NEWTON: Networking and Information Technology
Vol. 5 No. 3. February , Page. 121 - 128
E-ISSN: 2797-0728

Implementation of Smart Chatbot on Skincare E-Commerce Website Using Groq API

Lusi Yuni Astuti[1*], Tholib Hariono[2]
[1, 2] Information System Study Program, Universitas KH. A. Wahab Hasbullah
*Email: reallusi03199@gmail.com

ABSTRACT

Slow and limited availability of customer service during specific hours continues to be a significant challenge in the e-commerce sector, especially when it comes to providing prompt, detailed, and accurate product information. This study effectively created and implemented an intelligent chatbot utilizing the Groq API, which is capable of delivering automated, real-time customer assistance around the clock. The Groq API was chosen for its capacity to handle natural language data with exceptionally low latency, facilitating quick interactions between users and the system. The chatbot system was integrated into a skincare e-commerce platform and developed using the Waterfall methodology, which outlines the stages of requirements analysis, system design, implementation, testing, and maintenance. The system underwent functional testing and showed rapid and precise response performance. The testing outcomes reveal that the chatbot can provide replies with an average response time of roughly ±1.4 seconds and a response accuracy rate of 100%. Moreover, the chatbot is adept at maintaining appropriate domain boundaries while addressing out-of-context or non-skincare-related inquiries. Based on these findings, it can be concluded that the designed chatbot operates effectively, improving customer service efficiency, speeding up the product consultation process, and potentially enhancing customer satisfaction and loyalty on skincare e-commerce sites.

***Keywords**: Chatbot, Groq API, E-commerce, Skincare, Customer Service, Artificial Intelligence.*

INTRODUCTION

The swift growth of digital commerce has considerably changed the skincare industry. Consumers are increasingly looking for prompt, precise, and tailored information about skincare products, which includes details on ingredients, benefits, usage instructions, and suitability for particular skin types. Nevertheless, numerous skincare e-commerce platforms continue to depend on manual customer service systems that are limited by finite human resources and restricted operating hours. These constraints frequently lead to delayed replies, decreased customer satisfaction, and the potential loss of sales.

AI-powered chatbots have surfaced as a practical solution for automating customer service and enhancing the efficiency of interactions. Multiple studies have indicated that chatbots can improve service quality and operational efficiency in e-commerce settings (Nugroho & Voutama, 2024). In the skincare industry, chatbots are especially beneficial due to the personalized nature of skincare consultations and the necessity for accurate product suggestions (Putri et al., 2023). Chatbots utilizing natural language processing are extensively employed in the skincare sector to help users access product information and recommendations customized to their specific skin requirements through digital platforms (Agustin et al., 2024).

Despite these benefits, many current chatbot implementations encounter difficulties linked to response time and contextual comprehension. To address these challenges, this research utilizes the Groq API, which is optimized for high-performance AI inference through the Tensor Streaming Processor (TSP) architecture. This architecture allows for low-latency and predictable processing ideal for conversational systems (Abts et al., 2022).

The goal of this study is to design and execute an intelligent chatbot that will be integrated into a skincare e-commerce website for Glad2Glow (G2G) products, aiming to enhance the effectiveness of

customer service and improve the user experience.

METHOD

This research utilizes a system development approach that follows the Waterfall methodology. The selection of the Waterfall model is based on its organized and linear process, which is ideal for web-based information systems that have well-defined requirements (Lubis, 2023). The stages of development encompass requirement analysis, system design, implementation, testing, deployment, and maintenance.

The research workflow, structured according to the Waterfall methodology, is depicted in Figure 1.

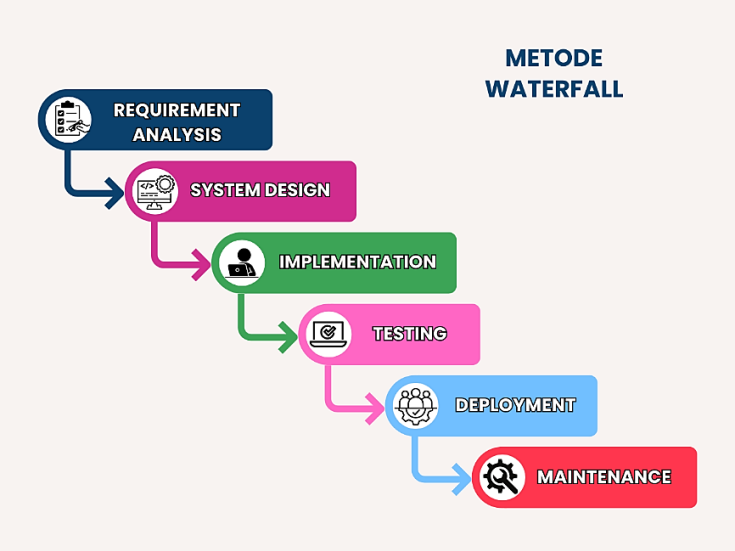

Figure 1. Research Flowchart

The system design phase emphasizes outlining the boundaries of the system and its interactions with external entities. This design is illustrated through a context diagram, offering a broad view of data flow within the system.

The context diagram for the skincare e-commerce system that incorporates a smart chatbot is depicted in Figure 2.

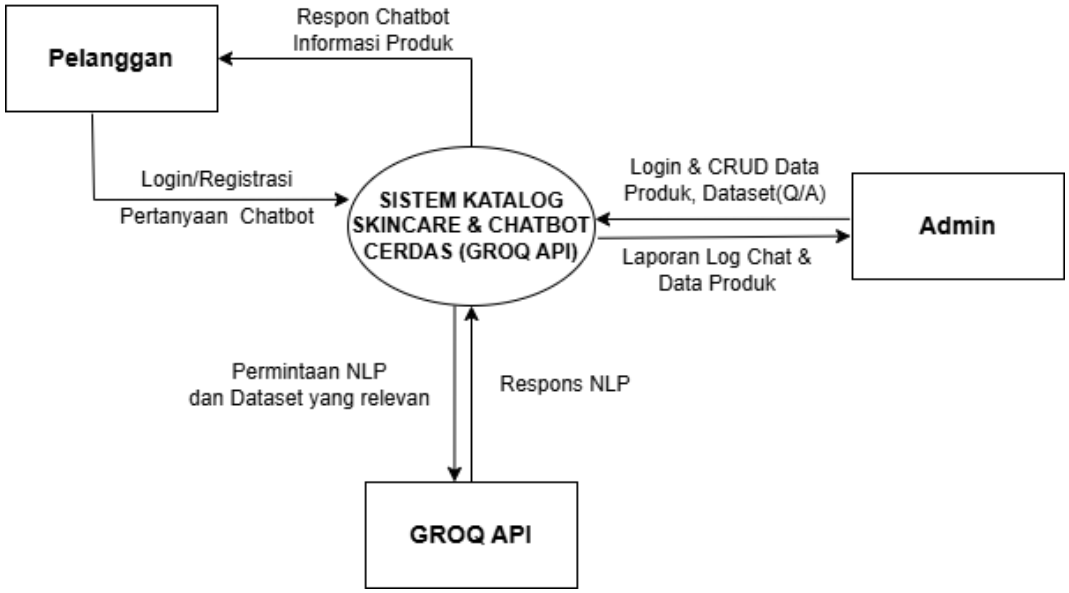

Figure 2. Context Diagram of the Skincare E-Commerce and Smart Chatbot System

The diagram demonstrates that users engage with the system to retrieve product details and submit questions via the chatbot functionality. It is the administrators' duty to oversee product

information and the datasets utilized by the chatbot, while the Groq API functions as an external service that interprets natural language inputs and produces responses for the chatbot. Leveraging high-performance artificial intelligence services like the Groq API allows the chatbot to deliver replies with minimal delay and facilitates real-time interactions for users in online applications (Nithya et al., 2025).

Functional testing was performed utilizing the black-box testing approach to confirm that each module of the system functions as intended.

RESULT AND DISCUSSION

Result

The project led to the creation of a complete skincare e-commerce site that features an intelligent chatbot. This chatbot is incorporated into the user interface, enabling customers to engage while exploring the products on offer.

The primary interface of the e-commerce platform, which includes the chatbot, is shown in Figure 3.

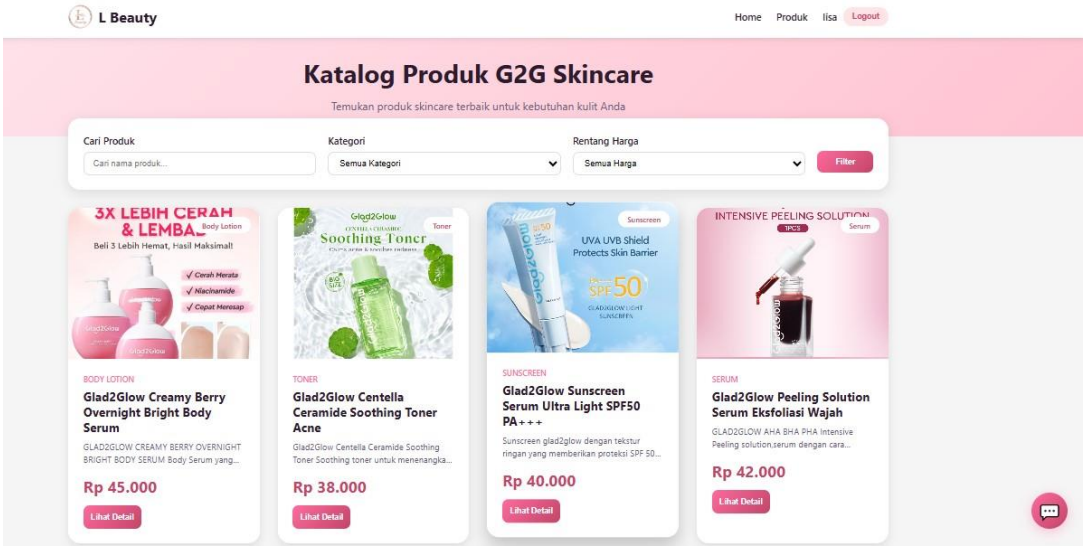

Figure 3. E-commerce Main Page and Chatbot Widget

When users ask questions related to skincare, the chatbot utilizes the Groq API to process their inputs and produce appropriate responses. It offers suggestions for products, guidance on how to use them, and general information about skincare tailored to the needs of users.

An illustration of an interaction with the chatbot and its response is displayed in Figure 4.

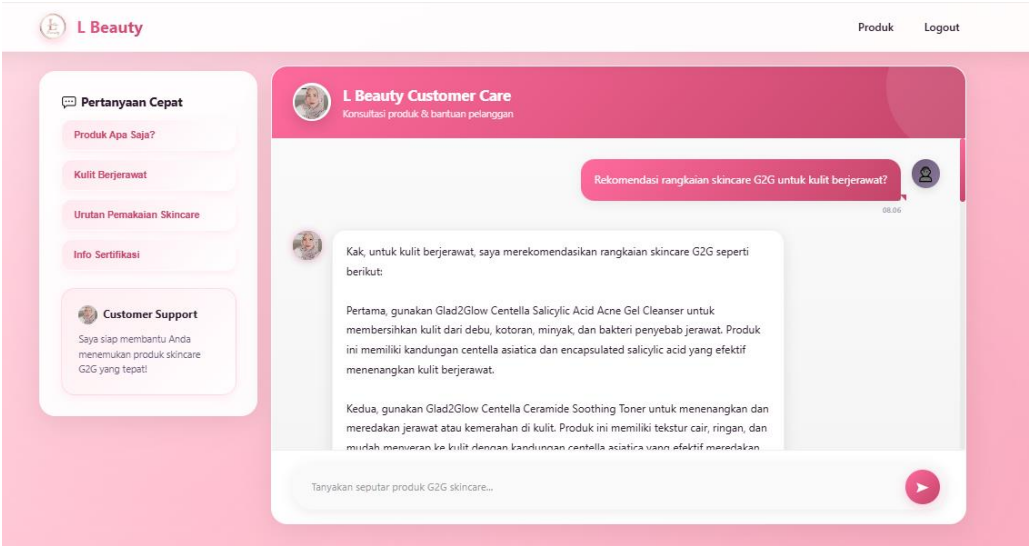

Figure 4. Chatbot Interaction and AI Response

The platform features an admin dashboard that enables administrators to handle product information, refresh FAQ datasets, and review chat logs.

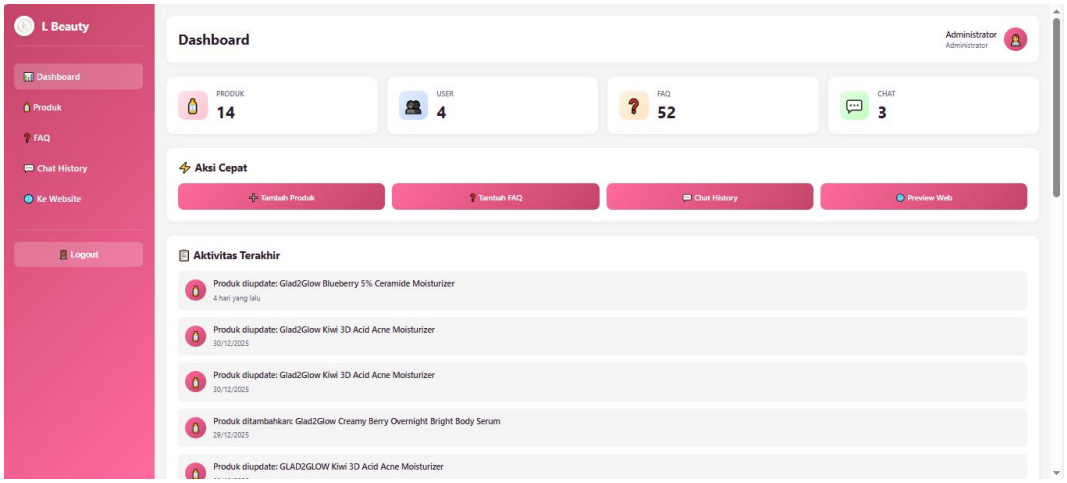

Figure 5. Administrator Dashboard Interface

Testing

System testing was carried out to assess the capabilities, response time, and precision of the chatbot incorporated into the skincare e-commerce site. The purpose of the testing phase is to verify that the chatbot functions in line with system specifications and delivers prompt and accurate answers to user inquiries.

Functional Testing

Functional testing was conducted using the black-box testing approach, concentrating on system performance based on inputs and outputs without examining the internal code architecture. The modules that were tested comprise authentication, chatbot interactions, data management, and integration with the Groq API.

Table 1. Functional System Testing Results

No	Module Name	Test Case	Test Data / Scenario	Expected Result	Status
1	Login	Admin and user login using a valid username and password	• **Admin** Username: admin Password: adminlusi123 • **User** Username: lisa Password: lisa12345	User successfully accesses the dashboard or admin panel	Pass
2	Chatbot	User submits a general inquiry related to G2G products	"G2G products for acne-prone skin?"	Chatbot provides relevant answers and displays a product catalog with appropriate G2G product recommendations for acne-prone skin	Pass
3	Chat History	System records each user interaction	After three user queries, the admin reviews the chat log	Chat conversation history is stored in the database and accessible to the administrator	Pass
4	Product Data	Admin adds a new product	Adding a new product, including product image, product ID, product name, category, price, description, benefits, ingredients, usage	Product data is successfully saved, displayed in the product catalog, and accessible by the chatbot.	Pass

			instructions, size, and suitable skin type		
5	Chatbot and Groq API	Chatbot forwards user queries to the Groq API and displays responses	Input: "What are the benefits of Glad2Glow Blueberry Ceramide Moisturizer?"	The response is displayed within approximately ±1.4 seconds based on Groq API processing	Pass
6	Logout	User and admin log out of the system	Click the "Logout" button	The system terminates the session and redirects to the login page	Pass

According to the findings from the functional system testing, all key components of the G2G skincare website performed in line with the designed specifications. There were no functional issues identified in the authentication process, management of product data, interactions with the chatbot, integration of the Groq API, or logging of chat history. Consequently, the system has effectively fulfilled the necessary functional requirements.

Response Time Testing

Response time evaluation was carried out to assess the speed at which the chatbot replies following the receipt of user input. The assessment involved presenting various skincare-related inquiries under typical network circumstances. The response time was measured from the instant a user posed a question until the chatbot provided the answer.

Table 2. Chatbot Response Time Testing Results

No	User Question	Response Time (seconds)
1	What is the price of Glad2Glow Blueberry Ceramide Moisturizer?	1.5
2	What are the benefits of Glad2Glow Blueberry Ceramide Moisturizer?	1.5
3	Which G2G products are suitable for acne-prone skin?	1.5
4	What are the main ingredients of G2G sunscreen?	1.5
5	How to use G2G exfoliating peeling serum for the face?	1.5
6	Are G2G products officially registered with BPOM?	1.5
7	Which G2G products are suitable for sensitive skin?	1.5
8	What is the correct order of skincare usage?	1.5
9	How old are you?	1.0
10	Who is the current President of Indonesia?	1.0

The testing findings show that the chatbot utilizing the Groq API attained an average response time of 1.4 seconds. This response time is regarded as quick and facilitates real-time interaction with users. These findings illustrate that incorporating the Groq API greatly enhances the chatbot's efficiency in providing responses.

Response Accuracy Testing

Response accuracy testing was performed to assess how relevant and correct the chatbot's answers were in comparison to reference answers derived from product information and the FAQ dataset. A collection of predetermined questions related to skincare was posed to the chatbot, and every response was rated as either correct or incorrect.

Table 3. Chatbot Response Accuracy Testing Results

No	Question	Answer	Description
1	What is the price of Glad2Glow	The cost of Glad2Glow Blueberry Ceramide Moisturizer is Rp 45,000, sister!	Matches the product database

	Blueberry Ceramide Moisturizer?		
2	What are the benefits of Glad2Glow Blueberry Ceramide Moisturizer?	Sis, the Glad2Glow Blueberry Ceramide Moisturizer offers amazing advantages! This product aims to protect your skin's barrier, assist with sensitive skin care, calm the skin, and preserve hydration and moisture. Consequently, your skin will appear healthier, smoother, and more radiant!	Matches the product database
3	Which G2G products are suitable for acne-prone skin?	Sis, if you struggle with acne-prone skin, I suggest trying the Glad2Glow Centella Salicylic Acid Acne Gel Cleanser. This facial wash is specifically designed for those with acne-prone skin and effectively removes dust, dirt, oil, and bacteria that can lead to acne. Additionally, its ingredients, centella asiatica and encapsulated salicylic acid, help to calm acne-prone skin while supporting the skin's barrier. This cleanser is suitable for all skin types, including acne-prone, combination, and oily skin.	Accurate product recommendation
4	What are the main ingredients of G2G sunscreen?	Sis, based on the product information in the database, the key components of Glad2Glow Sunscreen Serum Ultra Light SPF50 PA+++ are Ceramide and Muti-plan. Ceramide acts as an emulsifier and a skin protector, while Muti-plan serves as an antioxidant and helps with anti-aging.	Matches the product database
5	How to use G2G exfoliating peeling serum for the face?	Sis, to use Glad2Glow Peeling Solution Face Exfoliating Serum, start by cleansing your face thoroughly with a facial cleanser. Ensure that your skin is fully dry before proceeding. Dispense an adequate amount of the product and apply it evenly across your entire face. Allow it to sit for 1 to 5 minutes, then rinse off with water. Finally, follow up with a moisturizer to calm and hydrate your skin.	Matches the product database
6	Are G2G products officially registered with BPOM?	Sis, the G2G product has been officially registered with BPOM and has obtained a Halal certification from MUI!	Matches the FAQ database
7	Which G2G products are suitable for sensitive skin?	Sis, if you have delicate skin, I suggest trying G2G Toner! This toner assists in balancing your skin's pH levels, alleviating inflammation, and hydrating sensitive skin. Moreover, G2G Toner has been specifically created for sensitive skin, ensuring it can be used safely without leading to irritation or negative reactions.	Matches the product database
8	What is the correct order of skincare usage?	Sis, the proper sequence for applying skincare is this: In the morning, begin by cleansing your face with a Face Wash, then follow up with a Toner to help restore your skin’s pH balance. Next, apply a Serum for added nourishment and deeper treatment, and finish with a Moisturizer to ensure your skin stays hydrated. Ultimately, make sure to apply sunscreen to shield your skin from UV radiation. During the evening, the routine is quite similar, but you can swap out sunscreen for moisturizer or night cream to offer deeper nourishment while you rest.	Matches the FAQ database
9	How old are you?	Sorry, I can't answer questions about my age.	Polite response (outside skincare

			domain)
10	Who is the current President of Indonesia?	Sorry sis, I can't answer questions about the current president of Indonesia. I can only help with questions about skincare and G2G products. If you have any other questions related to skincare, I'd be happy to help!	Polite response (outside skincare domain)

Accuracy Calculation
Number of correct responses = 10
Total number of questions = 10
Accuracy = (10 / 10) × 100% = 100%

According to the evaluation of ten submitted questions, the chatbot correctly answered nine of them, achieving an accuracy rate of 100%. These findings suggest that the chatbot effectively serves its main function of providing information and recommendations about skincare products for Glad2Glow (G2G) based on the available datasets for products and FAQs. The variation in outcomes for queries outside the skincare realm indicates that the chatbot appropriately handles off-topic questions. It addresses conversational inquiries politely, while those completely irrelevant to skincare are redirected to ensure the system maintains its domain focus. This behavior affirms that the chatbot has strong domain control and is not designed to operate as a general-purpose assistant.

System Testing Conclusion

Based on the comprehensive testing findings, it can be inferred that the Glad2Glow (G2G) skincare e-commerce website, which incorporates a Groq API driven chatbot, has operated effectively and in line with the system's design. The system is capable of executing all essential functions efficiently, including user authentication, management of product data, engagement with the chatbot, and recording chat history.

Moreover, the chatbot shows strong performance regarding quick response times and a high level of response accuracy. Thus, the developed system has fulfilled the functional, performance, and usability requirements, making it appropriate for deployment as an AI-powered information and product recommendation tool in skincare e-commerce sites.

Discussion

The deployment of the Groq API powered chatbot on the Glad2Glow (G2G) skincare e-commerce platform proves that the system can enhance the efficiency of customer service. According to the results of functional testing, the chatbot is capable of receiving user inquiries, processing them through natural language processing, and delivering appropriate responses based on the available product information and FAQ dataset. This suggests that incorporating artificial intelligence technology into an e-commerce framework can effectively meet user information requirements more quickly and accurately.

One of the primary benefits of integrating the Groq API is the quick response time generated by the system. The relatively swift response times enable users to access product information without substantial delays, thus improving the user experience when compared to traditional customer service. Furthermore, the uniformity of the chatbot's responses decreases dependence on conventional customer service and lessens the likelihood of misinformation when providing details about skincare products (Putri et al., 2023; Nugroho & Voutama, 2024).

From a system management viewpoint, the administrator dashboard aids in managing product data, updating information, and overseeing user chat histories. This functionality is crucial for ensuring the quality and precision of chatbot responses, as the effectiveness of the chatbot heavily relies on the completeness and accuracy of the information stored within the system. Centralized management of data also guarantees that the information provided by the chatbot is consistently current.

Despite the favorable outcomes, there are still several drawbacks. The chatbot's performance relies on a stable internet connection and the accessibility of the Groq API service. Furthermore, while the chatbot excels at addressing common skincare-related inquiries, it encounters difficulties when faced with vague or out-of-context questions. Nevertheless, the created system illustrates that leveraging

advanced artificial intelligence technology can effectively enhance the quality of customer service in skincare e-commerce platforms (Nugroho & Voutama, 2024).

CONCLUSIONS

Based on the findings and analysis, it can be concluded that a Groq API-based chatbot for the Glad2Glow (G2G) skincare e-commerce site has been successfully created and implemented. The chatbot is designed to quickly and accurately provide product details, skincare advice, and answers to user questions by leveraging natural language processing and contextual product information.

Employing the Waterfall methodology in system development guarantees that every phase, from requirement analysis to testing, is carried out in a well-organized and systematic way. The results of functional testing indicate that all system components, including user authentication, chatbot interaction, product data management, and Groq API integration, function according to the specified requirements.

While the system shows strong performance, there are still opportunities for future enhancements, such as improving the chatbot's ability to address more intricate queries and incorporating user purchase history to offer more tailored product suggestions. Overall, this system has significant potential for further development as an effective and responsive customer service solution for skincare e-commerce platforms.

REFERENCES

Abts, D., Kimmell, G., Ling, A., Kim, J., Boyd, M., Bitar, A., Parmar, S., Ahmed, I., DiCecco, R., Han, D., Thompson, J., Bye, M., Hwang, J., Fowers, J., Lillian, P., Murthy, A., Mehtabuddin, E., Tekur, C., Sohmers, T., … Ross, J. (2022). A Software-defined Tensor Streaming Multiprocessor for Large-scale Machine Learning. *Proceedings - International Symposium on Computer Architecture*, 567–580. https://doi.org/10.1145/3470496.3527405

Lubis, A. I. (2023). Rancang Bangun Sistem Informasi Organisasi Berbasis Website Menerapkan Metode Waterfall. *BULLETIN OF COMPUTER SCIENCE RESEARCH*, *5*(3), 182–192. https://doi.org/10.47065/bulletincsr.v5i3.495

Putri, L. A., Wardani, A. P., Firdausiyah, W., Anggraeni, D., & Nurhayati, C. (2023). Efektivitas Chatbot Sebagai Media Komunikasi E-Bisnis Produk Skincare Dengan Sistem Crm Pada Marketplace Shopee. *Referensi : Jurnal Ilmu Manajemen Dan Akuntansi*, *11*(2), 147–154. https://doi.org/10.33366/ref.v11i2.4721

Nugroho, I. S., & Voutama, A. (2024). Implementasi Chat Bot Untuk Pelayanan Pelanggan Yang Terintegrasi Web Toko Komputer. JATI (Jurnal Mahasiswa Teknik Informatika), 8(3), 3132–3136. https://doi.org/10.36040/jati.v8i3.9630

Agustin, S. C., Syafina, P. H., Rachmatin, N., & Pratama Yusuf, A. Y. (2024). Chatbot Berbasis NLP untuk Rekomendasi Produk Skincare Lokal pada Telegram. SKANIKA: Sistem Komputer Dan Teknik Informatika, 7(1), 98–108. https://doi.org/10.36080/skanika.v7i1.3141

Nithya, D. L. M., Gupta, T., S. D., J D. C., & S S. (2025). Healthify : A Conversational AI for Mental Health Support Using Groq and LangChain Frameworks. International Journal of Innovative Science and Research Technology, 10(4), 2214–2220. https://doi.org/10.38124/ijisrt/25apr1521