

Research Article

Implementation of AI Chatbots for Education and Introduction to Blockchain Products

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Abstract

This study aims to develop an artificial intelligence-based chatbot system designed to enhance public understanding of blockchain technology and introduce sharia-compliant products from PT. iBantu Solusi Syariah. The project used the System Development Life Cycle (SDLC) waterfall model, covering requirement analysis, system design, web interface development, AI model configuration with Ollama, and testing. The Chatbot was deployed via the WebUI with a FastAPI backend, a ReactJS frontend, and a SQLite database, integrated with a local LLM model. The results showed that the Chatbot could interact in context, answer blockchain-related questions, and effectively introduce company products. Performance testing indicated a page load time of 910 ms and a secure response against SQL injection and XSS attacks. User acceptance testing confirmed high usability and accuracy in responses. The study is limited to educational and promotional functions without blockchain transaction integration. The novelty lies in combining AI chatbot technology with blockchain education for a Sharia fintech company in Indonesia.

Keywords: AI Chatbot, Blockchain, Sharia Products, WebUI, Ollama

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1. Introduction

Blockchain adoption in Indonesia faces challenges due to low literacy and limited public understanding. PT. iBantu Solusi Syariah. One of the main challenges is the low level of public literacy regarding Blockchain technology. Indonesians' understanding of Blockchain remains low due to limited, simple, and easy-to-understand information available to the general public. This results in Blockchain-based innovations not gaining a proper place in people's digital lives. Studies on educational approaches show that interactive, technology-based approaches can significantly improve understanding and acceptance of new technologies compared to passive methods such as articles or videos (Fatimah et al., 2021). This study aims to implement an AI chatbot that integrates blockchain education with product promotion, filling the gap in interactive educational platforms and offering novelty by localizing the chatbot persona for sharia-compliant services.

Research on chatbot education systems (Rahman et al., 2025) shows that implementing AI-based chatbots in digital education systems has been proven to increase user participation and learning effectiveness, as they can provide a personalized, responsive, and easily accessible learning experience at any time on digital devices. To address this problem, a Generative AI-based chatbot was developed that integrates Natural Language Processing (NLP) technology (Hikmah et al., 2023). The application of Natural Language Processing (NLP) enables the Chatbot to understand the meaning and context of questions asked by users, making communication more human-like and responsive

Another advantage of this system is its openness, as the Chatbot will be publicly accessible and free for anyone to use via digital platforms. This provides added value for PT iBantu Solusi Syariah, as it not only supports efforts to increase Blockchain literacy in general, but also serves as a digital marketing tool to introduce the company's products in a persuasive yet educational manner (Sisephaputra et al., 2024)

The purpose of this research is to facilitate the dissemination of information while also opening up potential for PT. iBantu uses AI to support education and promote digital products efficiently and sustainably.

The novelty of this research lies in the fact that the system's function and usefulness are not limited to internal education but also provide public access to information about AI-based products without time or location constraints. This makes the system an inclusive and efficient medium for digital literacy.

2. Literature Review

Philanthropy and Blockchain: The use of Blockchain in philanthropy has been widely discussed as a way to enhance transparency in donations and charitable activities. Blockchain ensures that funds donated by individuals are traceable and can only be used for their intended purposes (Zidifaldi et al., 2022). This increases donor trust and encourages greater participation in philanthropic initiatives, particularly in environments where accountability is a concern.

Large Language Models (LLMs): LLMs, such as GPT or LLaMA, are based on transformer architectures that enable contextual understanding of language by processing vast amounts of textual data (OpenAI, 2020). LLMs power advanced chatbots and conversational AI, enabling them to handle complex queries, maintain coherent dialogues, and adapt across diverse domains. Their scalability and adaptability make them crucial for developing educational and promotional chatbots in fintech contexts.

Evaluation frameworks for chatbot performance now emphasize quantifiable metrics such as interaction success rate, time efficiency, and user trust level rather than only subjective feedback (Debets et al., 2025)

Hybrid chatbot implementations that combine rule-based structures with LLM-driven responses have been reported to enhance response accuracy while maintaining domain control, making them suitable for financial and educational platforms that require both precision and flexibility (Dogan & Gurcan, 2024).

According to OpenAI, LLMs such as GPT (Generative Pre-trained Transformer) work in two stages: pre-training and fine-tuning. In the pre-training stage, the model learns from a large amount of unlabeled public data on the internet. The fine-tuning stage is carried out using specific instructions or datasets to narrow the model's behavior to specific objectives (Brown et al., 2020).

Adaptive chatbots that apply NLP-driven personalization can deliver tailored content to users, which increases comprehension and retention in digital learning environments (Mageira et al., 2022). Recent advancements in transformer-based dialogue systems demonstrate that multi-turn reasoning in chatbots is enabled by attention-based memory integration, enabling more natural, human-like conversations (Israwati Hamsar et al., 2024). The evolution of LLM architectures has shifted chatbot development from rule-based scripting toward parameter-driven reasoning, reducing the need for manual dialogue design and increasing domain adaptability (Labadze et al., 2023; Yi et al., 2025). Chatbots are considered capable of understanding user needs, resolving problems, and delivering fast, efficient service. This makes students feel more satisfied and more likely to return to shop and recommend the platform to others (“Analisis Pengaruh Chatbot AI terhadap Pengalaman Mahasiswa Menggunakan E-commerce,” 2024). Chatbots embedded into student service systems improve communication flow between learners and institutions by automating repetitive questions and reducing administrative workload (Labadze et al., 2023).

The results of the literature review show that implementing chatbots in schools can significantly improve the quality of information services. Chatbots are considered capable of providing instant answers to various student questions without depending on the presence of administrative staff. With this system in place, staff workload is reduced, and services become more practical and accessible to students and parents at any time (Oka et al., 2022). AI chatbots in education have been shown to increase student participation and maintain engagement by providing immediate responses without human delay (Okonkwo & Ade-Ibijola, 2021). The integration of chatbots into institutional environments enables users to access information services more efficiently, especially when human staff is limited, thereby improving service accessibility (Kuhail et al., 2023).

Previous research confirms chatbot adoption: Prior studies confirm that chatbot adoption significantly improves user engagement, satisfaction, and efficiency in areas such as e-commerce and education (Huda, 2021). Chatbots provide learners and customers with personalized, on-demand interactions that are more effective than static content such as articles or FAQs. However, few studies have examined their role in blockchain education or in promoting sharia-compliant financial products, leaving a research gap that this study seeks to address.

3. Methods

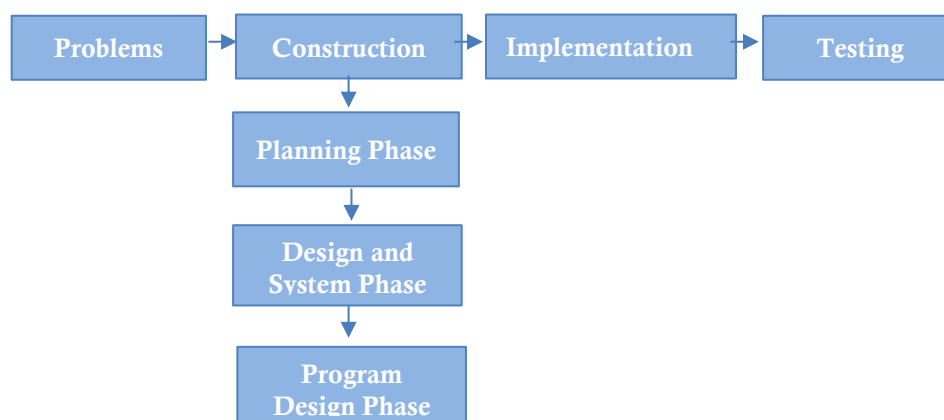


Figure 1. Stages Of The Research Method

From Figure 1, the stages of the research method carried out are:

1. Problem

The main issue is the public's low literacy regarding Blockchain technology. Indonesians' understanding of Blockchain remains low due to a lack of simple, easily understandable sources of information for the general public.

2. Construction

a. Planning Stage After identifying the existing problems, we began analyzing and planning solutions that could be implemented. The solution is to create an Artificial Intelligence (AI)-powered website featuring educational content on blockchain technology and an introduction to PT's products. iBantu Solusi Syariah. In this stage, we also outlined the required features and determined the technologies to be used.

b. Design and System Stage At this stage, we started designing the main layout (UI/UX) of the website to be user-friendly, aiming to make it easily understood by various groups, especially users who are still unfamiliar with blockchain technology.

c. Program Design Phase

After the design and system are determined, we proceed to the program implementation phase. At this stage, we begin installing components, integrating the AI model with Open WebUI, and adjusting the educational content about Blockchain for presentation through the AI chatbot. The program is designed to answer user questions contextually and deliver product information.

3. Implementation

At this stage, we began implementing the developed website within the PT environment. iBantu Solusi Syariah. The implementation process was carried out to ensure that the system could operate according to plan and was ready for end-user use. The uploaded website will be used as an educational medium about blockchain technology as well as information about the company's products. This implementation serves as an initial step before comprehensive testing to ensure no technical issues are encountered during use.

4. Testing

After the implementation process is complete, the next stage is to test the developed website. This testing is carried out together with PT. iBantu Solusi Syariah aims to evaluate system performance, ensure all features function properly, and identify potential issues or shortcomings. Testing is conducted up to the maximum allowable usage limit to assess the system's stability and reliability. The results of this testing will be presented in full in the appendix section as supporting documentation.

4. Results

Based on the performance testing results, the website performs well for initial access and is highly optimized for repeated access (with caching). No layout shifts or heavy JavaScript load were found. However, to further improve performance, it is recommended to Reduce the number of HTTP requests (combine JS/CSS files), Enable image compression and stronger caching and Minimize the total page size if possible.

Performance testing was conducted using the WebPageTest service with the configuration set to Jakarta (Indonesia) location, Chrome device, and LTE network. The purpose of this test is to measure the website's performance from a real user perspective, both on the first visit (first view) and after the page has been cached (repeat view). Performance Test in the Figure 2.

Here are the test results, available at the following link:

https://www.webpagetest.org/results.php?test=250720_YiDcWG_2C7.

Performance test in the Table 1.

Parameter	Nilai First View	Nilai Repeat View
Load Time	910 ms	201 ms
Fully Loaded	4.534 detik	1.485 detik
Number of Requests	136	3
Data Size In (Bytes In)	2.85 MB	746 Byte

Parameter	Nilai First View	Nilai Repeat View
First Contentful Paint (FCP)	747 ms	233 ms
Largest Contentful Paint (LCP)	747 ms	233 ms
Total Blocking Time (TBT)	114 ms	19 ms
Cumulative Layout Shift (CLS)	0	0
Time to First Byte (TTFB)	299 ms	421 ms
Speed Index	4484	1429



Figure 2. Performance Test

Security testing was carried out by attempting to enter the character OR 1=1 – in the User's login password field. The Chatbot System rejected it and displayed an error indicating that the credentials were incorrect, thereby terminating system access. Security Test : SQL Injections Rejected in the Figure 3.

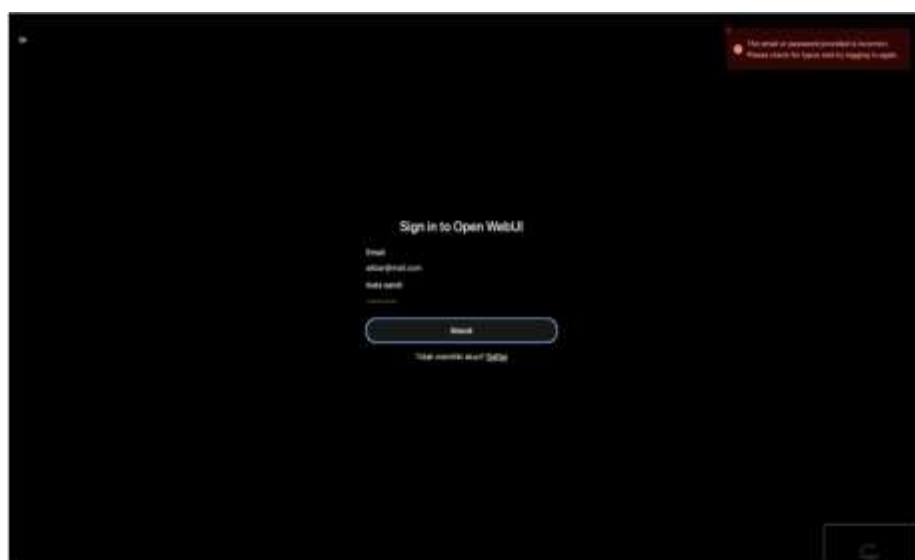


Figure 3. Security Test : SQL Injections Rejected

XSS security testing by entering XSS scripts into the Chatbot interaction input. The system will detect the XSS code and notify that it is an attack on the system, so the Chatbot will not respond to the attack. Security Test : XSS Payload Blocked in the Figure 4.



Figure 4. Security Test : XSS Payload Blocked

It is an implementation of the interaction between the User and the Chatbot. At the beginning of the conversation, the User must have a topic they want to learn about, namely Blockchain Education or iBantu Products. The Chatbot will provide answers based on the topic and the User's questions, as shown in Figure 5.



Figure 5. System Output

5. Discussion

The AI chatbot successfully improves blockchain education through interactive Q&A, outperforming static methods like articles. Compared with studies in e-commerce and schools, the results align—chatbots enhance engagement and efficiency. The integration of LLM with localized persona ensures relevance to sharia-compliant financial services. However, limitations include absence of direct blockchain transaction features, and reliance on local model constraints affecting scalability.

6. Conclusion

This study demonstrates that an AI chatbot integrated with WebUI and Ollama can effectively provide blockchain education and promote sharia products at PT. iBantu Solusi Syariah. The system is secure, fast, and user-accepted, making it a promising tool for fintech education

Recommendation

Future implementations should explore multilingual support, larger model deployment, and integration with real blockchain transactions..

Limitations and avenue for future research

This study is limited to educational use, not to financial operations. Further research should involve real blockchain integration and broader testing in public domains. Add module-based training features so that users can learn gradually through the Chatbot. Integrate with PT. iBantu's real-time product database keeps product information up to date. Add analytics features to monitor user interactions and periodically evaluate the system's effectiveness.

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