17. AI IN FRONTEND: CHALLENGES AND SOLUTIONS

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The challenges of implementing artificial neural networks in the frontend and their solutions are considered in the paper.

Nowadays the AI field evolves at a high pace. Therefore, many processes have become automated, and programming is not an exception. 92 % of programmers use AI for coding, and 48 % of programmers are supposed to use it daily [1]. 55 % of IT companies have already implemented AI, and 80 % of companies are estimated to be using it in five years [2]. The frontend has a lot of things that can be automated, which will save a lot of time and money. For example, writing HTML/CSS website frame using Figma files takes at least a half of the time that is spent by frontend specialists. And sophisticated AI allows to automate this process. Nevertheless, there are some challenges in implementing AI in IT companies that work on designing websites.

The first challenge is picking the most efficient yet not so expensive AI. The most advanced models are o1 and o3 families by OpenAI, Claude Sonnet family by Anthropic, Grok family by xAI, Gemini family by Google and the open-source model R1 by DeepSeek. Table 1 lists the AI results in coding benchmarks and the price per token [3].

Table 1 – Different AI benchmark results and price per million output tokens

Model name	Coding average	Cost per million output tokens
o3-mini-2025-01-31-high	82.74	$4.4
claude-3-7-sonnet-thinking	74.54	$15
o1-2024-12-17-high	69.69	$60
grok-3-thinking	67.38	$10
deepseek-r1	66.74	$7
gemini-2.0-flash-thinking-exp-01-21	53.49	$0.5

Thus, the best model is o3-mini. The problem is that using this model is possible only by having a subscription: $25 subscription for 150 messages per day and $200 subscription for unlimited access. Using Claude Sonnet 3.7 is more effective considering its cost ($20 subscription for at least 200 messages per day). And o3-mini gives a little increase of performance compared to the price. Thus, using o3-mini is less efficient and the most suitable model for our needs is Claude Sonnet 3.7.

The second problem is how to gain the most efficiency using AI. Let us show it on the example. We will create a simple yet realistic design with the help of Galileo AI, which makes website designs based on the user's prompt. By sharing the resulting Figma file with Claude Sonnet 3.7 and using the generated code without changes, we will be left with a slightly modified design, which is shown in the pictures below (Figure 1).

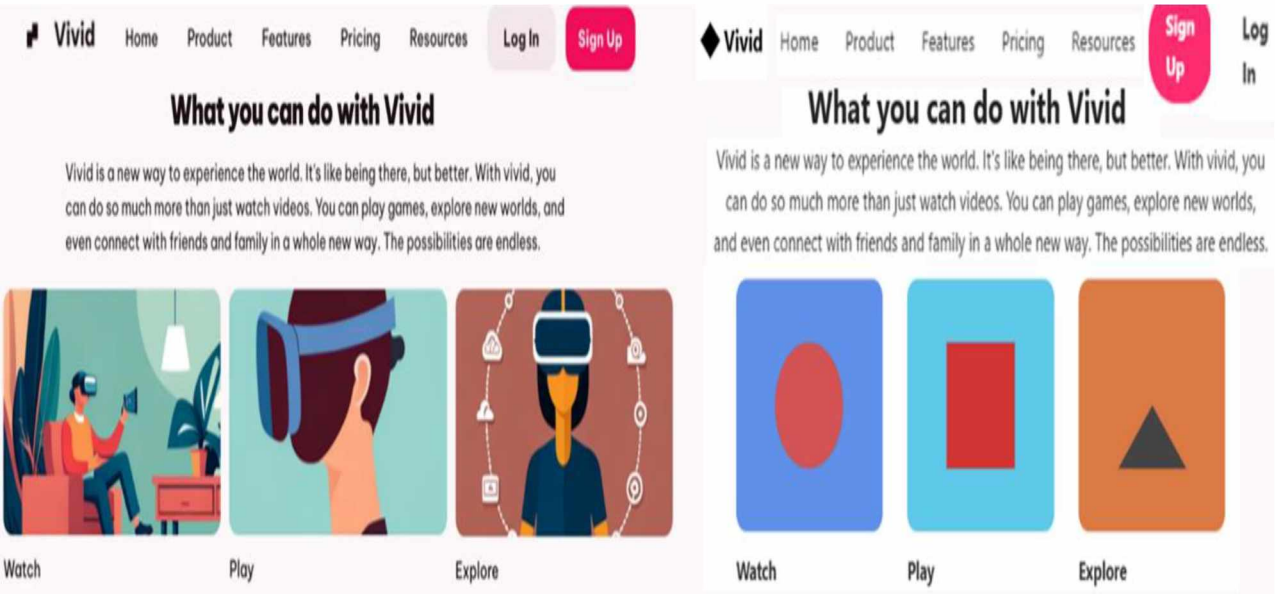

Figure 1 – Figma design (on the left) and AI code result (on the right)

The code is well-written using suitable semantic tags and a rubber layout. Nevertheless, some elements are not displayed appropriately, e.g., the *sign up* and *log in* buttons. It makes some companies cease the future optimisation at this point. But there is a well-known solution for maximizing the efficiency using AI such as prompting. An AI prompt is a detailed statement that allows the model to produce the desired output [4]. The earliest models needed a lot of strict instructions for users to get an intended result. The newest models need much less prompting, but they still do need it. There are some libraries of well written instructions on many topics for old and new models. Let us take one of the most popular prompts for creating a HTML/CSS frame of a website and try to get code from Figma again. The AI response after using prompting is shown in the picture below (Figure 2).

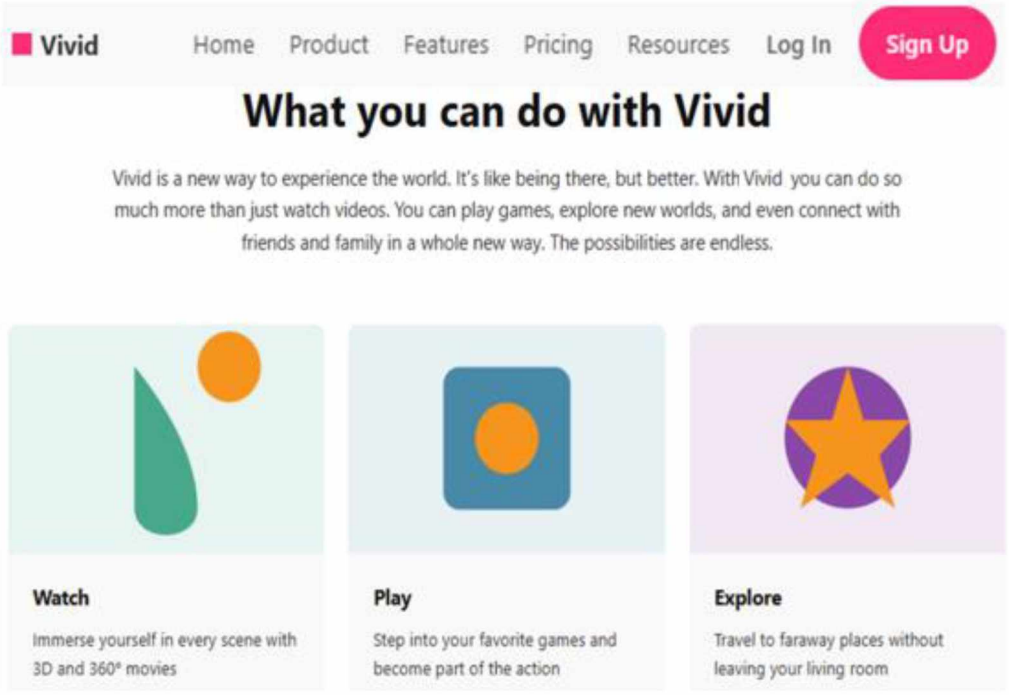

Figure 2 – AI code result with prompting

The results differ drastically, which may not be seen in the picture, but is clearly seen in the code. Claude 3.7 Sonnet added an adaptive layout, a hover for the text and a bit of JavaScript to the code. Eventually all the elements are displayed correctly. Therefore, the use of prompting for tasks that are so complex is required.

To sum up everything that was mentioned earlier, the ability to implement AI in companies that develop websites is no longer beyond the state-of-the-art of AI. There are many models that are efficient for writing the HTML/CSS website frame. It is shown that Claude Sonnet family is the most suitable for these needs. Sometimes the model cannot completely follow our instructions, thus prompting is required for the maximum efficiency. We hope that the use of Galileo AI for making a website design and the use of other AI models for creating HTML/CSS frame of websites will stimulate the creation of low-code or no-code platforms where users would only need an idea for their sites without knowing how to design or how to code. It is believed that it would not lower the amount of frontend specialists because of the Jevons paradox that states: if the technology becomes more accessible and the price is elastic, the resource consumption rises [5]. Some people will make their own websites without turning to professionals like they did before, but many people will still trust the specialists more. Thus, the price of websites may drop, but the amount of websites will rise because of the increased accessibility, so that the overall amount of money will stay almost the same. But the time that was earlier spent on creating the HTML/CSS frame will be spent on adding more features and writing cleaner code.

References:

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5. The Coal Question: An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal-Mines, Chapter VII (2nd ed.) / W.S. Jevons // London: Macmillan and Company, 1866. – 383 p.