

# GeoSketch: Pen-Based Interface for GeoSpatial Analysis

Danielle Cummings from Texas A & M University presents "GeoSketch: Pen-Based Interface for GeoSpatial Analysis" at the 2011 GeoDesign Summit.

[http://video.esri.com/watch/184/geosketch-pen\\_dash\\_based-interface-for-geospatial-analysis](http://video.esri.com/watch/184/geosketch-pen_dash_based-interface-for-geospatial-analysis)

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## Video Transcription

**00:01** Good morning everybody. My name is Danielle Cummings.

**00:02** I'm a PhD student at Texas A&M University.

**00:06** And I work in the Sketch Recognition Lab in the Computer Science Department.

**00:11** And today I'm going to be talking about GeoSketch.

**00:13** It's a pen-based interface for geospatial analysis.

**00:18** So, in our lab, we currently have a few ongoing research projects where we collaborate

**00:27** And so we get the opportunity to work closely with the civil engineering students and

**00:37** And the more we work with them, the more we've discovered that a lot of the tools, although fairly image dependent...

**00:44** ...they don't have very many pen-based interfaces that recognize freehand sketches and also minimize...

**00:54** ...the use menus and predefined commands to make changes to maps and

**01:04** So as a result, we felt there was kind of a gap or a limit to the level of unrestricted interaction...

**01:12** ...that between GIS systems and novice users...

**01:15** ...or users like myself who are too lazy to go through all the tutorials.

**01:20** But we believe that drawing with the pen and paper is the most natural means of

**01:26** I mean, everybody can do it.

**01:28** It's a quick and simple way to communicate ideas and, you know, it's something that

**01:37** So, excuse me...

**01:41** We believe the solution was to provide a pen-based interface for interacting with a lot

**01:48** ...and we believe that that's kind of the direction that most interface design is taking.

**01:55** Here's a quick example of where we thought a pen-based interface would be useful.

**02:00** So I was working with a couple of civil engineering students and they told me that...

**02:06** ...it wasn't uncommon to have a simple line or a point object in a shapefile to contain

**02:15** ...which is why it required lots of commands or using menus to make edits to that

**02:23** And I figured that, you know, watching them, I figured it was kind of a tedious

**02:27** ...especially for someone like myself who isn't familiar with the tool.

**02:30** So this is one of the reasons that we thought a pen-based interface that would allow a

**02:36** ...make quick sketches and modifications to files such as this without having to...

**02:42** ...be familiar with the tool ahead of time would be very useful.

**02:47** So we quickly designed a pen-based interface for working with a shapefile...

**02:54** ...and what we did is, we extended one the ArcObjects provided in the ArcGIS library

**03:02** ...and we used to generate basic primitive shapes for recognition.

**03:07** And once we recognized those shapes, we could use them to delete existing map

**03:14** ...using an intersection of points as well leaving vertices on an existing map using

**03:22** So we can begin to see how some of these simple interaction methods can be

**03:30** ...to interact with this geospatial data in a way that closely resembles a pen and

**03:37** ...so if I were interacting with a digital map on paper.

**03:42** Okay. So here's another example that involves sketch recognition for the

**03:55** So...see if I can find my mouse. Oh, there it is.

**04:00** Okay, so in the Sketch Recognition Lab, we developed a real-time sketch

**04:07** ...and it recognizes over 900 freehand drawn military interaction symbols,

**04:16** ...and to date, that's the largest set of freehand recognized symbols.

**04:23** And you can kind of see, the menus that are popping up now are generated by the...

**04:27** ...sketch recognition algorithms. They're not being chosen by the user who's drawing.

**04:32** So it's basically the system's best guess of what the user is trying to draw...

**04:38** ...their confidence levels.

**04:41** And then the military course of action diagrams are used to depict battle

**04:46** ...and they can include thousands of unique symbols.

**04:57** So in regards to COA Sketch, what we did is...

**05:06** ...we took that application and extended it to include a geographical

**05:15** ...and by the way all of this interaction is done using a Wacom tablet and a

**05:29** So...oops. Okay, that one's not...where's my mouse? There it is...okay.

**05:43** So you can see here that by integrating COA Sketch with a geospatial interface, we're able to use that sketch recognition...

**05:51** ...and the geolocation data to begin to analyze it and create kind of an action narrative for...

**06:01** ...for mission planning purposes.

**06:04** And here, since we're using a sketch recognition application that provides real-

**06:12** ...we can then take that information and deliver it to a location-aware system to

**06:22** And there's...I'm not very good at drawing stars so I had to think for a while.

**06:30** Okay. And the Sketch Recognition Lab actually finished a prototype recently for a location-aware system called GeoTrooper.

**06:38** And the purpose of this system was to aid paratroopers in locating their

**06:48** Excuse me.

**06:49** The GeoTrooper system uses minicomputers as beacons...

**06:52** ...and those minicomputers broadcast an ad hoc Wi-Fi network that contains

**07:01** And...excuse me...allergies acting up.

**07:05** That's encrypted, and it sends that encrypted information to receivers which we

**07:15** ...and those receivers picked up the location of the beacons and then used the internal GPS capabilities...

**07:23** ... to be able to map and locate the bearing and distance to each of the beacons

**07:30** Okay. So here you can see the interfaces for both the beacon and the receiver

**07:39** So the beacon interface is on the left and as you can see, it broadcasts...

**07:43** ...not only its location but also the location of other beacons that are in range...

**07:48** ...so that even if a beacon is out of range of any receiver, the closest beacon will...

**07:52** ...still transmit all of the information of beacons that are out of range to that...

**07:57** ...receiver so it can see all of the beacons that are connected through this daisy-chaining process.

**08:04** And then on the right is the interface for the receiver and...

**08:09** ...it shows the location of the beacons superimposed over an MGRS grid.

**08:16** So here you can see the potential use where GeoSketch can be integrated within this system.

**08:22** So if I am, excuse me, if I have my Wacom tablet and my stylist and a digital...

**08:28** ...map and I want to communicate a point of the location or a point of interest to

**08:37** All I have to do is draw this symbol on the map and that information will be

**08:42** So you get this real-time kind of tactical coordination and at the same time, it

**08:52** ...in order to be able to recognize, you know, my intent through sketching.

**08:57** And then also it minimizes the need for radio communication if that's a problem

**09:08** Okay, so just to wrap up. I just want to conclude that we've currently been

**09:14** ...for quickly editing and editing digital maps using freehand sketching

**09:20** And then we also use sketch recognition to decipher sketches...

**09:25** ...as a means of translating course of action, military course of action symbols...

**09:29** ...and then translating those actions into tactical analysis information that could...

**09:34** ...be transmitted to a location-aware system.

**09:38** And if anyone is currently working on related research, I would really love to

**09:46** Thank you.