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UXSense AI – Intelligent Website Analysis and AI-Driven User Experience Optimization Platform

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***Abstract*— In the digital age, modern websites are crucial for portraying companies, institutions, and services. However, a lot of websites have problems with performance, search engine optimization (SEO), usability, accessibility, and inconsistent design, all of which can have a detrimental impact on the user experience. It takes a lot of time and technological know-how to evaluate websites manually. UXSense AI is suggested as an intelligent platform for automated website analysis and UI/UX optimization in order to address these issues. Users can submit a website's uniform resource identifier (URL) to the system, which then evaluates the website's HTML structure, layout, accessibility, performance, search engine optimization (seo), and content quality. To gather pertinent website data, web crawling and data extraction techniques are employed. To assess the gathered data and spot possible usability and design problems, artificial intelligence (AI), computer vision, and natural language processing (NLP) tools are applied. The system produces an overall website score and practical suggestions for enhancing search engine optimization (SEO), usability, accessibility, performance, and visual design based on the analysis. To assist customers in comprehending the problems found and recommended fixes, a comprehensive report is offered. In order to help developers, designers, and organizations create more efficient, accessible, and user-centered digital experiences, UXSense AI serves as an AI-powered website consultant.**

Keywords— ***Artificial Intelligence, Machine Learning, User Experience, UI/UX Optimization, Website Analysis, Website Accessibility, Search Engine Optimization, Computer Vision, Natural Language Processing, Automated Website Auditing.***

I. INTRODUCTION

Websites are becoming a vital tool for digital services, communication, and information exchange among companies, organizations, educational institutions, and service providers. User engagement, usability, accessibility, and general user pleasure are all strongly impacted by a website's quality. In addition to offering pertinent content, a well-designed website should have responsive layouts, easy navigation, an efficient visual hierarchy, decent performance, and accessibility for various user types. However, a lot of websites still have problems with slow loading times, ineffective layouts, bad user interface design, insufficient accessibility, and poor search engine optimization (SEO). [1] Developers, designers, or usability specialists typically manually check websites as part of traditional website review. Such an assessment may take a long time and call for a high level of technical and design expertise. Additionally, distinct tools are frequently used to assess various aspects of a website, including structure, visual presentation, accessibility, performance, and search engine optimization (SEO). This calls for the application of an integrated approach that can automatically and methodically examine several facets of a website. A number of tasks pertaining to website analysis and interface design can now be automated thanks to recent advancements in artificial intelligence (AI), machine learning (ML), computer vision, and natural language processing (NLP). AI-based methods can be used to analyze textual content, assess performance-related elements, find possible usability and accessibility issues, look at the structure of websites, and offer suggestions for improvement.[2] Simultaneously, prompt-based design approaches have been established by generative AI. In these approaches, users can utilize natural language to define their requirements and receive relevant interface designs or layouts. Even while AI-based design tools, performance testing, and website analytics are available, these features are frequently dispersed across many platforms. As a result, users might have to transfer between several tools for creating interfaces and evaluating websites. This drives the creation of an integrated platform that blends AI-assisted UI/UX design generation with automated website analysis. UXSense AI, an intelligent web-based platform that blends prompt-based UI/UX design generation with website analysis, is suggested as a solution to this need. The website analysis module gathers and analyzes pertinent data from a particular website and assesses elements including performance, search engine optimization (SEO), usability, accessibility, and website structure. The system produces a structured report based on the analysis that might assist users in comprehending possible

problems and opportunities for development.[3][10] Through natural-language prompts, the UI/UX design creation module enables users to specify requirements such website type, theme, style, and design preferences, and it creates a corresponding visual user interface (UI) concept. The goal of the suggested method is to make interface design and preliminary website evaluation less labor-intensive while increasing accessibility for novices, developers, and designers. The present approach employs a web-based platform to generate layout-level user interfaces and automate website analysis. Although they are outside the current scope, advanced real-time user behavior tracking, support for mobile applications, and production-scale autonomous design generation are possible topics for future development.[1]

II. Literature Survey

Several existing platforms have been developed to analyse website performance, understand user behaviour, and assist in UI/UX design. However, these systems generally focus on specific aspects of website analysis or design rather than providing an integrated solution.

One popular web analytics tool for tracking user activity and website traffic is Google Analytics.[4] User sessions, audience characteristics, engagement, bounce rate, and performance reports are among the data it offers. It primarily concentrates on quantitative internet analytics and necessitates users to manually evaluate the gathered data, although offering comprehensive analytical data and being simple to integrate. It doesn't immediately offer design suggestions or UI/UX enhancements.

Hotjar [5] uses heatmaps, session recordings, polls, and feedback tools to better understand user behavior. It is helpful for discovering usability issues since it offers visual information regarding user clicks, scrolling patterns, and interactions. However, its capabilities are mostly restricted to behavior visualization and feedback analysis; it cannot create new user interface designs and offers few automated or AI-based recommendations.

Click heatmaps, scroll tracking, and A/B testing are all features of Crazy Egg [6], another behavior analytics software. It aids in the optimization of website layouts by helping designers comprehend how people interact with various webpage elements. However, it does not offer thorough website review or automatic user experience (UX) optimization; instead, it focuses mostly on user interaction and click analysis.

Figma AI [7] facilitates collaborative workflows and component-based design while offering AI-assisted UI/UX design features. It uses AI-based recommendations to assist designers in producing contemporary interfaces more quickly. However, it doesn't examine current websites for usability, performance, accessibility, or search engine optimization (SEO) problems; instead, it mostly concentrates on designing and altering designs.

Canva AI [8] offers templates, a drag-and-drop interface for producing visual material, and AI-powered design support. Because of its simplicity, it is appropriate for novices and allows for quick design creation without the need for coding. Nevertheless, it lacks thorough website analysis, sophisticated user experience (UX) review, and automatic recommendations for already-existing websites and is mostly focused on template-based visual design.

It is evident from the examination of current systems that these platforms typically deal with specific elements like website analytics, user behavior tracking, or visual user interface (UI) design creation. Hotjar and Crazy Egg mostly show user interactions, whereas Google Analytics provide traffic and behavioral data. However, the primary focus of Canva AI and Figma AI is design creation. These technologies don't offer a single platform that can analyze an existing website's usability, accessibility, performance, search engine optimization (SEO), and visual design in addition to producing reports and recommendations based on artificial intelligence. An integrated intelligent platform that integrates AI-driven user experience (UX) advice with automated website analysis is therefore required. By offering automated website evaluation, rating, actionable recommendations, and AI-assisted UI/UX design development on a single platform, UXSense AI seeks to close this research gap. [9][11]

III. Proposed Methodology

Website analysis and AI-driven UI/UX design generation are combined in UXSense AI, an integrated web-based platform. A website uniform resource identifier (URL) for analysis and a natural-language design prompt for creating a new user interface design are the two main forms of user input that the system takes. Through specialized modules, the system processes these inputs and outputs analysis findings, suggestions, reports, or created user interface designs. The user gives the system the uniform resource identifier (URL) of a website for website analysis. The Website Crawler uses web-scraping techniques to collect pertinent information from websites. Structural and visual data are included in the information gathered and sent to the Website Analyzer for assessment. The analyzer finds possible user experience (UX) problems by looking at factors like usability, accessibility, search engine optimization (SEO), performance, and website structure. The analysis engine processes the retrieved website data to find usability issues and compute pertinent user experience (UX) and search engine optimization (SEO) scores. The Recommendation Engine produces recommendations for enhancing website performance, usability, accessibility, and design based on the issues found and the study findings. With the second process, users can use a natural-language prompt to create a new UI/UX design. Keywords, themes, and design specifications are extracted from the prompt by the Prompt Processor. The user interface (UI) Generator then generates the desired interface design when the Template Engine chooses an appropriate template or layout. The produced design can be exported as frontend code and is displayed as a visual preview. The Report Generator receives the processed results following website analysis. A report including user experience (UX) scores, issues found, suggestions, and other analytical findings is produced by the system. The database can hold the generated reports and pertinent system data, which can then be displayed to the user via the platform. The Prompt Processor, Template Engine, Website Crawler, Website Analyzer, Recommendation Engine, user interface (UI) Generator, and Report Generator are some of the main modules that make up UXSense AI. This

modular architecture offers a full workflow from user input to the final design or analysis output and enables communication between the various components via the backend.

IV. System Architecture

UI/UX Design Generation and Website Analysis are the two main components of the web-based platform that makes up the proposed UXSense AI system. The user can provide the system with a website uniform resource identifier (URL) or a natural-language design prompt. The relevant module processes the input based on the chosen functionality in order to create a user interface design or examine an already-existing website. In order to determine pertinent design criteria, themes, and keywords, the UI/UX Design Generation Module uses a Prompt Processor to interpret the user's natural-language prompt. After that, an appropriate interface structure is chosen using a Template/Layout Selection component. The visual user interface (UI) Generator creates the desired interface, which may be exported and shown to the user as a preview. The Website Crawler/Data Extraction component receives a website uniform resource identifier (URL) from the Website Analysis Module. HTML structure, CSS, photos, scripts, and other pertinent website data are all gathered by the crawler. In order to assess elements like usability, accessibility, search engine optimization (SEO), performance, and website structure, the Website Analyzer processes the retrieved data. The Report Generator compiles the analytical results into a report, while the Recommendation Engine makes recommendations depending on the concerns found.

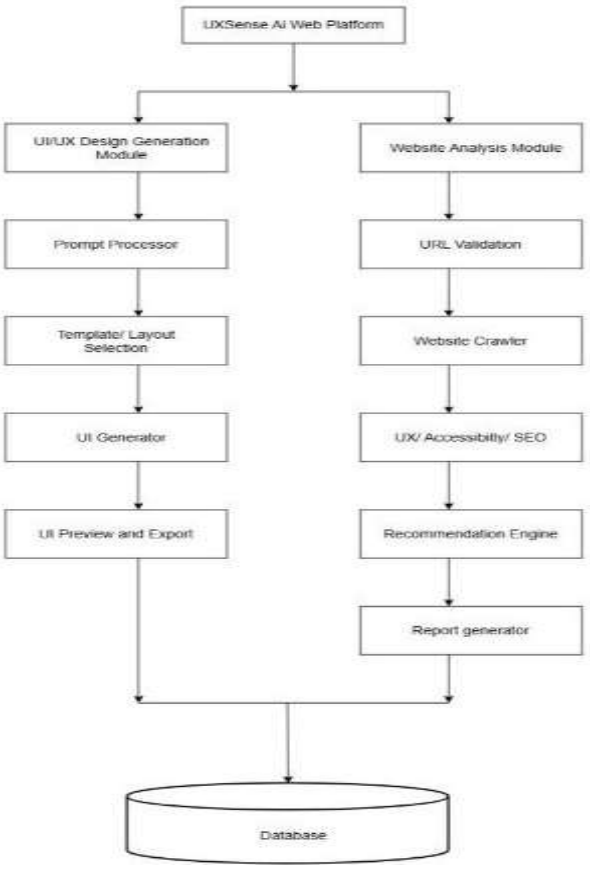


Figure 1. UXSense AI System Architecture

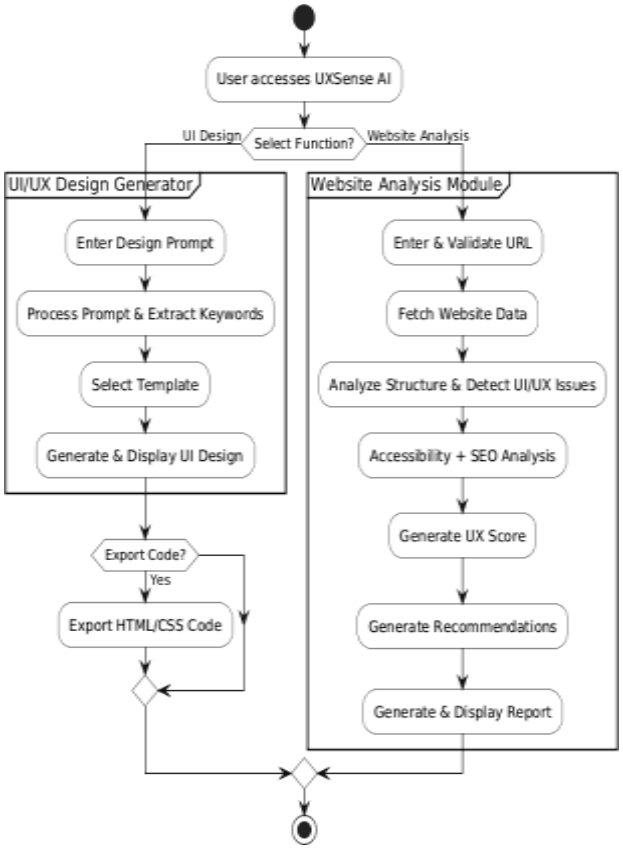


Figure 2. UXSense AI Activity Diagram

V. Implementation

Modern web development tools are used to construct the UXSense AI platform as an online application. The frontend is developed using JavaScript and React.js, while the user interface's structure and style are provided via HTML and CSS. Animations, icons, navigation, and interactive elements are supported by additional frontend libraries. Data storage and application processing are supported by database services, backend services, and APIs. Source-code management and version control are handled via GitHub and Git.

Table 1. Technologies used in uxsense ai

Technology	Purpose
React.js	Developing component-based user interfaces.
JavaScript	Implementing frontend logic and interactive functionality.
HTML	Structuring web interface elements.
CSS	Styling layouts and supporting responsive design.
Frontend Libraries	Supporting animations, icons, navigation, and interactive features.
Backend Services and APIs	Handling application requests and communication with processing components.

Database Services	Storing user data, prompts, design preferences, generated designs, analysis results, and reports.
Git and GitHub	Managing source code, version control, and collaboration.

Module	Input	Main Functionality	Output
Website Analysis	Existing website URL	Evaluates website structure, performance, accessibility, best practices, SEO, and security using implemented assessment functions. Identifies issues and provides suggestions.	Analysis scores, identified issues, suggestions, and report
UI/UX Design Generation	Natural-language prompt, selected theme, and layout	Generates a new interface with an interactive preview, desktop/tablet/mobile display options, Light/Dark modes, and save functionality.	Generated UI/UX design and saved designs
Frontend Interface	User input and navigation actions	Provides separate interfaces for website analysis and design generation, displaying results and previews through React components.	Interactive interface and navigation between modules

The UXSense AI platform preserves the capabilities of each of the two primary modules while integrating them into a single application environment. While the UI/UX Design Generation Module builds a new interface based on the user's prompt and chosen design preferences, the Website Analysis Module works with an existing website that is supplied via a uniform resource identifier (URL). The system keeps track of pertinent application data needed for future access and user engagement. User data, website uniform resource identifier (URL), analytical findings, created reports, design prompts, chosen themes, layouts, generated designs, and stored design data are examples of data. Without having to go through the entire procedure again, users can access previously created designs and pertinent analysis results thanks to the stored data. Information can flow through the system in accordance with the chosen functionality thanks to the integration of the frontend, processing services, and database.



Figure 3. Home Page



Figure 4. Dashboard



Figure 5. Website Analysis Module



Figure 6. UI/UX Design Generation Module

VI. RESULT AND DISCUSSION

The outputs produced by the two main modules of the implemented UXSense AI platform—the Website Analysis Module and the UI/UX Design Generation Module—were used to evaluate the platform. The outcomes show that the created system can facilitate both the creation of new UI/UX designs based on user-defined requirements and the assessment of current websites. The conversation is on the system's functional outputs and how its implemented components interact.

A. Website Analysis Results

A website uniform resource identifier (URL) is successfully entered into the Website Analysis Module, which then processes the chosen website for analysis. The system uses a structured interface to display the analysis results after processing. The findings emphasize the problems found and offer details on the assessed website attributes. In order to enable visitors to comprehend the state of the examined website without having to manually examine its entire structure, the analysis output is given in an approachable manner. Website scores, issues found, suggestions, and other

pertinent analysis data backed by the system in place can all be included in the provided results. The output of the Website Analysis Module is shown in Figure. 7, 8, 9.

B. UI/UX Design Generation Results

A variety of natural-language prompts and chosen design preferences were used to assess the UI/UX Design Generation Module. Through the prompt, the user can choose options like theme and style and designate the sort of website or interface. The system creates a relevant UI/UX design and presents it via an interactive preview after analyzing the input. The prompt's requirements and the chosen design settings are reflected in the created design.The output of the UI/UX Design Generation Module is shown in Fig. 10, 11, 12, 13.

The findings show that UXSense AI offers two complimentary features on a single platform. While the UI/UX Design Generation Module concentrates on developing a new interface based on user needs, the Website Analysis Module evaluates an existing website. Because of this division, users may carry out various UX-related tasks without the need for separate apps. By arranging the available analytical data into a structured result, the Website analytical Module lessens the requirement for entirely manual inspection. Instead of building the entire interface from scratch, the UI/UX Design Generation Module streamlines the initial interface design process by letting users choose their design preferences and define their needs in simple language. In order to maintain continuity across design generating sessions, the generated UI/UX designs can also be saved and examined at a later time. The suggested UXSense AI platform's practical usefulness is demonstrated via the combination of website evaluation and design generation. Overall, the developed system effectively illustrates the fundamental workflow of UXSense AI: a user-provided prompt and design preferences may be used to produce a new UI/UX design, while the uniform resource identifier (URL) of an existing website can be examined. Future work can provide more thorough validation of the system by additional examination using larger collections of websites, other design prompts, quantitative performance measurements, and user studies.



Figure 7. Website Analysis Module Result

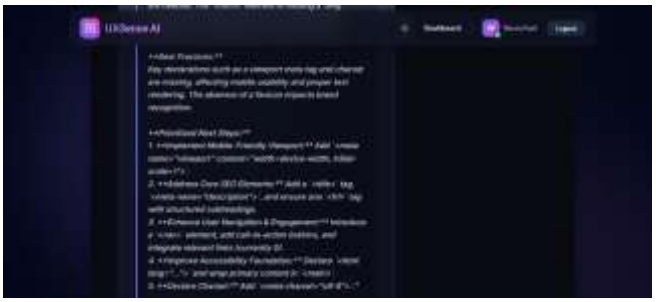


Figure 8. Website Analysis Module Result

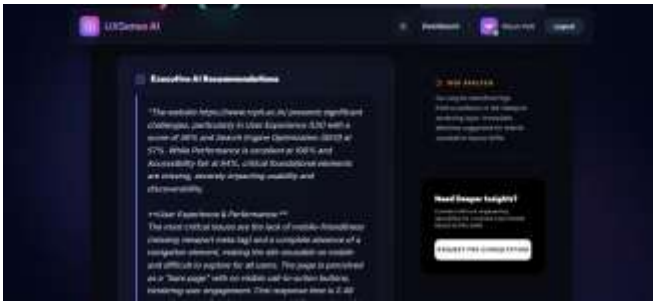


Figure 9. Website Analysis Module Result



Figure 10. UI/UX Design Generation Module Result



Figure 11. UI/UX Design Generation Module Result



Figure 12. UI/UX Design Generation Module Result

VII. FUTURE SCOPE

The UXSense AI platform may be enhanced by adding more features to its two primary modules, the Website Analysis Module and the UI/UX Design Generation Module. Future work in the Website Analysis Module may use sophisticated AI and machine learning techniques to more precisely identify usability flaws, design inconsistencies, accessibility problems, search engine optimization (SEO) concerns, and performance-related variables. Other options to expand the module include quantitative evaluation using larger and more diverse website datasets, continuous website monitoring, and comprehensive WCAG-based accessibility testing. More advanced AI-based design generation, personalized design recommendations, support for language prompts, and the development of complex interfaces with reusable components, typography, color schemes, and responsive layouts are all possible future improvements to the UI/UX Design Generation Module. The module can also be integrated with frontend frameworks and design and development tools such as Figma to export generated designs as editable designs or reusable code components. A major future development would be the integration of both modules, whereby the Website Analysis Module identifies usability and design problems in an existing website and the UI/UX Design Generation Module uses those findings to produce an improved interface. Additionally, both modules can be supported by cloud-based deployment to improve scalability and accessibility. These enhancements can make UXSense AI more comprehensive by combining automated website evaluation and intelligent UI/UX design generation into a single platform.

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