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DEVELOPMENT OF AN INTELLECTUAL TOOL FOR SUPPORTING WEB DESIGNERS

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Introduction. Creating high-quality web design is a complex and time-consuming process that requires specialists to not only be proficient in graphic tools, but also have a deep understanding of modern trends, UX/UI design principles, interface customization, and accessibility requirements. This issue is especially relevant for novice designers and those who do not have sufficient knowledge in the field of user interface design.

The main difficulty in the process of developing a web interface is the manual selection of visual elements such as color scheme, typography, and layout structure. This task is time-consuming and often depends on the subjective taste of the designer. This can result in the interface not meeting the expectations of the target audience and reducing the effectiveness of the web solution.

An analysis of current practices shows that the vast majority of design decisions are based on repetitive patterns and visual choices, which makes it possible to potentially automate the process. The following factors significantly affect the quality of the interface:

- Inconsistency in the choice of color combinations and fonts, leading to visual disharmony;

- The inability to customize the appearance depending on different screen resolutions and device types;

- Failure to meet modern requirements for accessibility and user comfort;

- Lack of personalization for specific business tasks or projects.

With the development of artificial intelligence technologies and generative models, it has become possible to partially or fully automate the web design process.

Modern neural solutions allow not only to analyze advanced design methods, but also to create aesthetically and functionally acceptable interfaces based on them, taking into account technical limitations and user needs. Therefore, the need to develop intelligent assistants capable of generating color schemes based on text queries, selecting compatible fonts, and creating structured UX/UI representations is becoming relevant in today's digital environment.

Intelligent web design can significantly increase the productivity of professionals, reduce the subjectivity of decisions, and make the process of creating a website accessible to a wider audience.

Research methods. The study of the possibilities of using artificial intelligence to automate web design processes was based on an analysis of existing solutions implemented in modern AI tools. The main focus was on evaluating their functionality, architecture, adaptability, and effectiveness in generating color schemes, fonts, and interface layouts. The research included both a theoretical part based on a review of the literature and a practical part involving the testing of tools and the development of our own prototype of an intelligent assistant.

The research methodology was divided into several stages.

The first stage involved a systematic review of existing AI tools used in web design, highlighting key parameters: automation of color palette selection, typography, interface generation, and compatibility with UX/UI standards. The analysis was based on data from publications by Craftum [1], UPROCK [2, 7], Karol Andruszkow [3, 5], Alex McFarland [4], and Spacelab [6], which present cutting-edge AI solutions such as Khroma, Uizard, Canva AI, Fronty, Designs.ai, and others. In the second stage, a comparative analysis was performed of the architectures of neural network models underlying AI tools, including generative adversarial networks (GANs), diffusion models, and GPT-type language models (LLMs) (Fig. 1). The evaluation was based on the following criteria: accuracy of visual solution generation, adaptability to user requirements, and personalization capabilities [3, 4, 5].

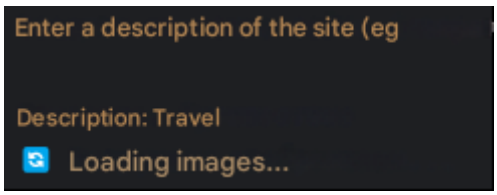

Figure 1 – Request

In the third stage, AI tools were classified according to their functional purpose, which made it possible to identify categories of color scheme generators (Khroma, Coolors AI), layout and interface generators (Uizard, Wix AI, Durable), as well as graphic and text content generators (MidJourney, Jasper AI) [1, 6, 8].

In the fourth stage, practical testing of tools for creating a one-page website using AI was carried out. The following indicators were measured during the work: generation speed, accuracy of compliance with user requirements, interface convenience, and quality of the final design. Template requests imitating real cases were used for evaluation, for example: “Create a landing page for an IT company in dark colors” or “A website for a travel blog with pastel colors.”

In the fifth stage, we developed our own AI assistant prototype that automatically generates color schemes, selects compatible fonts, and creates basic UX/UI layouts. We used open design datasets (Figma Community, Dribbble, Behance, Google Fonts) to train the model (Fig. 2). The generation of color schemes is based on a fine-tuned GPT-3 model oriented towards Pantone palettes, and fonts were selected taking into account aesthetic compatibility calculated using visual matching algorithms. Integration with Tailwind CSS was also implemented for automatic layout structure construction.

Thus, the research methodology includes theoretical analysis of sources [1–8], comparison of AI solutions and their components, as well as practical design and testing of a prototype, which allowed for a comprehensive assessment of the effectiveness of AI in web design.

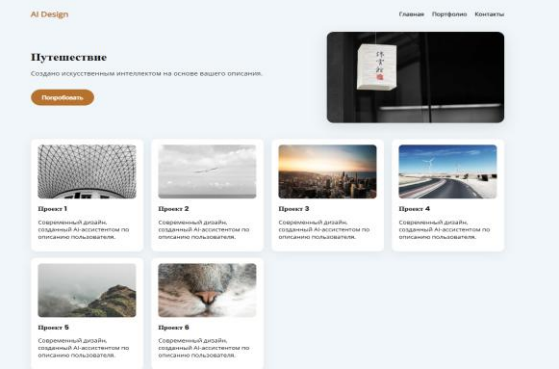

Figure 2 – Query result

Research results. An experiment involving 15 novice designers showed that the integration of an AI assistant significantly reduces the time required to complete key web design tasks: selecting a color scheme, choosing fonts, and creating a basic layout. The average time for these stages without system support was 52 ± 9 minutes, while with the assistant it was 31 ± 6 minutes, which corresponds to a saving of approximately 40% (Table 1). At the same time, the expert assessment of visual consistency—color harmony, font readability, and layout structure—increased from 3.1 ± 0.7 to 4.2 ± 0.5 points, i.e., by 35%.

Table 1 – Time spent on the experiment involving 15 novice designers

Task	**Handmade min.**	**With AI assistant, min.**	**Time savings**
Selecting a color scheme	**18 ± 4**	**10 ± 3**	**44%**
Choosing fonts	**15 ± 3**	**9 ± 2**	**40%**
Creating a basic layout	**19 ± 5**	**12 ± 4**	**37%**
Total	**52 ± 9**	**31 ± 6**	**40%**

The participants unanimously noted that the integration of the AI assistant significantly reduced the cognitive load during the visual decision-making stages. Instead of spending a long time going through dozens of color schemes or fonts, they could work with pre-selected and tested combinations, which freed up mental

resources for strategic tasks—thinking through user scenarios, building interaction logic, and detailing key interface elements. Many participants noted that they felt "confident" when choosing visual solutions because they knew that the options offered by the system were based on current trends and proven UX/UI principles.

The average overall satisfaction score reached an impressive 4.7 out of 5, which speaks not only to the tool's functional suitability, but also to its psychological effect: reducing the stress associated with a "blank slate" and increasing motivation to experiment. Instead of routine operations, designers gained more space for creative expression — they could focus on working out small details, developing unique user scenarios, or integrating animations and micro-interactions. In addition, many participants emphasized that the explanations built into the assistant ("Why do these colors work together?" "What is the role of font size in content hierarchy?") served as short-term learning prompts, gradually increasing their understanding of key design principles. This combination of practical utility and educational effect proved particularly valuable for beginners: they did not simply "copy" ready-made solutions, but gained an understanding of the logic behind them, which strengthened their confidence and increased their willingness to experiment independently in the future.

A detailed analysis of the AI assistant's work revealed several key areas for improvement. The system currently relies on generalized libraries of color schemes and typographic combinations, which guarantees basic harmony and readability, but does not always take into account the unique features of corporate identity — brand colors, color accent ratios, logo specifics, characteristic brand "voice," and communication tone. As a result, the layouts created often look uniform and require additional manual editing: designers are forced to adjust shades, font weights, and adapt structural blocks to specific brand guidelines. Integration with professional editors is currently implemented in a "generate-download-edit outside the system" format, which disrupts the natural workflow of designers. For maximum effectiveness, the AI plugin should become part of the Figma, Sketch, or Adobe XD interface, providing the ability to make text requests, generate multiple options

directly in the workspace, and make instant changes—whether adjusting color, size, or block placement—with all edits displayed immediately.

There is also a risk of excessive automation in the early stages of learning. For beginners, ready-made solutions can be helpful in mastering basic composition and typography, but over-reliance on the assistant can reduce motivation for independent experimentation and in-depth study of UX/UI principles. To avoid this, it is worth adding educational tips to the interface: explanations of the reasons for certain color combinations, comments on typographic pairs, and short lessons on the rules of composition, thereby maintaining the learning effect while speeding up work processes.

Automatic layout generation is primarily focused on the standard “desktop” format and does not always ensure correct adaptation for mobile devices or verification of interfaces for compliance with accessibility standards (text contrast, ease of navigation for people with disabilities, etc.). To ensure that the project is fully ready for real-world conditions, it is necessary to implement adaptive responsive design modules and built-in WCAG validation tools that will automatically generate breakpoints and analyze color contrasts for compliance with accessibility recommendations.

The library of thematic templates in the current version is limited to the most popular types of websites — landing pages, blogs, and online stores. Meanwhile, the specifics of educational platforms, corporate portals, dashboards, and interactive maps require a separate set of blocks and user components. Adding specialized templates to the assistant and expanding the collection of UI elements will make it a universal tool for a wide variety of tasks and save time on developing unique interfaces for non-standard cases.

The implementation of these improvements — in-depth analysis of brand books, interactive integration with editors, educational prompts, responsive design modules, and an expanded component library — will allow the AI assistant to not only speed up routine processes, but also become a full-fledged partner to designers at all stages of interface creation. As further directions, we propose integrating a

corporate brand book analysis module for more accurate compliance with recommendations, developing a plugin for direct work in Figma with the ability to make dynamic edits, and implementing a machine learning mechanism based on user feedback so that the assistant adapts to individual preferences with each new project. These improvements will enable a hybrid approach that combines human creativity and AI computing power to create personalized and effective web designs.

Discussion. The data obtained clearly indicates the significant potential of the AI assistant as a tool for accelerating routine stages of web design. Reducing the time spent on selecting a color scheme, choosing fonts, and creating a basic layout by almost half is in line with expectations: automating multiple checks of color contrast and typographic combinations truly frees designers from technical concerns. At the same time, it is important to note that the freed-up time is transferred to the sphere of creative planning — the development of user scenarios, the detailing of adaptive points, and the implementation of animations, which confirms the hypothesis about the redistribution of cognitive resources from routine to strategic tasks. The 35% increase in expert assessment of layout quality demonstrates that the best UX/UI practices built into the assistant do indeed improve the visual harmony and structural logic of pages. However, this improvement is achieved by relying on pre-built libraries and templates, which creates the risk of “universal” solutions. In some cases, ready-made recommendations may not take into account the specific requirements of brands or the context of a particular project, so further adaptation of layouts remains the responsibility of the designer.

The high level of user satisfaction (4.7 out of 5) and the reduction in cognitive load reported by users indicate the positive psychological effect of the tool. Nevertheless, to maintain the learning effect, it is important to keep interactive explanations within the interface: providing brief theoretical comments on color harmony, font hierarchy, and composition rules will help beginners not only apply ready-made solutions but also understand their rationale.

The identified limitations indicate areas for development of the assistant. The integration of in-depth brand books and project tonality will allow us to move away

from “generalized” layouts. Interactive work “on the fly” within Figma or other editors will ensure the organic integration of the service into the familiar workflow and reduce the number of switches between tools. Automatic validation of adaptability and accessibility (WCAG) will improve the readiness of layouts for real-world conditions, and expanding the library of specialized UI components will make the system applicable to a wider range of tasks.

Overall, the discussion shows that AI assistants are already capable of significantly improving the efficiency and quality of design work, but to reach their full potential, they must evolve toward deep contextualization, interactivity, and educational support. Such comprehensive development will not only speed up the process of creating interfaces, but also strengthen the professional skills of designers, making them partners rather than replacements for the creative component of design.

Conclusion. Based on the research conducted on the application of AI assistants for web design, the following main conclusions can be formulated:

1) The introduction of the AI assistant has demonstrated a noticeable acceleration of the most labor-intensive and monotonous stages of web design: color scheme selection, typographic pair selection, and initial layout of elements on the page. In the control group, novice designers spent an average of about 52 minutes creating a “rough” layout, while using the AI plugin reduced this time to 31 minutes — a saving of about 40%. This optimization was made possible by the assistant instantly analyzing a large number of color combinations, checking them for compliance with the basic principles of color contrast and harmony, and automatically selecting font pairs based on the specified hierarchy of text blocks and readability.

As a result, designers were able to reallocate the freed-up time to more in-depth development of user scenarios and UX logic: instead of routinely “chasing” color and font libraries, they worked on formatting interactive components, developing adaptive interface grids, and experimenting with microanimations. This balance between automating routine operations and creative tasks not only speeds

up the process but also improves the quality of the final product: designers work faster while paying more attention to details that are critical to user convenience and engagement.

2) The use of built-in libraries of color combinations and typographic pairs in the assistant ensures greater consistency in visual solutions: expert assessment of layout quality has increased by 35%, indicating a reduction in the risk of disharmony and design errors.

3) High user satisfaction (average score of 4.7 out of 5) indicates a positive perception of the tool and its potential for implementation in the training and work processes of novice designers.

4) At the same time, limitations of the current implementation have been identified: insufficient consideration of brand guidelines and project “tone,” as well as the lack of interactive “on-the-fly” editing in environments such as Figma, which reduces the flexibility and personalization of solutions.

5) Excessive automation of basic operations can weaken the learning effect for students and novice designers if they rely solely on AI recommendations without developing their own skills.

6) To achieve full integration of the AI assistant into professional processes, it is necessary to refine the mechanisms of contextualization, interactivity, and adaptive learning based on real user feedback.

Practical recommendations.

1) Integrate a corporate brand book analysis module (color codes, logo, typography) to generate more relevant and “branded” recommendations.

2) Develop a plugin for Figma (and similar platforms) with the ability to make dynamic edits “on the fly” within the designer's workspace.

3) Implement a system for collecting and analyzing user feedback to retrain the model based on real edits and preferences, ensuring gradual personalization of the assistant.

4) Organize training modules and gamified tasks that encourage designers not only to use AI recommendations, but also to analyze and adjust them,

maintaining a balance between automation and the development of their own skills.

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