required for serial communication, e.g. 1-Wire.

Reply

JO says:
May 4, 2012 at 1:35 pm

Why would you want to do a serial transfer using the touchscreen? That sounds rather pointless

Reply

> **RobB says:**
> May 4, 2012 at 2:22 pm
>
> I can't think of a cheaper way to interface a microcontroller with a touch device?
>
> Reply
>
>
> > **MS3FGX says:**
> > May 5, 2012 at 6:11 am
> >
> > Just plug it into the device's audio port and use audio tones.
> >
> > If you are going to write an application on the phone/tablet to interpret touch, you can just as easily write an application to interpret audio.
> >
> > Reply
> >
> >

Tom says:
May 4, 2012 at 5:29 pm

Yes, you'll find that these circuits will be very sensitive. The sensors on the screen measure changes in the femtofarad range, it's actually pretty impressive. Reducing the length and gauge of the wire will help a lot.

Also, just leaving a pin in high z mode really isn't sufficient. There's way too much capacitive coupling to ground. You'll only get reproducible results using an actual mechanical relay.

Finally, this would probably be about the slowest way to send data I can think of. The touchscreens only update the OS on the order of 10 Hz.

Reply

Andrew says:
May 5, 2012 at 12:45 am

What about putting a layer of dielectric material between the foil and the screen? Then pulse the foil positive or negative to charge/discharge the dielectric material.

Would that work?

Reply

> **fightcube says:**
> May 5, 2012 at 12:52 am
>
> The screen is already a dielectric, and you put a charge on the conductive material, not the dielectric ;-)
>
> Reply
>
>
> > **Andrew says:**
> > May 5, 2012 at 1:09 am
> >
> > Can you explain this more – I don't understand? I thought that your finger was additional dielectric material that altered the capacitance of the touchscreen. Wouldn't some additional dielectric material allow you to add/remove charge to that portion of the screen?
> >
> > In the normal capacitive touchscreen, what are the two capacitor plates?

Reply

fightcube says:
May 5, 2012 at 9:54 am
http://en.wikipedia.org/wiki/Touchscreen#Capacitive
"A capacitive touchscreen panel consists of an insulator such as glass, coated with a transparent conductor such as indium tin oxide (ITO).[12][13] As the human body is also an electrical conductor, touching the surface of the screen results in a distortion of the screen's electrostatic field, measurable as a change in capacitance. Different technologies may be used to determine the location of the touch. The location is then sent to the controller for processing. Unlike a resistive touchscreen, one cannot use a capacitive touchscreen through most types of electrically insulating material, such as gloves; one requires a special capacitive stylus, or a special-application glove with an embroidered patch of conductive thread passing through it and contacting the user's fingertip. This disadvantage especially affects usability in consumer electronics, such as touch tablet PCs and capacitive smartphones in cold weather."

..

"Mutual capacitance

This is common PCT approach, which makes use of the fact that most conductive objects are able to hold a charge if they are very close together. In mutual capacitive sensors, there is a capacitor at every intersection of each row and each column. A 16-by-14 array, for example, would have 224 independent capacitors. A voltage is applied to the rows or columns. Bringing a finger or conductive stylus close to the surface of the sensor changes the local electrostatic field which reduces the mutual capacitance. The capacitance change at every individual point on the grid can be measured to accurately determine the touch location by measuring the voltage in the other axis. Mutual capacitance allows multi-touch operation where multiple fingers, palms or styli can be accurately tracked at the same time."

Want more info?
http://bit.ly/IW633i

Reply

RobB says:
June 15, 2012 at 9:29 am
Updated with two way communication.
http://blog.theultimatelabs.com/2012/06/two-way-serial-interface-using-touch.html

Reply

janwillempenterman says:
November 2, 2012 at 12:11 pm
A while back I made something similar, using just a 555 and a bilateral switch.

Reply

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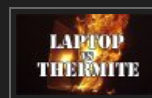Follow @hackaday   28.1K followers

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