

Games: The Killer App. for Pen Computing?

Eric Saund

Perceptual Document Analysis Area
Intelligent Systems Laboratory
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Pen to Paper



Practical Pen Computing Today



Draw & Paint programs



Form-filling



Mobile data collection



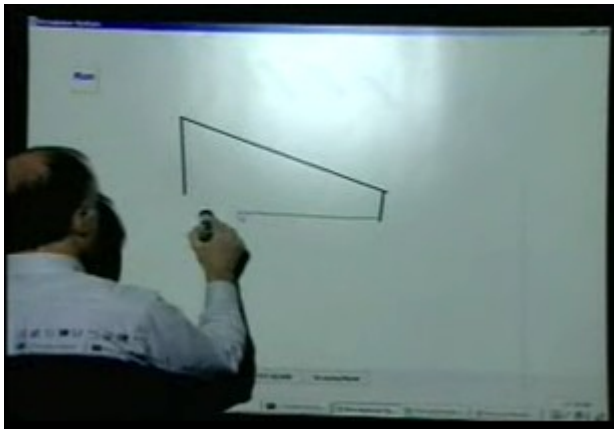
Signature capture



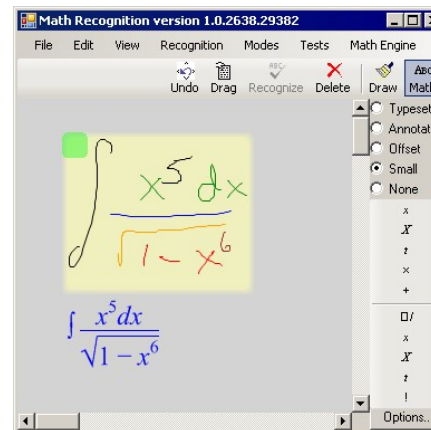
Vision of Pen Computing

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"

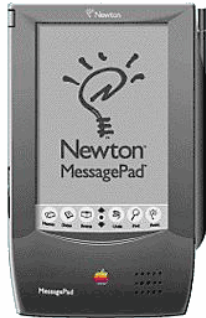


Brown Math Recognizer

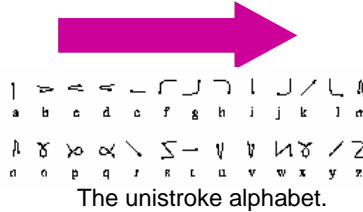
Outline

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

Pen Computing Hardware



Apple
Newton



Modern PDA



Momena

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

Tablet PC

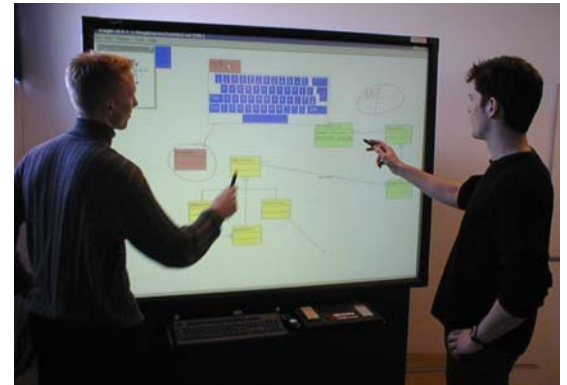
1.6 GHz processor
1 GB RAM
40 GB Hard Drive
\$2000



Xerox LiveBoard



SmartBoard



Is Pen Computing *Hardware* Successful?



Robert Williams, Director of Mobile Platforms Division Business Development, showed a Tablet PC sales growth chart. Looks like things are moving up!

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Desktops & Notebooks


By David Coursey
August 29, 2005

Tablet PC Is Stronger Than Predictions Suggest


Comments on this article
8 comments posted

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.](#)

COMPUTERWORLD
Hardware

Don't Give Up on Pen Computing

Michael Gartenberg [Today's Top Stories](#) or [Other Hardware Stories](#)

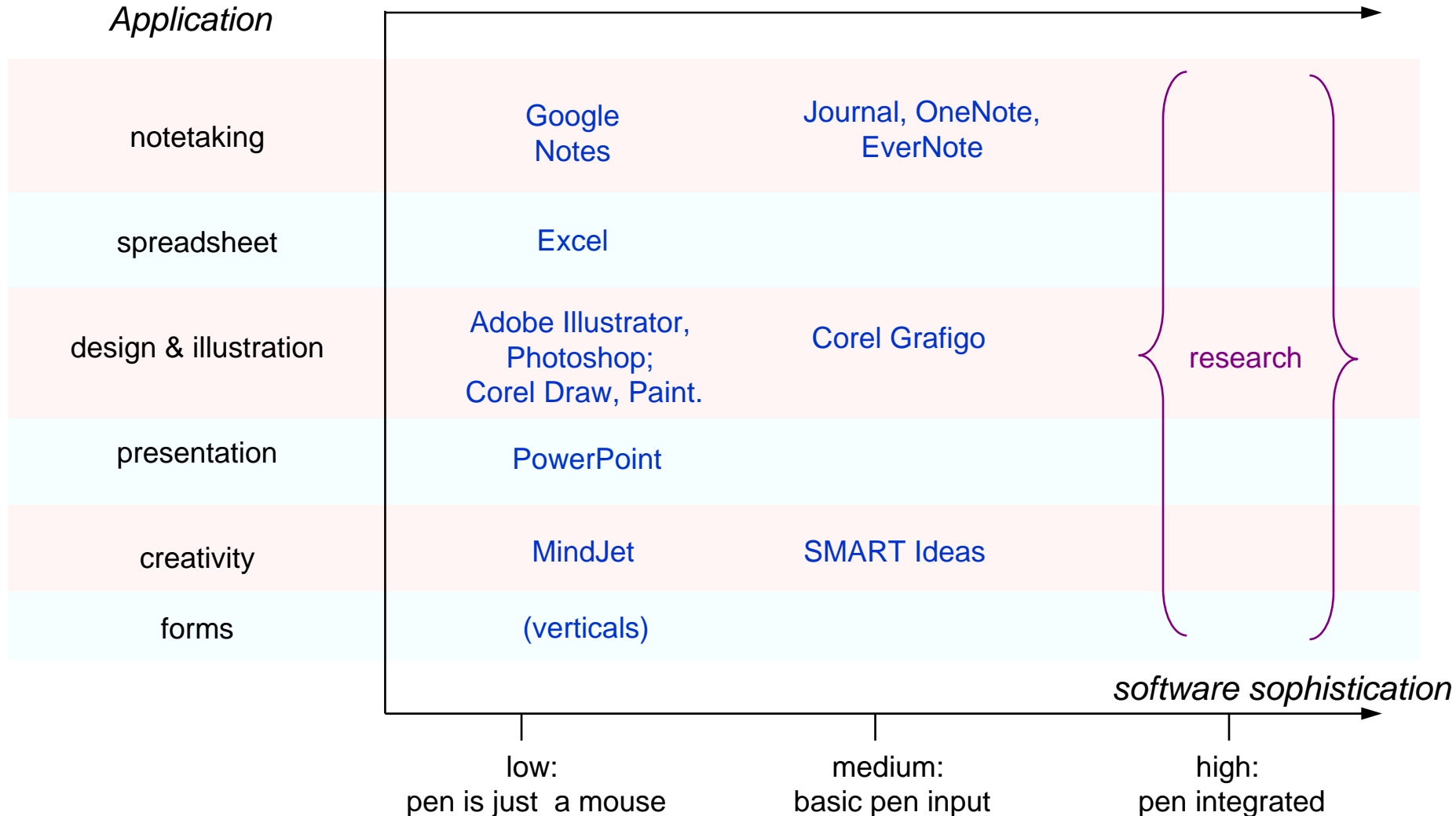
September 12, 2005 ([Computerworld](#)) -- When it comes to futuristic concepts, few ideas have captured the imagination like pen-based computing. The idea of doing away with a cumbersome keyboard for navigating and entering information has long been a Holy Grail, but it has met with little success. Microsoft's Tablet PC operating

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

engadget

Time to write off pen computing

Is Pen Computing Software Successful?



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 Tablet PC Killer App conversation

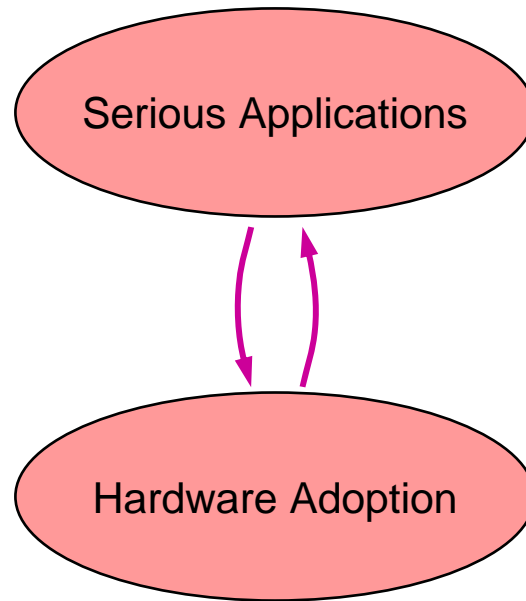
Posted 11/7/2005 by [James Kendrick](#) (Mobile Tech Expert)

Comments (0) | Trackbacks (0)

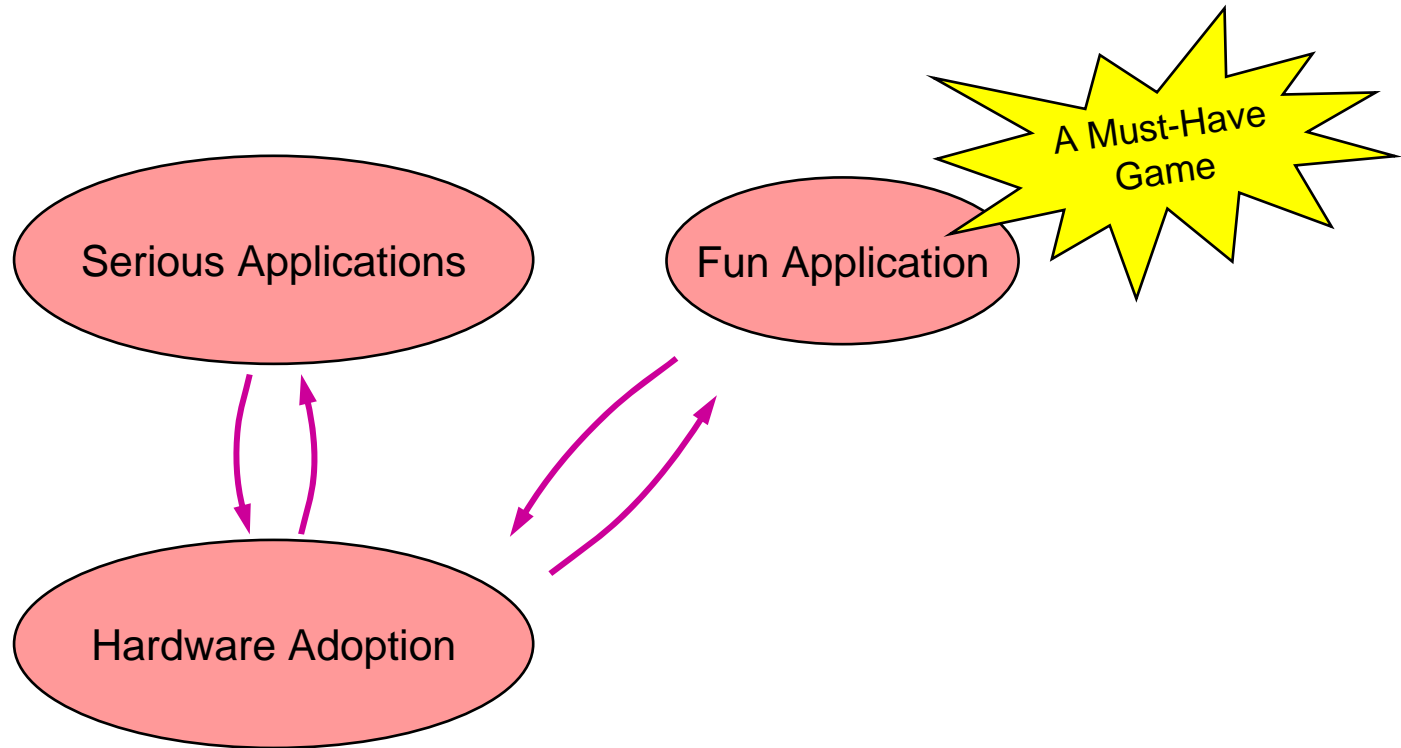
The search for the "killer app" for the Tablet PC always generates a lot of conversation and the current one [started by Lora of WhatNow](#) is a good one. The theory is that once ...

<http://blogs.ittoolbox.com/wireless/ontherun/archives/the-tablet-pc-killer-app-conversation-6428>

A Chicken-and-Egg Problem



Hypothesis



Games are Compelling



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

WIRED NEWS

The Quest to End Game Addiction

<http://www.wired.com/news/holidays/0,1882,48479,00.html>

Chess
Checkers
Go
Backgammon
Bridge
Poker
Blackjack
Scrabble
TicTacToe
Monopoly
Trivial Pursuit
RoShamBo
Dungeons & Dragons
Magic
Pokemon
Tetris
Settlers of Catan
Diplomacy
Risk
Rubik's Cube
Pictionary
Pong
The Sims
Sudoku

InkBall

Computer Games

The Computer Game Industry



Half-Life



Starcraft



The Sims



Quake



Madden NFL Football



Everquest



Halo



Grand Auto Theft



Animal Crossing

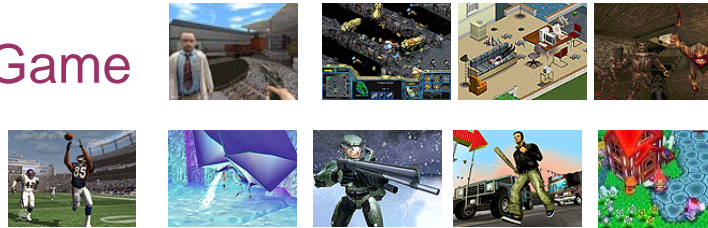
Nintendo DS

- 2 x 256x192 screens
- stylus input



Computer Games

The Computer Game Industry



Folk Games

ADDICTINGGAMES.COM **Scribble**

42,26
LEVEL 100,000

Q = Toggle Quality

Game Information

Author: tmth02.com

Description: Think you can connect the dots?

Looking for a real travel deal?
SHERMAN'S TOP 25

This Week's Deals:

ADDICTINGGAMES [All Games](#) [Tell A Friend](#) [Addicting Clips](#) powered by Google

Updated August 25

New Games

- Street Shooter**
This is one mean street!
- More Beer**
Keep the beer guzzlers happy!
- Madness Baseball**
America's favorite bloody pastime.
- Castle Attack 2**
Enough arrows. Let's try boiling oil!
- Meal or No Meal?**
At last...play for the ultimate meal!
- Dead Chickens**
- Leech**
Help a leech drink delicious blood!
- I Love My Computer**
Who doesn't love their computer?
- Turbo Spirit XT**
Outrageous motorcycle racing!
- Tradewinds Legends**
Fight and barter your way through exotic lands.

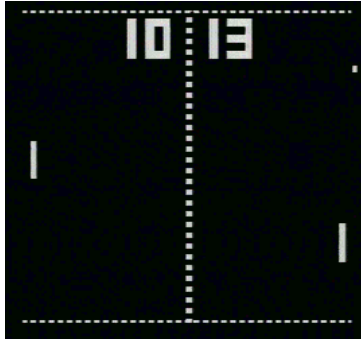
clip of the day:
Me
[Get Cash for Your Clips!](#)

voted BEST DRESSED
Deals on Back to School's Hottest Trends
Who are you shopping for?
☒ my son
☐ my daughter
Age
WIN \$1000
Back to School Shopping Spree!
[Personal Shopper.com](#)

Sports & Skill Games **Action Games** **Recent Games**

<http://www.addictinggames.com/scribble.html>

Wanted: A Fad Folk Game for Pen Computing



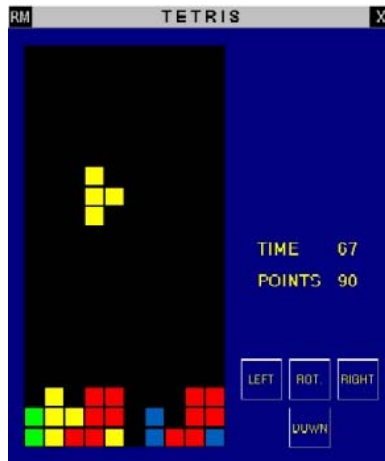
Pong



Rubik's Cube



Tomogatchi



Tetris



Online Poker

	9		1		7			2
3	2			9			1	
4		7		3		5		
2								4
		5		7		9		
8								1
		2		1		8		5
	8			6			2	3
7			4		8		6	

Sudoku

Brainstorming

[illegible]

Clustering:
 scribble in front of the page

Come chat with
 creative elements

8 remote pictorial

5 online things remove borders until they collapse

7


large scale strategy + monetization

50 pool balls


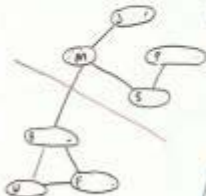
Diagrams showing various shapes, lines, and symbols, including a large circle with a smaller circle inside, a square with a cross, and a square with a dot.

[illegible]

partition with least ink




breaking a graphy
kpx




The image shows a series of hand-drawn diagrams illustrating different types of mutations:

- Chromosomal mutations:**
 - Deletion:** A chromosome with a missing segment.
 - Duplication:** A chromosome with a repeated segment.
 - Inversion:** A chromosome with a segment that has been flipped 180 degrees.
 - Translocation:** Two chromosomes where segments have been swapped.
- Point mutations:**
 - Silent mutation:** A single nucleotide change that does not affect the amino acid sequence.
 - Missense mutation:** A single nucleotide change that results in a different amino acid.
 - Nonsense mutation:** A single nucleotide change that results in a premature stop codon.
 - Frameshift mutation:** A deletion or insertion of nucleotides that shifts the reading frame.
- Gene mutations:**
 - Missense mutation:** A single nucleotide change that results in a different amino acid.
 - Nonsense mutation:** A single nucleotide change that results in a premature stop codon.
 - Frameshift mutation:** A deletion or insertion of nucleotides that shifts the reading frame.
 - Silent mutation:** A single nucleotide change that does not affect the amino acid sequence.



 mess, direct arrow
 Madden Football


Re gun
 Roller coaster
 gesture string



 draw your own constellations
 after VIs for


- dancing
 - fencing
 - Piloting with joystick

instruments



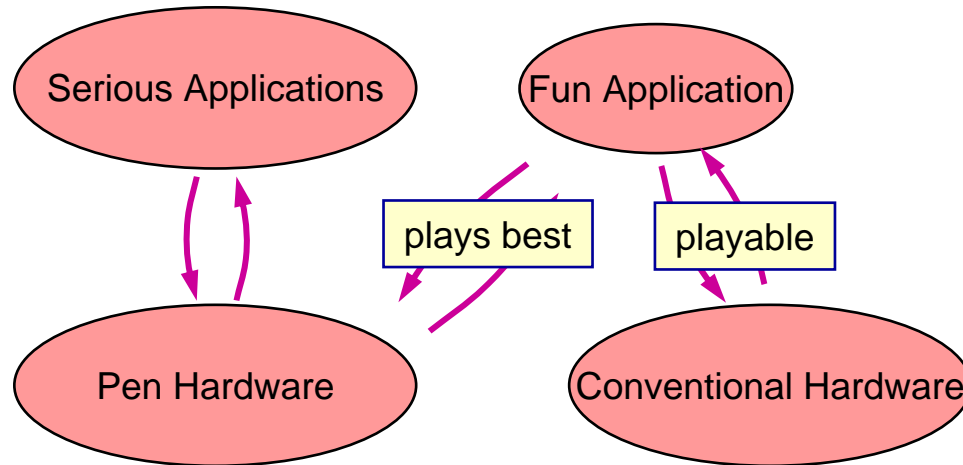
re: - Art Restoration
 apply chemicals to
 delicate painting

Brainstorming

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

Criteria

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

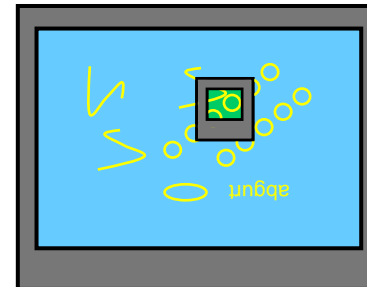


Take advantage of pen input:

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.

Criteria

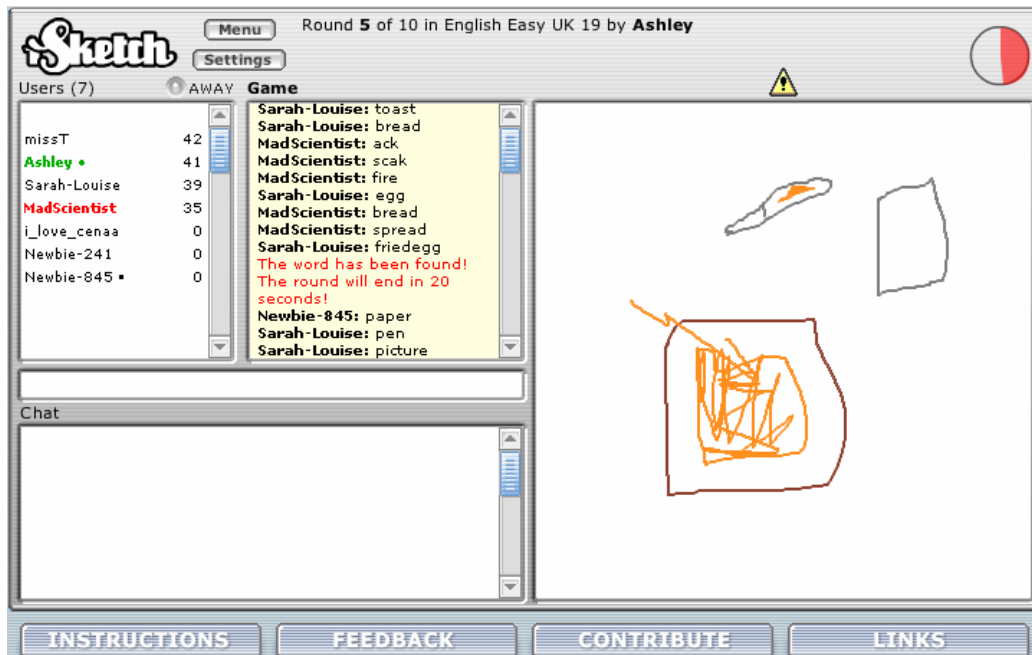
3. Time scale: A few minutes.

- 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

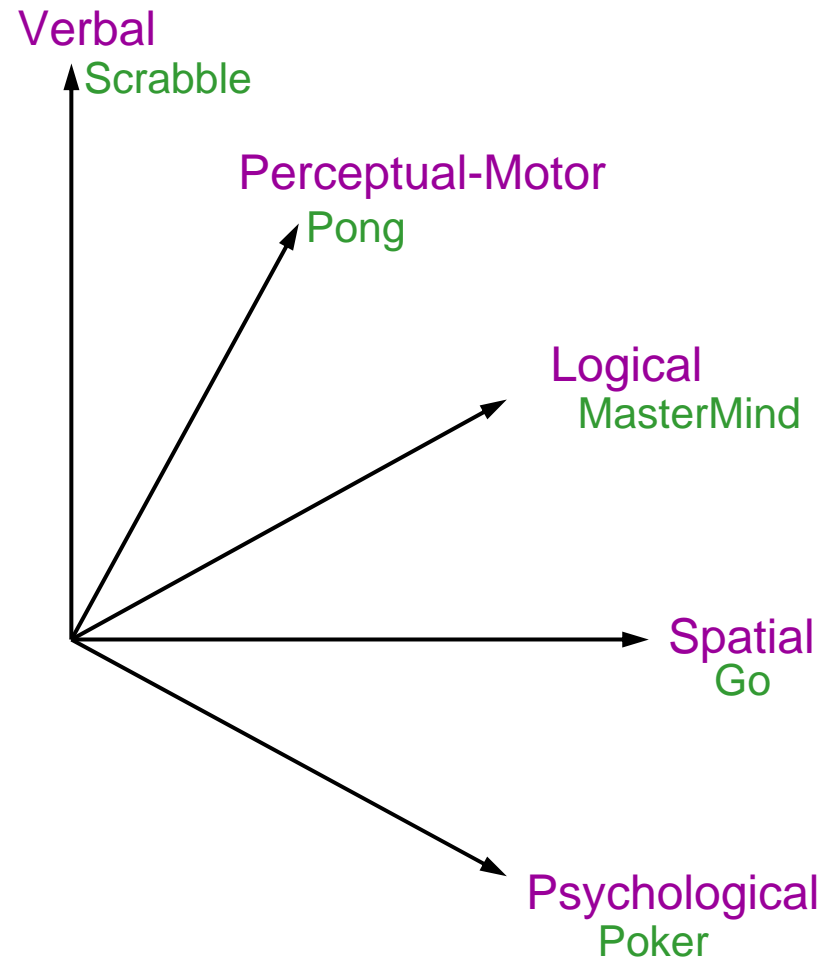


Networked folk game example: isketch
<http://www.isketch.net>

also, the ESP Game
<http://www.espgame.org/>

Criteria

5. Mixed of skill components.



Criteria

6. Handicappable.

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

7. Cool music.



floats

<http://www.ferryhalim.com/orisinal/g3/floats.htm>

Brainstorming

- Seven criteria.
- • A ton of concepts.
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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

Earthquake

- simulate mechanisms

- crossword puzzle

- constraining flow

Sheepdog

- propelling / repelling moving objects

- mimicking another drawing

- choreography

- number puzzle

Hidden Drawing

- guess path of moving objects

- musical performance

- driving and steering

Tracker

- capture territory

- track moving objects

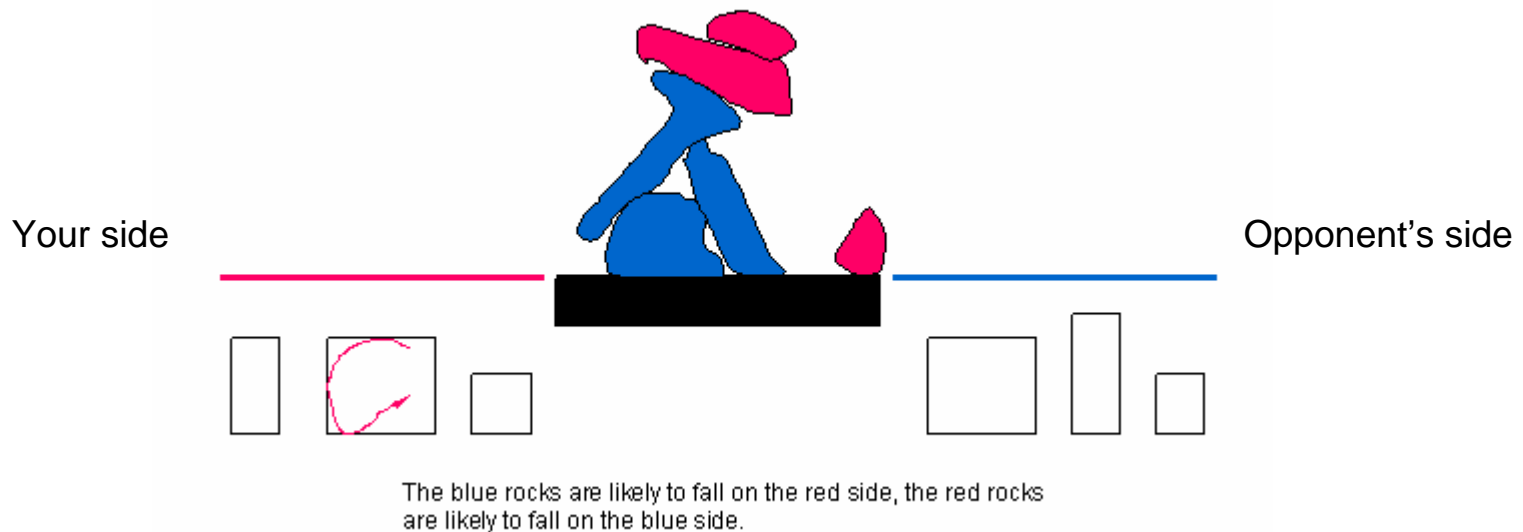
Maze Control

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.



Sheepdog

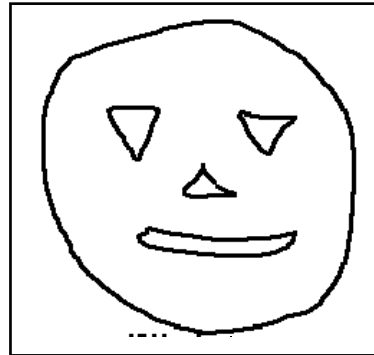
Object: Direct the sheepdogs to herd the sheep into the pens.



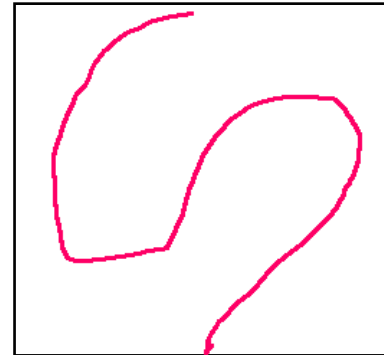
<http://www.saund.org/sheepdog.html>

Hidden Drawing

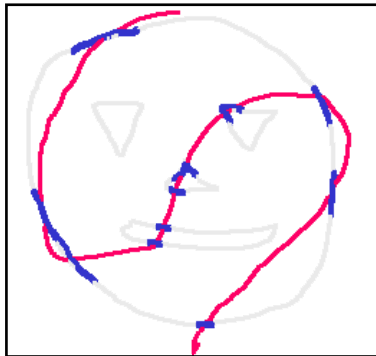
Object: Reveal a hidden drawing by tracing it based on partial information.



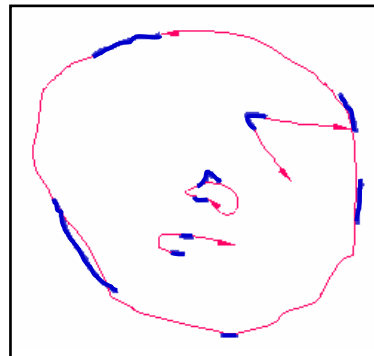
1. Hidden drawing.



2. Player's first guess (red).



3. Drawing revealed by player's first guess (blue).




4. Player's second guess (red).



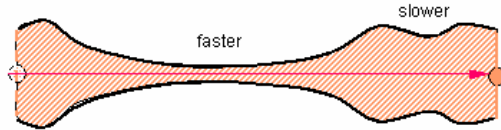
5. Drawing revealed by player's second guess (blue).

Tracker

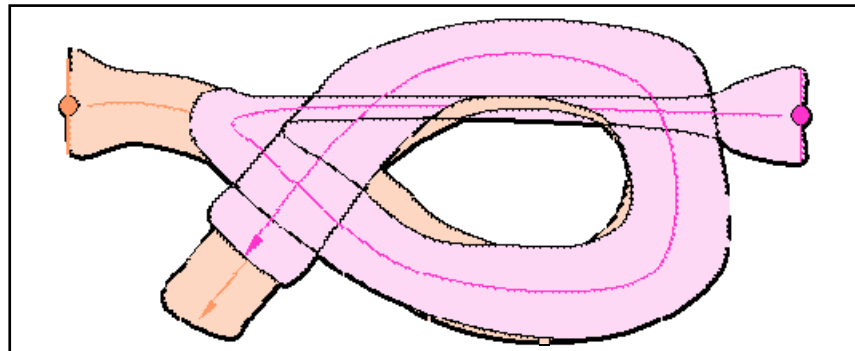
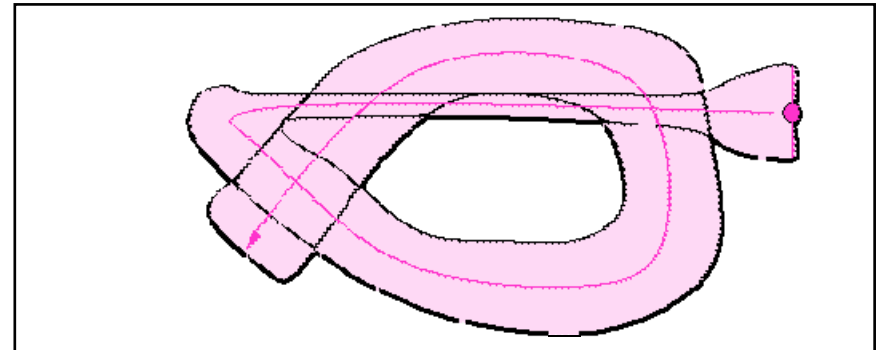
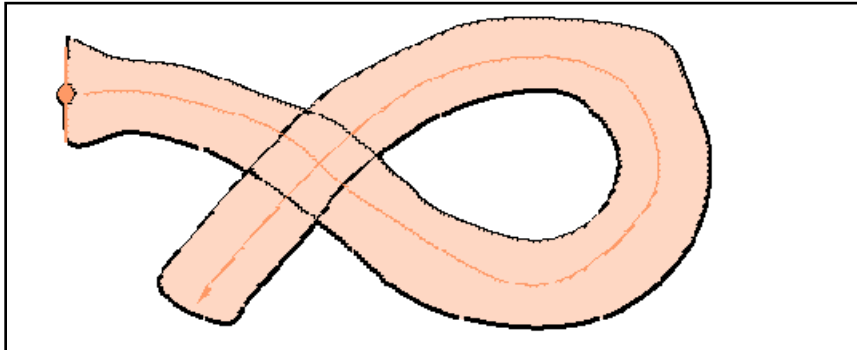
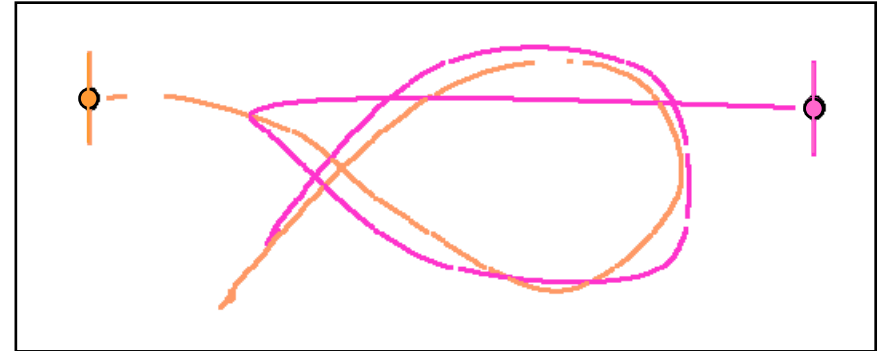
Object: Capture territory by dragging your boom over ground *later* than your opponent does.



Player's token and its boom that claims a swath of territory as the token moves...



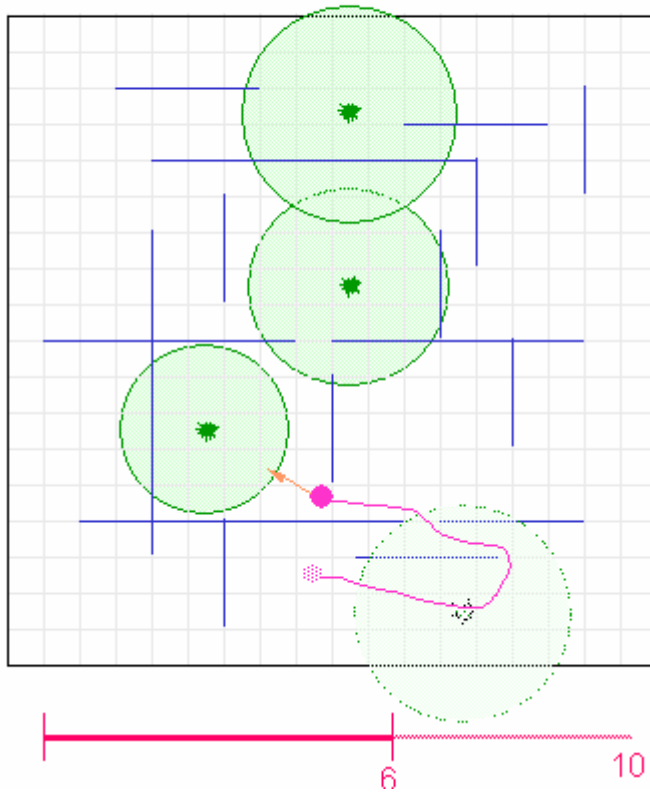
Territory claimed by a straight-line move that speeds up then slows down for a while near the end.



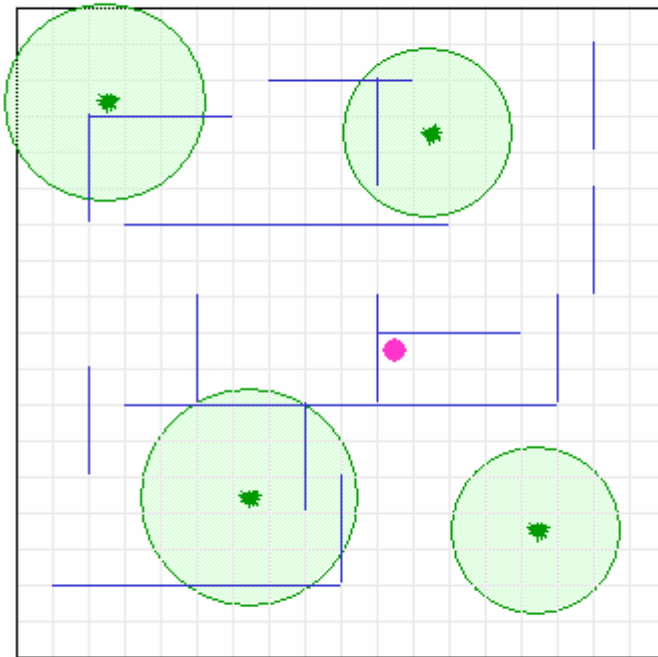
Maze Control

Object: Cover your opponent's territory with trees.

Your territory



Opponent's territory



MazeControl

Brainstorming

- Seven criteria.
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- Five (inadequate) game ideas.

But where's the vision?:

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


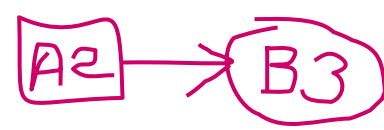


- Eight technology enablers.

Technology Enablers for New Game Concepts

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

ConceptSketch

- 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.

Eric Saund
saund@parc.com

falling sand game

Is Pen Computing Successful?



Web Results 1 - 10 of about **164,000** for **"pen computing"**. (0.18 seconds)



Tablet PC Blogs

Building the Community One Blog at a Time.

[Home](#) [Blogs](#) [Forums](#) [Photos](#) [Tableteers](#) [Little Tableteers](#)

Top 10 Tablet PCs
Ranked by popularity and
average sales. The Grand
Compare Here!

Touch Screen Laptops
Rugged & Reliable Notebook
PCs with Touchscreen from
Panasonic.

Dell™ Laptops
Dell™ Power 5549 Notebook
or 4420 Desktop. Shipped Free.
Details Here!

Toshiba
Official 80
Days On
to 30% Off

Building a community ... one blog at a time.

A Brief History of Tablet PCs

A Brief History of Tablet PCs is a fun read for everyone interested in Tablet PCs. The part about members of the press being enthusiastic then critical was worth a chuckle.


Pen computers, as envisioned in the 1980s, were built around handwriting recognition. In the early 1980s, handwriting recognition was seen as an important future technology. Nobel prize winner Dr. Charles Elbaum started Nestor and developed the NestorWriter handwriting recognizer. Communication

Are Tablet PC sales growing? Yes!



Robert Williams, Director of Mobile Platforms Division Business Development, showed a Tablet PC sales growth chart. Looks like things are moving up!


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about us services solutions contact us tablet pc

The Market Leader in Tablet PC Solutions


Overview



Home Products Downloads Shop Support Company

An Interactive Journal for Math

xThink has released MathJournal version 1.1, an interactive program for the Tablet PC that provides a natural and intuitive environment.




making learning mobile

Solutions Products Clients & P

Mobile Learning Higher Education Dist

Agilix delivers superior solutions for e



handwriting recognition technology


About us Handwriting Recognition Markets Products Partners News & Media

MyScript® Handwriting Recognition for:

- FORM PROCESSING
- NOTE TAKING
- MOBILE MESSAGING
- EDUTAINMENT

OUT NOW!

Vision Objects®: providing the industry standard in handwriting recognition



NEWS

August 2
Vision Obj
Technolog
delivers inn
electronic
reading ...

May 16th
Vision Obj
handwritin

Is Pen Computing *Software* Successful?

Software Sophistication

Level 3: pen integrated

- UI designed for a pen.
- WYPIWYG (What You *Perceive* Is What You Get) graphics recognition.
- Handwriting entry and editing integral to the application.

Level 2: basic pen input

- Single-stroke shape and gesture recognition.
- Handwriting in application goes to text entry widget.

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.