

AI - Assisted Tutor Authoring

Tommaso Calò – Politecnico di Torino

1 Teacher Presents Concept

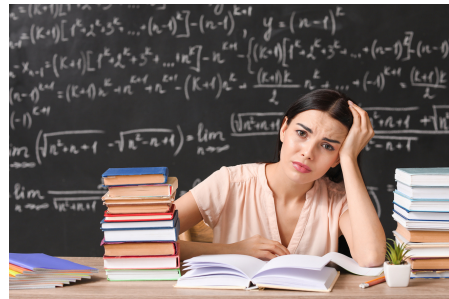


Absent Students

2 Students Practice Concept



5 Teacher Uses this Understanding to Teach Next Lesson



In an Ideal World

Classroom Management



3 Students ask for Feedback



4 Teacher Provides Feedback

Teacher Shortage

Fewer Prep Periods

1 Teacher Presents Concept



2 Students Practice Concept

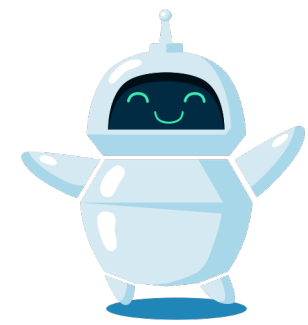


5 Teacher Uses this Understanding to Teach Next Lesson

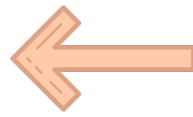
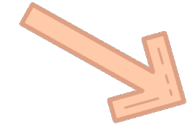
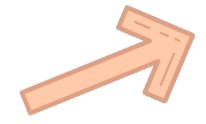


With **Apprentice Tutors**

3 Every Student receives Personalized Feedback



4 Tutor Provides Student Mastery Data to Teacher



Our Vision for Scaling Personalized Education

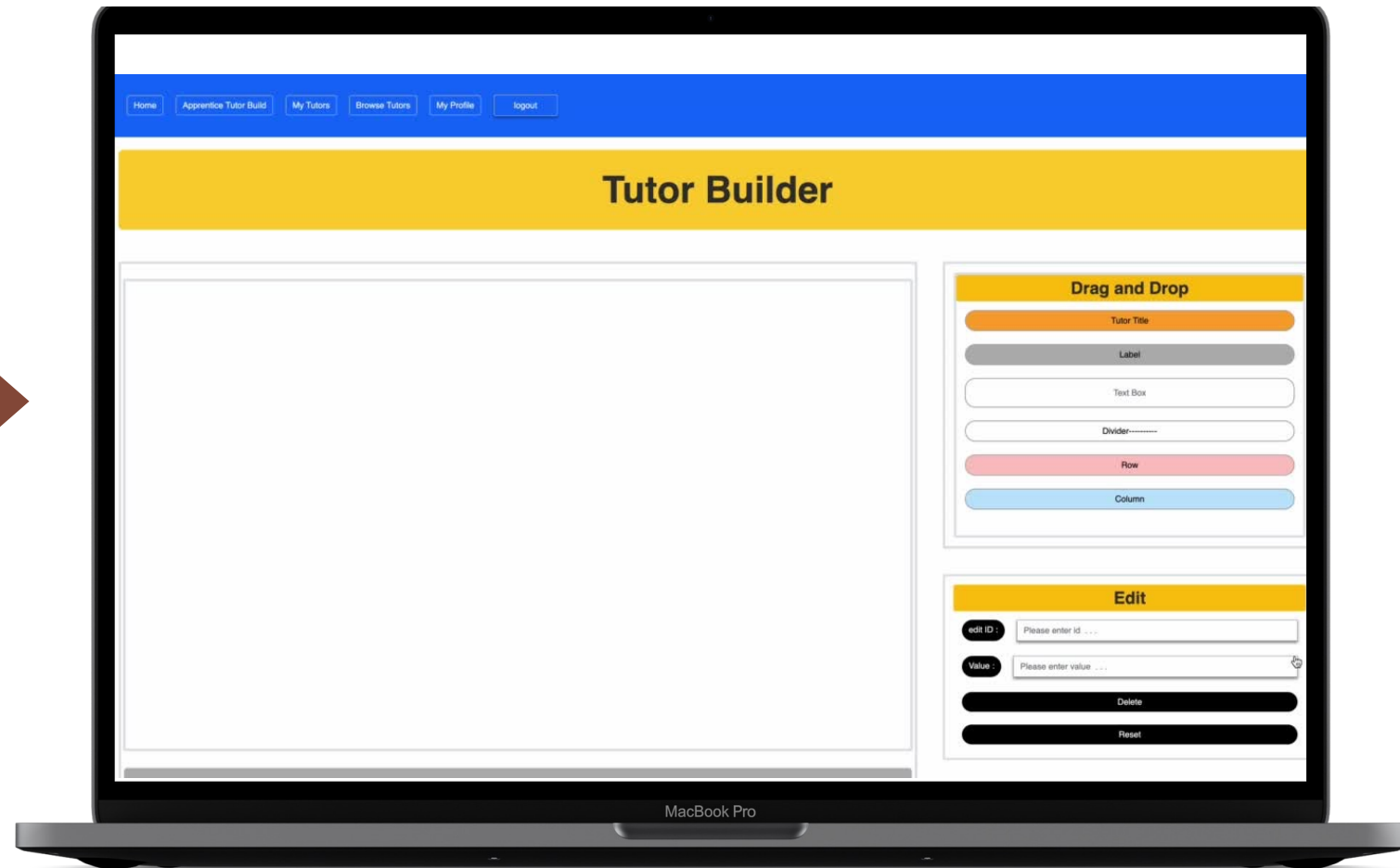
**Teacher decides
what students
need to learn**



Our Vision for Scaling Personalized Education

Teacher Builds Tutor Interface Through Drag & Drop

Teacher decides
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to learn

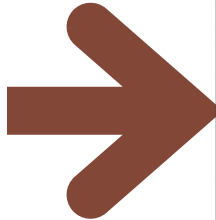
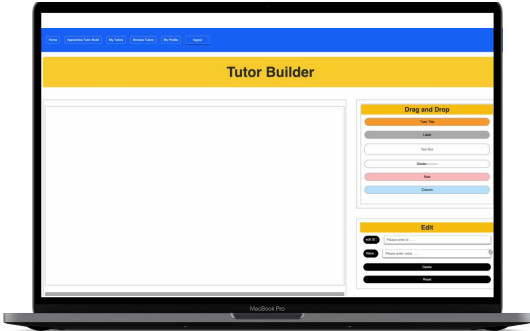


Our Vision for Scaling Personalized Education

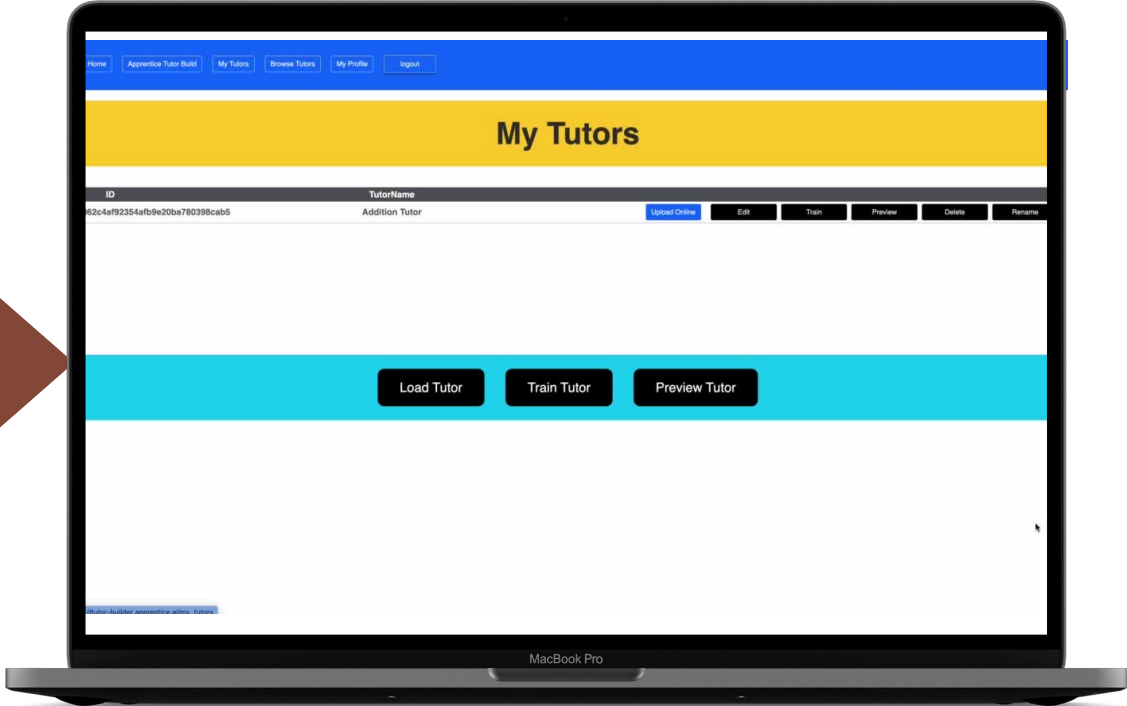
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Teacher Builds Tutor Interface Through Drag & Drop



Naturally Train the AI through demonstrations

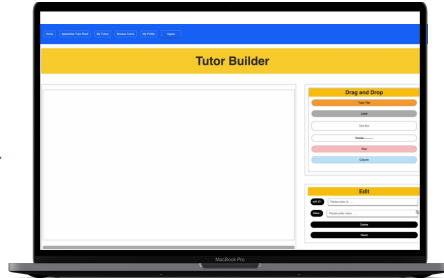


Our Vision for Scaling Personalized Education

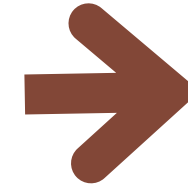
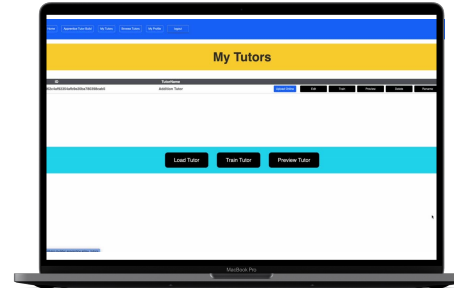
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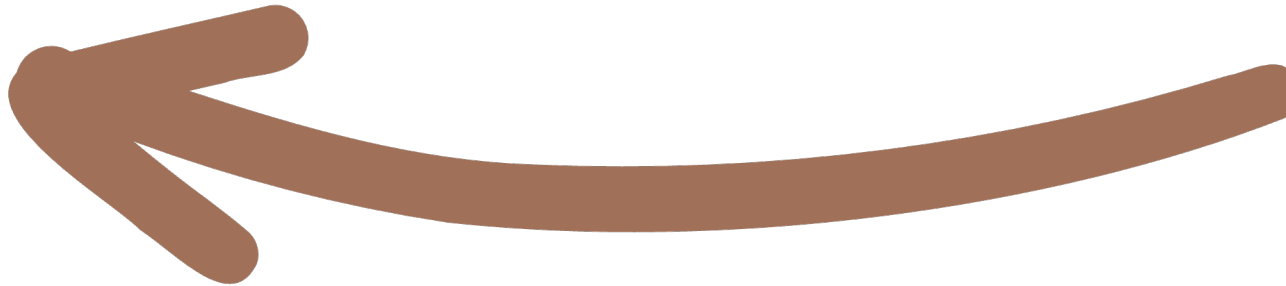
Teacher Builds Tutor
Interface Through Drag &
Drop



Naturally Train the
AI through
demonstrations



Blackboard
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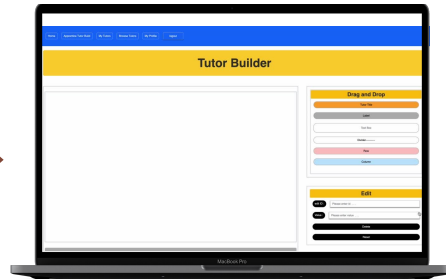


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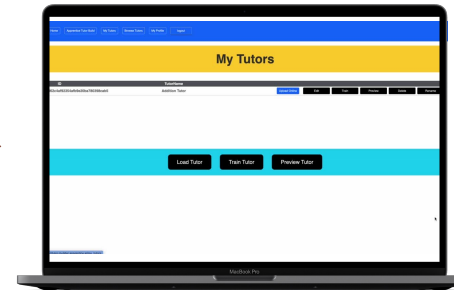
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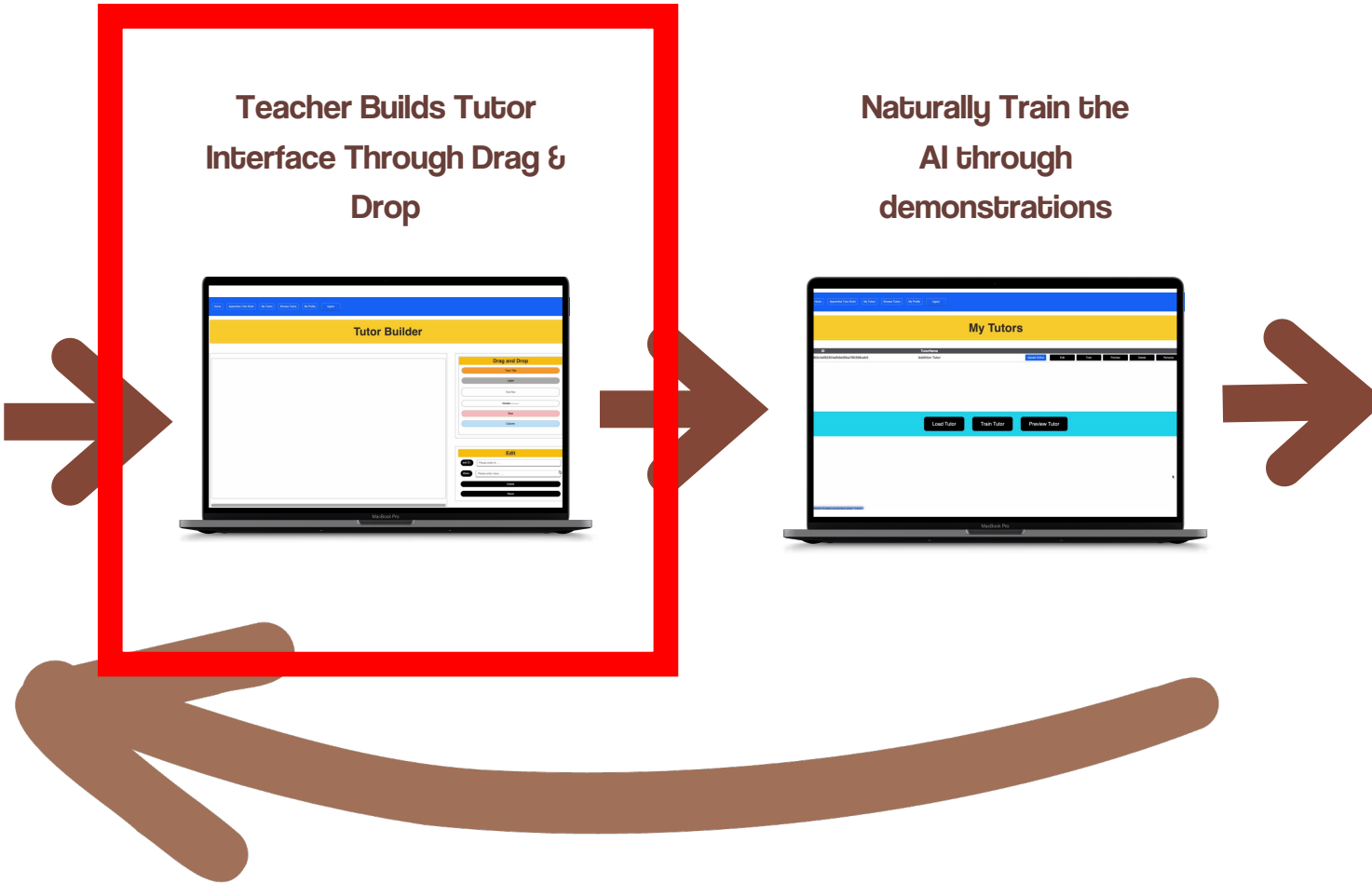
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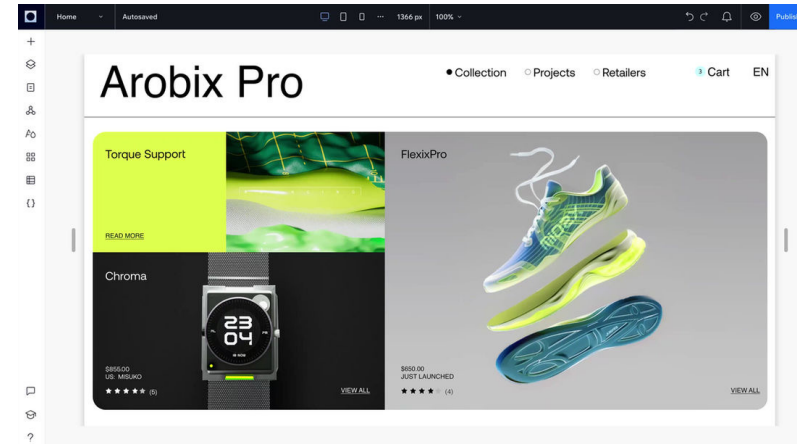
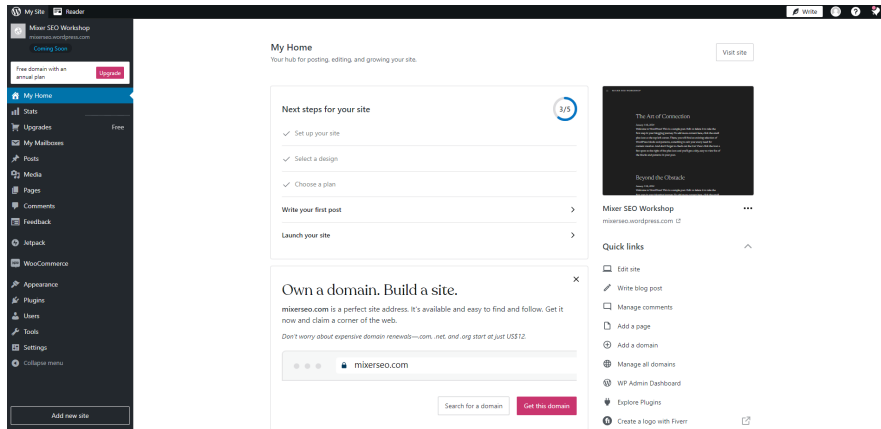
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Educators development of tutors interfaces

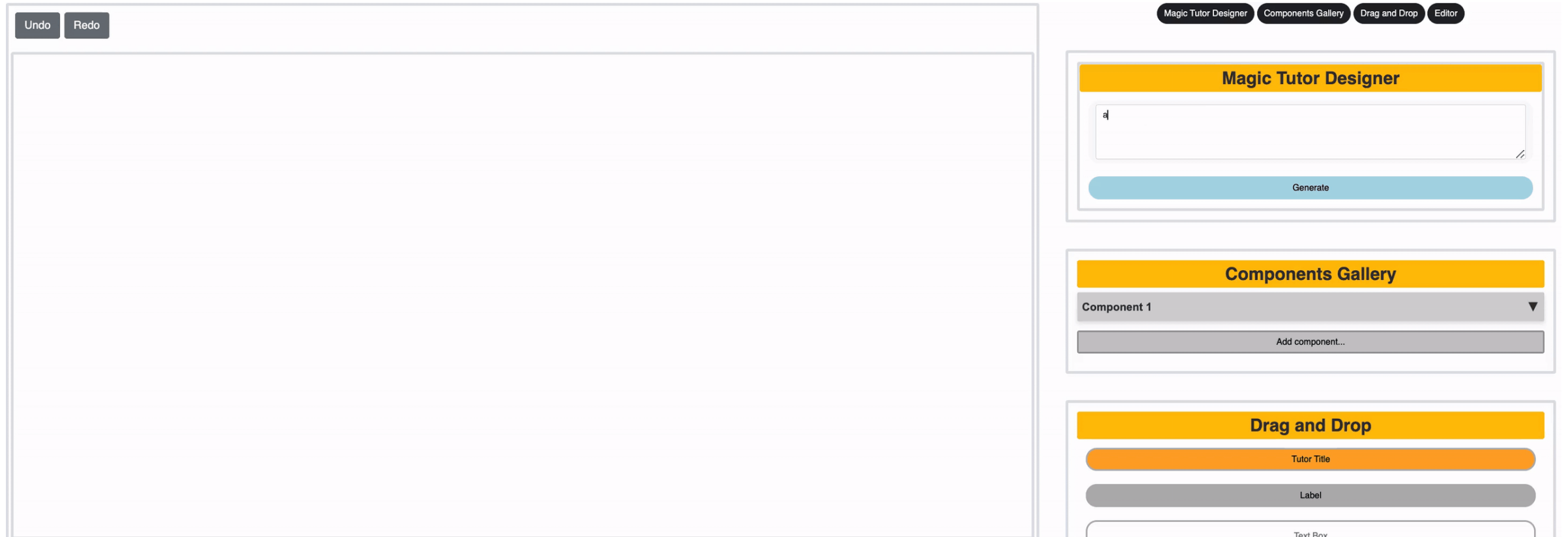
General Problem: End User Development of Graphical Interfaces

Traditional Solutions: Low/No-Code Builders (Wix Studio, Bubble, etc.)



Our Idea: Leverage Generative AI to translate High Level Requirements to Low Level Artifacts (Code/Domain Specific Languages).

Generative AI Approaches for Creating Intelligent Tutor Interfaces



Preliminary results

- **AI-assisted approach substantially reduces time & effort**
 - **Especially for complex designs**

Interface Type	Time (s)			Keystrokes		
	Classical	AI-Enhanced	Reduction	Classical	AI-Enhanced	Reduction
Simple	187	143	-23%	184	126	-31%
Complex	372	116	-68%	141	74	-47%

Table 1: Comparison of time and keystrokes required for building tutor interfaces: Classical vs. AI-Enhanced

- **Further development in partnership with educators**
 - **Optimally integrate generative AI into workflows**
 - **Meet requirements of real-world tutoring**

An Educator-Centered Framework

1 **Input Requirements**

Input Problem Requirements

Analyze log file for malware

Cancel Back **Next**

2 **Refine Pedagogical Steps**

Pedagogical Steps

- Verify any suspicious elements using additional malware identification resources
- Confirm the presence of malware using appropriate tools
- Identify and record the type of malware detected
- Further investigate the log for any additional instances of that malware type
- Document the findings

Cancel **Recommend** Back **Generate Tutor Drafts** **Use Findings Later**

3 **Explore AI-generated Designs**

Layout 1, Layout 2, Layout 3, Layout 4, Layout 5, Layout 6

+

4

Identify Malware Type, Search For More Signs, Document Findings, Apply Response Measures, Run System Scan, Confirm Results, Review Security Measures, Update Security Measures

Malware Type, Signs, Findings, Response, System Scan, Network, Security Review, Security Devices

Process 5: New cookies, Malware ID

Like **See This Layout** **Share Your Preference**

Express Preferences on the Designs

5

Malware Analysis Tool

Open the log file, Analyze the log for suspicious activity, Scan the log using a malware susceptibility software, Cross-verify potentially malicious elements, Confirm the presence of malware using the appropriate endpoint tool, Verify the specific type of malware detected, Search for additional signs of the same malware type, Document your findings, Implement response measures to isolate and remove the malware

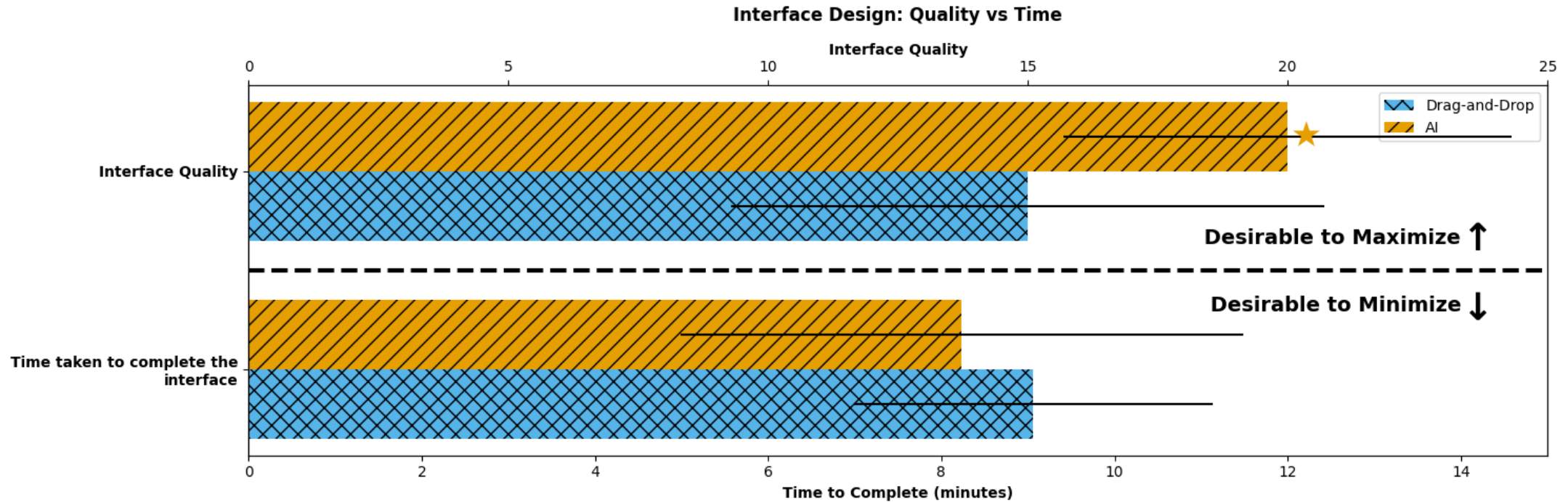
Log File, Malicious Entries, Cover Security Software, Malware Datasets, Malware Confirmation, Malware Sign, Malware Type Search, Findings Record, Response Measures

Drag and Drop

- Tutor Title
- Label
- Text Box
- Row
- Column

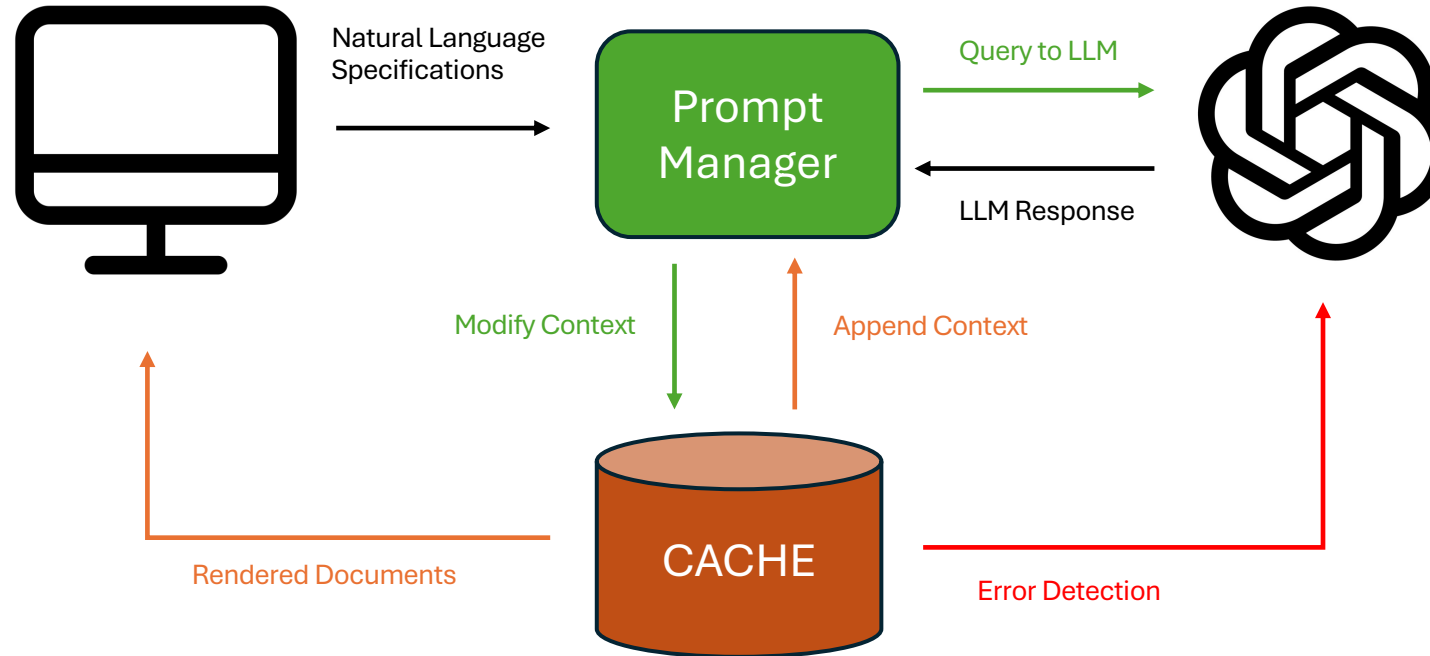
Manually Refine the Final Interface

An Educator-Centered Framework



Significant enhancement of final interface quality.

End User Development of Graphical Interfaces



We introduce a framework to allow end users to generate and refine websites without concerning with the underlying code.

End User Personalization of Graphical Interfaces

Enhance With AI

Static Settings

Dynamic Settings

Personalize!

-- Select an Element --

Navigation Buttons

What it should do

How it should appear

AI Imitation

0/10 Generate ✨

Previous ⏪

Restore 🔄

- 1 Dropdown menu for selecting interface elements to customize.
- 2 Selected component name and remove option.
- 3 Define component behavior.
- 4 Specify visual styling.
- 5 Create new interface based on specifications.
- 6 Return to last generated version.
- 7 Reset to original interface.



Starting Calendar

Previous

Mon Sep 16 2024 - Sun Sep 22 2024

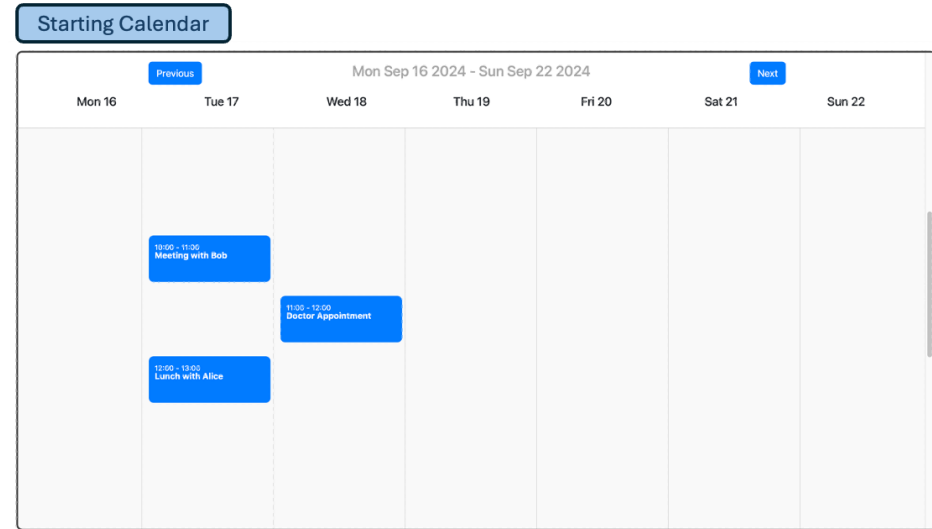
Next

Mon 16 Tue 17 Wed 18 Thu 19 Fri 20 Sat 21 Sun 22

10:00 - 11:00 Meeting with Bob

11:00 - 12:00 Doctor Appointment

12:00 - 13:00 Lunch with Alice



Easy Target Calendar

Tuesday, 17/09/2024

10:00 - 11:00 Meeting with Bob

12:00 - 13:00 Lunch with Alice



Difficult Target Calendar

19 Thursday

Mon Sep 16 2024 - Sun Sep 22 2024

Meeting with Bob

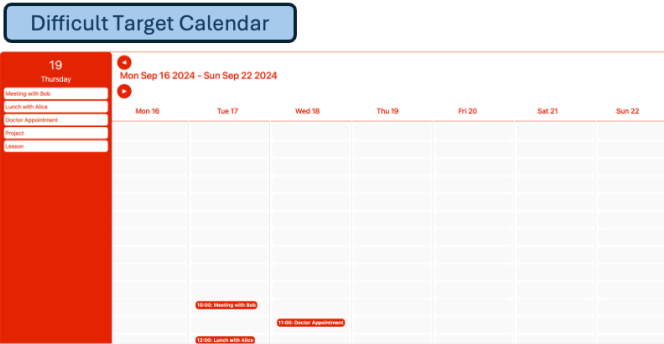
Lunch with Alice

Doctor Appointment

10:00 Meeting with Bob

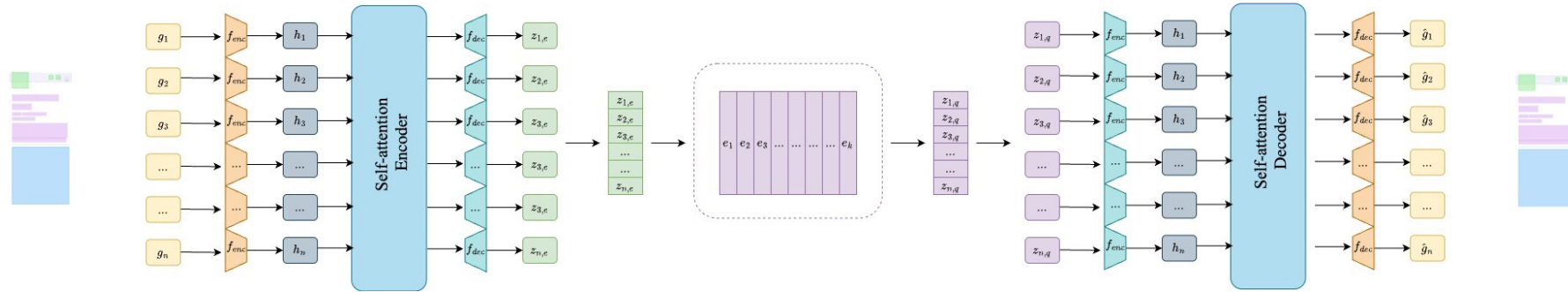
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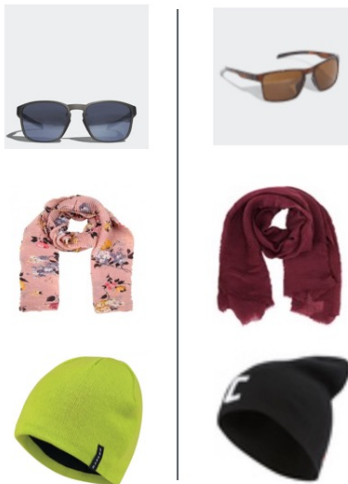


We introduce MorphGUI, a framework that leverages Large Language Models to enable free-form interface customization through natural language interaction.

Deep Learning Based Approaches



We introduce a specialized multimodal VQ-VAE for modelling Figma GUIs.



Model	mIoU \uparrow	Acc \uparrow	PosErr \downarrow	AreaErr \downarrow	Acc _{col} \uparrow	Cos _{txt} \uparrow	Cos _{img} \uparrow
VQ-VAE512	0.10 \pm 0.05	98.63 \pm 2.81	0.08 \pm 0.03	0.51 \pm 0.11	99.63 \pm 2.61	0.84 \pm 0.06	0.81 \pm 0.09
VQ-VAE768	0.11 \pm 0.05	98.90 \pm 2.59	0.07 \pm 0.03	0.51 \pm 0.11	99.59 \pm 2.26	0.84 \pm 0.06	0.81 \pm 0.09

Original text	Reconstructed text
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2 reviews	3 Reviews
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