Games:
The Killer App. for Pen Computing?

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Pen to Paper
Practical Pen Computing Today

Draw & Paint programs

Form-filling

Signature capture

Mobile data collection
Vision of Pen Computing

Computers that respond intelligently to what we write, draw, and gesture.

- handwriting recognition
- diagram and drawing recognition
- gesture recognition
- interactivity
- direct manipulation simulations
- direct manipulation visualization

"MIT Sketching"

Brown Math Recognizer
Outline

- Pen computing hardware and software
- Platform adoption
- Games
- Criteria
- Game properties and concepts
- (Inadequate) proposals
- Game-Changing Technologies
Pen Computing Hardware

Apple Newton

Momenta
- 80 MHz processor
- 4 MB RAM
- 40 MB Hard Drive
- Built-in Fax / Data Modem
- $5000

Modern PDA

Tablet PC
- 1.6 GHz processor
- 1 GB RAM
- 40 GB Hard Drive
- $2000

Xerox LiveBoard

SmartBoard

The unistroke alphabet.
Is Pen Computing *Hardware* Successful?

Pen computing isn't dead, but it is stagnant.

Tablet PCs obviously aren't setting the world afire. Click here to read why it's taking so long for tablet PCs to catch on with users.

Don't Give Up on Pen Computing

Pen computing isn't dead, but it is stagnant.
## Is Pen Computing *Software* Successful?

<table>
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<th>Application</th>
<th>Low: Pen is just a mouse</th>
<th>Medium: Basic pen input</th>
<th>High: Pen integrated</th>
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<td>notetaking</td>
<td>Google Notes</td>
<td>Journal, OneNote, EverNote</td>
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<tr>
<td>design &amp; illustration</td>
<td>Adobe Illustrator, Photoshop; Corel Draw, Paint.</td>
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Search for the Killer App.

This brings on the natural question—how do you make a Tablet PC a "no-brainer" purchase decision? I've been giving this some thought and while my needs may very well be different than other users I know what would do it for me. A killer app. You see that mentioned a lot, that there is no killer app for the Tablet PC that would push prospective consumers over the edge.

http://jkontherun.blogs.com/jkontherun/2005/08/tablet_pc_a_nob.html

The search for the "killer app" for the Tablet PC always generates a lot of conversation and the current one started by Lora of whatthenow is a good one. The theory is that once …

A Chicken-and-Egg Problem

- Serious Applications
- Hardware Adoption
Hypothesis

Serious Applications

Hardware Adoption

Fun Application

A Must-Have Game
Games are Compelling

Wikipedia: **Senet** is believed to be the oldest board game.

http://www.wired.com/news/holidays/0,1882,48479,00.html
The Computer Game Industry

- Half-Life
- Starcraft
- The Sims
- Quake
- Madden NFL Football
- Everquest
- Halo
- Grand Auto Theft
- Animal Crossing

Nintendo DS

- 2 x 256x192 screens
- stylus input
Computer Games

The Computer Game Industry

Folk Games

http://www.addictinggames.com/scribble.html
Wanted: A Fad Folk Game for Pen Computing

- Pong
- Rubik’s Cube
- Tomogatchi
- Tetris
- Online Poker
- Sudoku
Brainstorming
Brainstorming

- Seven criteria.
- A ton of concepts.
- Five game ideas.
- Eight technology enablers.
**Criteria**

1. Playable on all hardware, privileged on Pen computers.

*Take advantage of pen input:*
   1. Fine control of position and shape.
   2. Mixed drawing and writing.
   3. Simultaneous positioning and entry of content (no cursor needed).

*Take advantage of a large format screen:*
   4. Large playing field.
Criteria

2. Simple concept, easy rules.

A fad casual game must be quickly accessible---not mystifying---to an over-the-shoulder observer.
3. **Time scale:** A few minutes.

- a “down-time” game to fill gaps in schedules but can absorb hours if desired
- repeated short rounds
- little cost for stopping on short notice
4. Solitaire **and** Competitive.

- single player version for lightweight entry to play, desire for down time from others
- competitive version for social engagement & human drama
- enabled by ubiquitous networking

Networked folk game example: isketch
http://www.isketch.net
also, the ESP Game
http://www.espgame.org/
5. Mixed of skill components.
Criteria

6. Handicappable.

- accessible to players at all levels:
  “grandparent vs. grandchild”

7. Cool music.

http://www.ferryhalim.com/orisinal/g3/floats.htm
Brainstorming

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Game Concepts and Components

- draw paths between nodes
- draw shapes toward some goal
- draw to enclose words or objects
- draw barriers
- herding
- draw cuts to partition sets
- hidden objects & words
- rearrange words
- direct agents’ movements
- snaking paths
- mazes
- simulate mechanisms
- crossword puzzle
- constraining flow
- propelling / repelling moving objects
- mimicking another drawing
- choreography
- number puzzle
- guess path of moving objects
- musical performance
- driving and steering
- capture territory
- track moving objects

Earthquake
Sheepdog
Hidden Drawing
Tracker
Maze Control
Brainstorming

• Seven criteria.
• A ton of concepts.
• Five (inadequate) game ideas.
• Eight technology enablers.
Earthquake

Object: Draw rocks so when the earthquake happens more rocks fall on your opponent’s side.

The blue rocks are likely to fall on the red side, the red rocks are likely to fall on the blue side.
Object: Direct the sheepdogs to herd the sheep into the pens.

http://www.saund.org/sheepdog.html
Hidden Drawing

Object: Reveal a hidden drawing by tracing it based on partial information.

1. Hidden drawing.
2. Player’s first guess (red).
3. Drawing revealed by player’s first guess (blue).
4. Player’s second guess (red).
5. Drawing revealed by player’s second guess (blue).
Tracker

Object: Capture territory by dragging your boom over ground *later* than your opponent does.
Maze Control

Object: Cover your opponent’s territory with trees.
Brainstorming

- Seven criteria.
- A ton of concepts.
- Five (inadequate) game ideas.

But where’s the vision?: **Computers that respond intelligently to what we write, draw, and gesture.**

- Eight technology enablers.
What cutting-edge software technologies could be exploited in a game for pen computing?

- UI techniques: write text or draw, without switching modes or devices.
- Excellent handwriting recognition.
- Use of covert recognition.
- Gesture recognition.
- Recognition of graphics with respect to existing markings and objects (e.g. enclosures, linkages).
- Linguistic processing.
  - boy hit the ball vs. ball hit the boy
- Networking.
- Machine Learning. e.g. adaptation to the user.
Take-Home Message

Opportunity: Invent the killer app. game for pen computing.

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fin
falling sand game
Is Pen Computing Successful?
Is Pen Computing *Software* Successful?

**Software Sophistication**

**Level 1:** pen is just a mouse
- Pen tap is like mouse click.
- Drawing is unparsed, raw digital ink.
- Enter text by bringing up a handwriting text entry widget.

**Level 2:** basic pen input
- Single-stroke shape and gesture recognition.
- Handwriting in application goes to text entry widget.

**Level 3:** pen integrated
- UI designed for a pen.
- Handwriting entry and editing integral to the application.