

Research Article

PENERAPAN CHATBOT AI SEBAGAI EDUKASI DAN PENGENALAN PRODUK BLOCKCHAIN PADA PT. IBANTU SOLUSI SYARIAH

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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 WebUI with FastAPI backend, ReactJS frontend, and SQLite database, integrated with a local LLM model. The results showed that the chatbot could interact contextually, answer blockchain-related questions, and introduce company products effectively. Performance testing indicated a page load time of 910 ms and 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, as a sharia fintech company, seeks innovative approaches to educate society and promote its blockchain-based products. Traditional methods such as articles or videos are less interactive, while AI-based chatbots with Natural Language Processing (NLP) provide responsive and personalized learning experiences (Raj, 2018). 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 chatbot persona for sharia-compliant services.

Research on chatbot education systems (Rahman et al., 2025), shows that the implementation of AI-based chatbots in digital education systems has been proven to increase user participation and learning effectiveness because they are able to provide a personalized, responsive, and easily accessible learning experience at any time through digital devices. As a solution to 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).

2. Literature Review

Blockchain Technology: Blockchain is a decentralized distributed ledger that records transactions across multiple nodes in a secure, immutable manner. Its transparency and tamper-resistance make it particularly attractive for financial applications, supply chain management, and identity verification (Nakamoto, 2008). In the context of fintech and Islamic finance, blockchain ensures accountability and trust by providing auditable records that cannot be altered once confirmed.

Chatbots in Business: Chatbots are conversational agents designed to simulate human-like interactions and provide services such as customer support, product recommendations, and information delivery. Their application in business helps reduce operational costs while maintaining 24/7 availability and improving user experience (Raj, 2018). In sectors like banking, e-commerce, and education, chatbots have demonstrated the ability to streamline communication and increase customer satisfaction.

Natural Language Processing (NLP): NLP is a subfield of artificial intelligence that enables machines to process, understand, and generate human language. Techniques in NLP include tokenization, parsing, semantic analysis, and sentiment detection, which are essential for enabling chatbots to interact naturally with users (Manning & Schütze, 1999). By combining rule-based methods and machine learning, NLP allows conversational systems to deliver more relevant and context-aware responses.

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): Large Language Models, 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, allowing them to handle complex queries, maintain coherent dialogues, and adapt to various 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 made possible through attention-based memory integration, allowing more natural and 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, providing solutions to problems encountered, and providing fast and efficient service. This makes students feel more satisfied and more likely to return to shop and recommend the platform to others (Israwati Hamsar et al., 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 study show that the implementation of 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, the workload of staff is reduced and services become more practical and accessible at any time by students and parents (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 allows users to access information services more efficiently, especially when human staff are limited, resulting in improved 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

The research applied the SDLC Waterfall Model consisting of:

1. Requirement Analysis – identifying low blockchain literacy and need for product education.
2. System Design – UML diagrams (use case, activity, flowcharts) for chatbot architecture.
3. Implementation – WebUI frontend, FastAPI backend, SQLite DB, Ollama runtime with LLaMA3 model.
4. Testing – Performance test via WebPageTest; Security test using SQL Injection & XSS simulation; User Acceptance Testing (UAT).

Hardware: VPS 4 vCPU, 16 GB RAM, Ubuntu 20.04.

4. Results

1. Performance Test: Load time 910 ms, FCP/LCP 747 ms, TBT 114 ms; repeat view improved to 201 ms with caching.
2. Security Test: SQL Injection rejected, XSS payload blocked—system declared secure.
3. User Acceptance: 100% success on test cases (registration, login, chatbot interaction).
4. System Output: Chatbot capable of providing contextual answers limited to blockchain and PT. iBantu products.

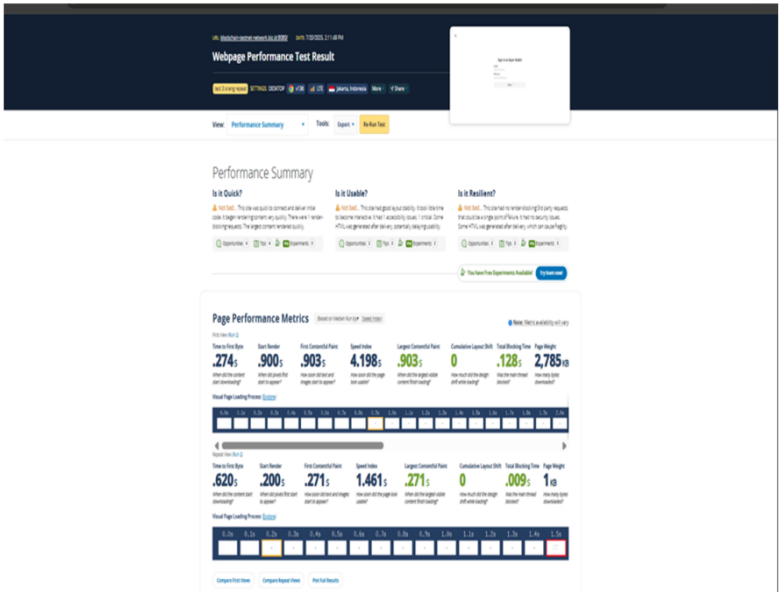


Figure 1. Performance Test

Parameter	Nilai First View	Nilai Repeat View
Waktu Muat Halaman (Load Time)	910 ms	201 ms
Fully Loaded	4.534 detik	1.485 detik
Jumlah Permintaan (Requests)	136	3
Ukuran Data Masuk (Bytes In)	2.85 MB	746 Byte
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

Table 1. Performance Test

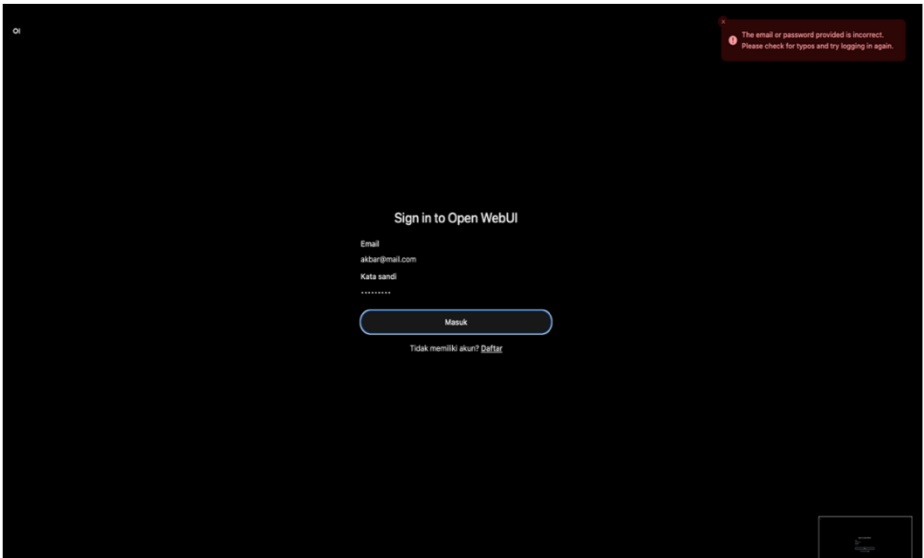


Figure 2. Security Test : SQL Injections Rejected

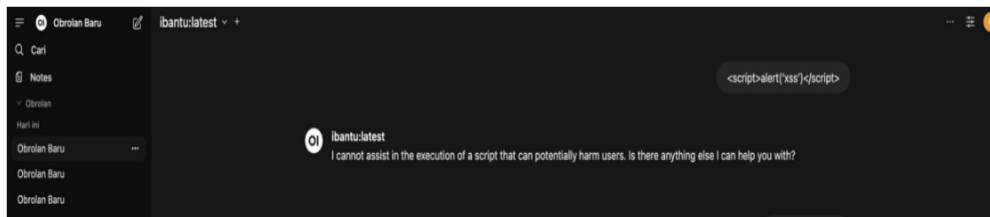


Figure 2.1. Security Test : XSS Payload Blocked

Dokumen User Acceptance Testing		
Nama Proyek	:	Penerapan Chatbot AI Sebagai Edukasi dan Pengenalan Produk Blockchain Pada PT. iBantu Solusi Syariah
Studi Kasus / Mitra	:	PT.iBantu Solusi Syariah
Manajer Proyek	:	Salman Abdurrubi Perwiragama

Fingure 3. User Acceptance Testing

No	Use Case	Hasil uji [Berhasil Gagal]	Nama Penguji	Tanggal pengujian	Catatan Penguji
1	Usecase Uji: Register Deskripsi: Melakukan pendaftaran kredensial pengguna Kasus Pengujian Email: usertest@mail.com Password: user123 Hasil yang diharapkan: - Jika register berhasil data	Berhasil Berhasil	Akbar Lana	22 Juli 2025 23 Juli 2025	

No	Use Case	Hasil uji [Berhasil Gagal]	Nama Penguji	Tanggal pengujian	Catatan Penguji
	kredensial akan tersimpan ke dalam sistem - Jika register tidak berhasil. Akan ada pesan kesalahan yang tampil sesuai kesalahan yang dilakukan oleh Pengguna				
2	Usecase Uji: Login Deskripsi: Melakukan verifikasi terhadap pengguna yang terdaftar dalam sistem Kasus Pengujian Email: usertest@mail.com Password: user123 Hasil yang diharapkan: - Jika login berhasil maka masuk ke dalam dashboard interaksi dengan Chatbot - Jika login tidak berhasil akan tampil pesan kesalahan yang dilakukan Pengguna	Berhasil Berhasil	Akbar Lana	22 Juli 2025 23 Juli 2025	
3	Usecase Uji: Interaksi dengan Chatbot Deskripsi: Melakukan	Berhasil Berhasil	Akbar Lana	22 Juli 2025 23 uli 2025	

Figure 3.2. User Acceptance Testing

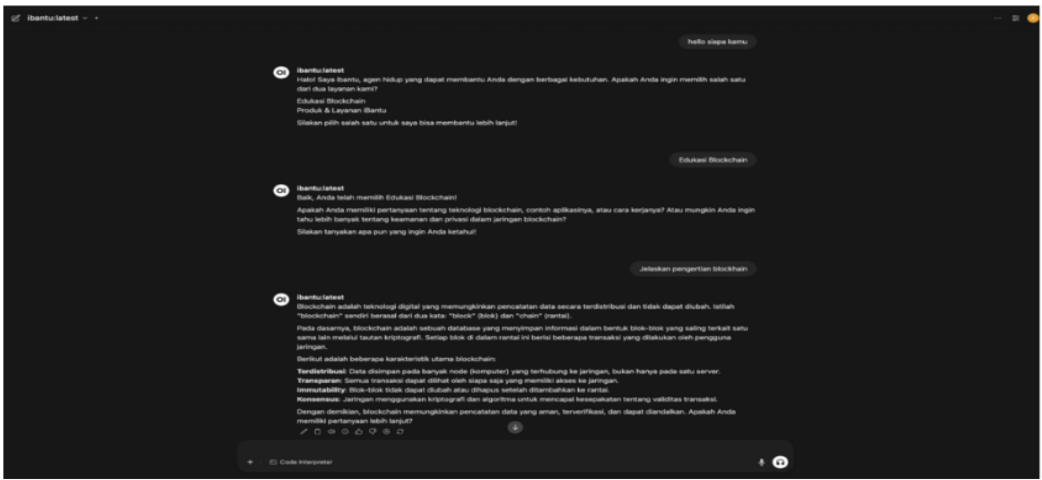


Figure 4. System Output

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 without financial operations. Further research should involve real blockchain integration and broader testing in public domains.

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