

Tools

Xi Pu

What are tools?

“A user interface software tool helps developers design and implement the user interface”

Basically everything

- Languages (python, MATLAB, RStudio)
- Web development (javascript, Google Web Toolkit)
- Mobile development (iOS SDKs, Apple API's, PhoneGap)
- End user programming (LabView)
- Other: CNC, MatchSticks

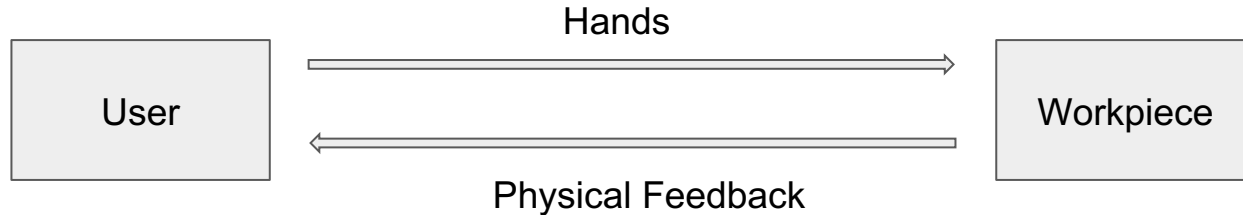
Traditional Fabrication

Cons:

- Slow - Every step requires conception + execution time
- First and final - no undo

Pros:

- User attention on workpiece
- Interactive editing



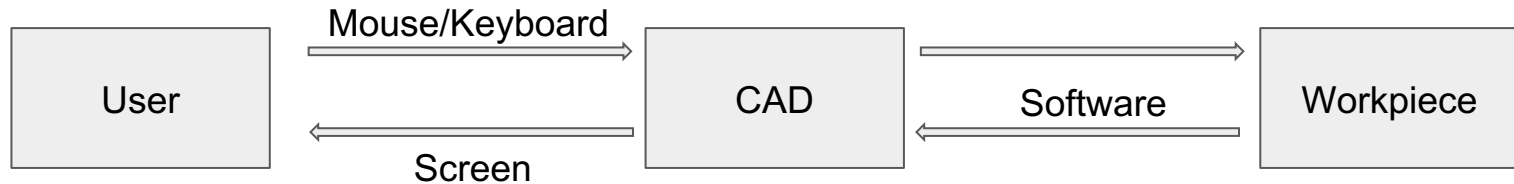
Existing Fabrication Metaphors

Cons:

- Removes user from workpiece
- Prevents interactive editing

Pros:

- Fast iterations
- Precision
- Allows trial and error



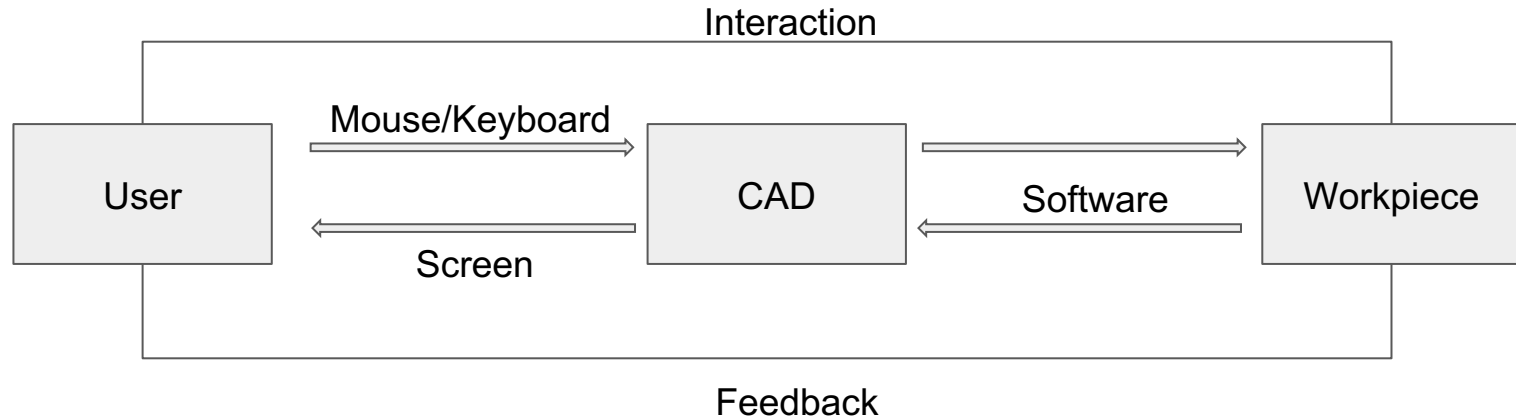
MatchSticks Fabrication Metaphors

Cons:

- Discuss if there are any cons?

Pros:

- Retains desirable features of CAD
- Enables Interactive Editing
- Improves design process by keeping user focus on workpiece



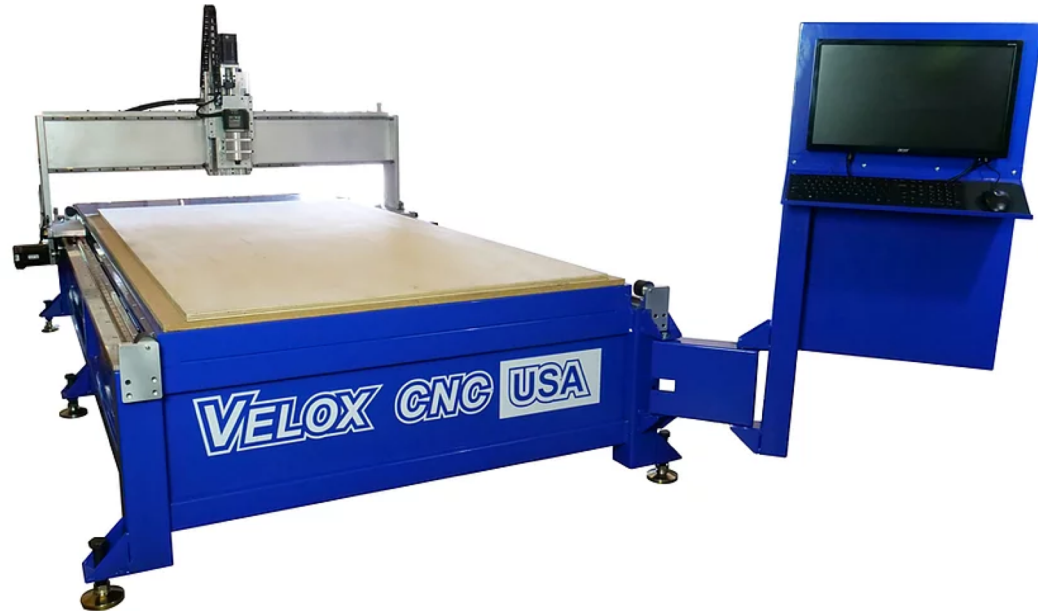
MatchSticks: Woodworking through Improvisational Digital Fabrication

Rundong Tian, Sarah Serman, Ethan Chiou, Jeremy Warner, Eric Paulos

What is CNC (Computer Numerical Control)

A CNC router is a machine that is very similar to the commonly used handheld router that is utilized for cutting various materials. A CNC router can aid in the cutting of materials like steel, wood, aluminum, composites, plastic, and foam.

Discuss: What is the limitation?



What is MatchSticks?

<https://youtu.be/wHmrjC35Ynw>

It combines a portable CNC machine, touchscreen user interface, and parametric joint library.

It embodies tacit woodworking knowledge and distills the distributed workflow of CNC tools into a hand tool.

What is MatchSticks?

A novel machine tool capable of easily fixturing wood in various orientations.

A touch screen display for primary interaction.

A parametric joint library.

A toolpath generator to create machining toolpaths.

A web application which handles the data storage, toolpath calculation and user interface.

Practice example

Rather than designing an entire detailed 3D model of the chair on the computer, she sits down in the workshop with her materials and sketches a few ideas that capture the overall size and topology of the chair. Instead of delegating the entire fabrication process to the machine, she works interactively with the system and her materials to determine what joints would be best suited for the design.

Discuss: Advantages of MatchSticks?

Interactive

Geometry Conscious

Parallel

Beyond Machine Scale

Compare CNC and MatchSticks

CNC router must be as big as the largest piece in the design

CNC is precise but with low efficiency (precision is only needed at detailed joinery sites)

CNC can't address the geometries required by many woodworking tasks

MatchSticks meets requirements?

What can we expect from MatchSticks?

User Interface?

Unlike hand tools that have no interactive interface, or digital fabrication tools that depend on external computers, MatchSticks is designed to afford direct, immediate, and creative workflows as directed by the user through handed interaction with the material and the machine.

What's the purpose of user interface of MatchSticks?

1. Interaction with both the material and the machine
2. Easy access to joinery library
3. Guiding the user step by step
4. Parallel working

Discussion: What was novel about the technique in the paper?

What audience do you think the tool is targeted at?

Discuss the proposed criteria

User Study

1. Capacity and Accessibility
2. Comparison to other machines
3. Workflow and Viscosity
4. Design of the machine

Discussion: How do you rate MatchSticks?

Discussion

What's the limitation of MatchSticks and what can be improved?

Past, Present and Future of User Interface Software Tools

Brad Myers, Scott E. Hudson, and Randy Pausch

What are user interface software tools?

A user interface software tool helps developers design and implement the user interface.

Goals

- 1) Discuss the proposed criteria for evaluating UI builders:
- 2) Discuss current/future criteria for UI builders:

Landscape of Technology in 1999



“Steve Jobs makes Apple a player again with the iMac”

“Though free email has been around for a while, this year's proliferation of other free services, along with the lower cost for computers and peripherals, sends a clear message: This technology is sinking into our lifestyles”

Harmful to Minors bill voted down

Why is a discussion of tools relevant (in 1999)?

Homogeneity and stagnation of user interfaces

Authors believe this will change as devices holding the user interfaces change, and new tools will be needed

- Ubiquitous computing
- Recognition based user interfaces
- PDA's, SmartBoards, BlueTooth

Discuss: Were they correct?

Themes in Evaluating Tools

Parts of the user interface addressed - does it help where it is needed

Threshold and ceiling - how difficult it is to learn vs how much power it has

Path of least resistance - does the tool guide the developer toward the 'right thing'

Predictability - does the tool perform in the expected way

Moving targets - did technology move away from the tool being useful

Discussion

Based on the themes outlined this paper, how do you think the MatchSticks does?
Would you predict it to be a successful future tool?

Parts of the user interface addressed - does it help where it is needed

Threshold and ceiling - how difficult it is to learn vs how much power it has

Path of least resistance - does the tool guide the developer toward the 'right thing'

Predictability - does the tool perform in the expected way

Moving targets - did technology move away from the tool being useful

What worked in the past

Window managers and toolkits

Event languages

Interactive graphical tools

Component systems

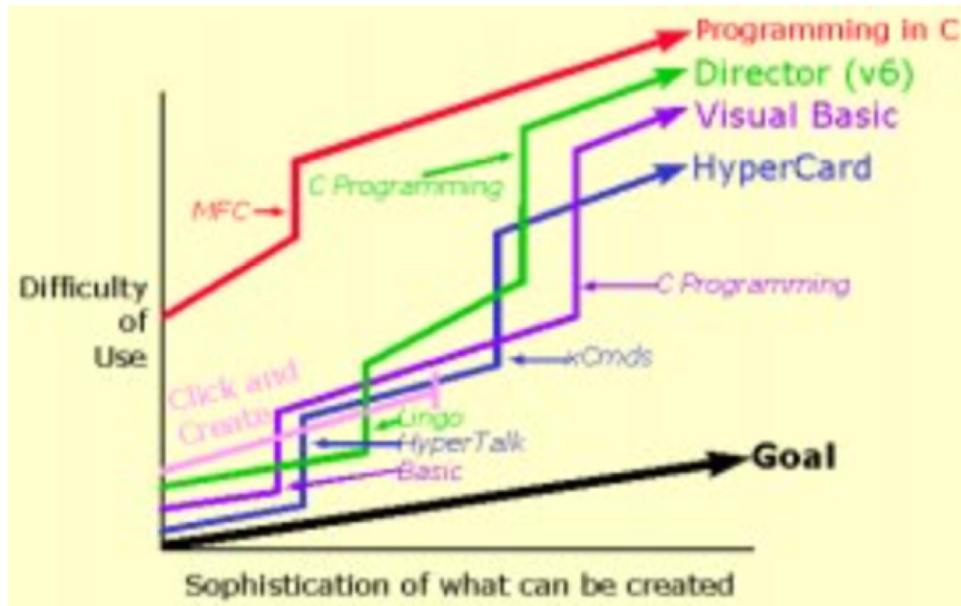
Scripting languages

Hypertext

OO Programming

Threshold and Ceiling

- C is hard to use, threshold starts high
- Visual basic is easy, but wall comes when you have to 1) learn basic, 2) learn C



Good use of threshold/ceiling: Scripting Languages

First languages were interpreted (Smalltalk, Lisp), then compiled (C, C++), then desire to come back to interpreted (Python, Perl)

What advantages do interpreted languages have over compiled?

Most either high threshold/low ceiling, low threshold/high ceiling, or a combination

Discuss: Can you think of a tool that's low-threshold and high ceiling? How is this achieved?

Bad use of threshold/ceiling: Formal language tools

Required programmers to learn language in addition to the ones they already knew

Required programmers to learn new programming concepts (expressing sequences as grammar)

If formal language tools came before scripting tools, do you think they have been a success?

Promising Approaches that have not caught on

User interface management systems (UIMS)

- Separate process or business logic from GUI's
- Low level details are important for user experience
- Standardization of user input made this irrelevant

What themes did UIMS fail at?

Formal language based tools, Constraints, Model based techniques

Future Prospects and Visions

- Computers as a commodity
- Ubiquitous computing
 - When all devices can communicate with each-other
 - Stresses need for recognition of diverse input-output modalities
 - Devices for communication instead of computation

How well did the authors do at predicting the future of ubiquitous computing?

Future Prospects and Visions

- Computers as a commodity
- Ubiquitous computing
- Recognition-based user interfaces
 - Gestures, handwriting, speech input and output

How big of a role does recognition based user interfaces play in our lives today?
Do they work well enough for you to use them?

Future Prospects and Visions

- Computers as a commodity
- Ubiquitous computing
- Recognition-based user interfaces
- 3D Tech
- End user programming

What did they get right? What did they get wrong?

Modular Interactivity

- Desktop Interactivity was relatively simple -- UI builders supported it with a set of primitives.
- Discussion question: In terms of Interactivity, how is UbiComp fundamentally different from desktops? How is contextual computing different from desktops?
- Discussion question: Can previous UI builder work on Interactivity handle UbiComp? Contextual computing? Why or why not?

Thank you