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Result Paper on Jarvis 2.0: AI-Powered Conversational Assistant with Voice and Chatbot Interaction and Dashboard Management

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Abstract

Artificial Intelligence (AI) virtual assistants have rapidly evolved, becoming integral to modern user interaction across various domains, including customer service, personal productivity, and smart environments. This literature survey investigates the develop and implementation of AI-powered voice and chatbot assistants, with a specific focus on virtual voice assistants. The study reviews key technologies such as automatic speech recognition (ASR), natural language processing (NLP), and text-to-speech (TTS), which enable seamless human-AI interaction. It also explores the use of the MERN stack (MongoDB, Express.js, React.js, Node.js) for building scalable, real-time, and interactive assistant platforms. Particular emphasis is placed on dashboard management systems that enhance transparency, allow customization of assistant behaviour, and provide in sights into user interactions. Through a comprehensive analysis of existing systems and methodologies, this paper aims to provide a foundation for the design and development of Jarvis 2.0, an AI virtual assistant that supports both voice and text-based communication with intuitive dashboard control.

Keywords: AI Voice Assistant; MERN Stack; MongoDB; Express.js; React.js; Node.js; Speech Recognition (ASR); Text-to-Speech (TTS); Natural Language Processing (NLP); Natural Language Understanding (NLU); Dialogflow; Rasa; Browser-Based Voice Assistant; Real-Time Interaction; Multi-Turn Conversations; Task Automation; RESTful APIs; Dashboard Management; GUI Design; Voice Command Processing; IoT Integration; Human–Computer Interaction (HCI); Conversational AI; Emotion Sentiment Analysis; User Experience (UX); Performance; Security.

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Introduction

In today's Jarvis 2.0 is designed using advanced Artificial Intelligence (AI) and Machine Learning (ML) techniques that enable the system to continuously learn from user interactions and improve its accuracy and efficiency over time. The integration of Natural Language Understanding (NLU) allows the assistant to interpret complex human language, understand user intent, and provide context-aware responses, making the interaction more natural and human-like.

The system supports multi-platform deployment, which means it can be integrated into web applications, mobile devices, and desktop systems, ensuring greater flexibility and accessibility for users. Additionally, Jarvis 2.0 is equipped with a real-time response mechanism that processes user inputs quickly and delivers instant outputs, thereby enhancing user experience and reducing communication delays.

A key feature of Jarvis 2.0 is its voice recognition and speech synthesis capability, where the system converts spoken language into text using speech-to-text technology and responds back using text-to-speech conversion. This feature enables hands-free operation and makes the system highly useful for users with accessibility needs.

Furthermore, the system includes a dashboard management module that acts as a centralized control panel. This dashboard allows users to monitor system performance, track activity logs, analyze user interactions, and manage different functionalities efficiently. It enhances transparency and provides better control over the assistant's operations.

Jarvis 2.0 also supports task automation, allowing it to perform various activities such as setting reminders, opening applications, fetching real-time information, and executing predefined commands. This automation reduces manual effort and increases productivity.

The system is built with scalability in mind, meaning it can be easily upgraded with new features, improved algorithms, and additional integrations as technology evolves. It also ensures data security and privacy by implementing secure data handling practices, authentication mechanisms, and controlled access to sensitive information.

Due to its versatile and intelligent capabilities, Jarvis 2.0 can be applied in multiple real-world scenarios such as smart home automation, virtual personal assistance, customer support systems, healthcare assistance, and educational platforms, making it a powerful solution for modern digital interaction**.**

Literature Review

Table 1. Comparative Analysis of Existing AI Voice Assistant and Conversational AI Systems

Sr. No.	Paper Title	Authors	Year	Existing Problem Statement	Existing Problem Solution / Technique Used	Future Scope
1	Real-Time Chat Application Development Using MERN Stack	Saloni Jadon, Prakhyat Singh, Priyanshu Singh	2025	Existing chat applications face challenges in real-time message delivery.	MERN Stack, WebSockets for real-time messaging, JWT authentication, bcrypt password security, and input sanitization.	End-to-end encryption, voice/video calling, offline messaging, and AI-based chat suggestions.
2	Natural Language Processing for Conversational AI: Chatbots and Virtual Assistants	Neeraj Shrivastava, Pushpa Tewari, S. Sujatha	2025	Chatbots face challenges in understanding context and generating human-like responses.	Machine Learning, Deep Learning, Semantic Analysis, NLU, and NLG techniques.	Enhanced contextual understanding, user personalization, multilingual capabilities, and stronger privacy.
3	Artificial Intelligence-Based Voice Assistant	Subhas S., Ullas A., Prajwal Srivatsa	2024	Difficulty in performing tasks hands-free and accessing information efficiently through traditional interfaces.	Natural Language Processing, Speech Recognition, Machine Learning, and Text-to-Speech synthesis.	IoT integration, improved contextual understanding, multilingual support, and enhanced personalization.
4	"JARVIS" – AI Voice Assistant	Priya Dalal, Tripti Sharma, Parth Gambhir	2023	Existing voice assistants struggle with natural language	Advanced Speech Recognition, NLP-based intent detection,	Enhanced contextual memory, multilingual support, emotion

				understanding.	context-aware processing, and device integration.	recognition, and broader smart-device compatibility.
5	A1-Voice Based Virtual Assistant	Girish Kumar	2023	Lack of multi-modal interaction and reduced speech-recognition accuracy in noisy environments.	Speech Recognition techniques and Dialogue Management.	Multilingual and regional language support with advanced context awareness.
6	INTELLIBOT – Intelligent Voice Assisted Chatbot with Sentiment Analysis, COVID Dashboard, and Offensive Text Detection	Gadiparthy Harika Sai, Meghna Manoj Nair, V. Vani, Shivani	2022	Chatbots struggle with sentiment understanding and offensive-content detection.	Voice-assisted chatbot integrating sentiment analysis, COVID dashboard, and NLP/ML-based offensive text detection.	Multi-domain expansion, enhanced voice recognition, improved dashboards, and personalized experiences.
7	Unified Test Framework for Voice Enabled Devices	Various Authors	2020	Lack of a standardized testing framework for voice-enabled devices.	Automated testing framework integrating Speech Recognition, NLP, and performance evaluation metrics.	Real-time analytics, multilingual testing, AI-driven adaptive testing, and support for multiple platforms.
8	Adheetee: A Comprehensive Bangla Virtual Assistant	Islam et al.	2019	Limited availability of intelligent virtual assistants supporting Bangla language.	Bangla NLP, Speech Recognition, Text-to-Speech, chatbot integration, and dashboard management.	Enhanced multilingual support, sentiment analysis, contextual understanding, and regional expansion.
9	Next-Generation of Virtual Personal Assistants	Veton Kepuska, Gamal Bohouta	2018	Existing assistants have limited conversational ability and contextual awareness.	Speech Recognition, NLP, Machine Learning, and AI-driven adaptive interaction.	Emotional intelligence, deeper contextual understanding, broader device integration, and real-time learning.
10	Evorus: A Crowd-Powered Conversational Assistant Built to Automate Itself Over Time	Ting-Hao “Kenneth” Huang, Joseph Chee Chang, Jeffrey P. Bigham	2018	Crowd-powered chatbots are slow and expensive, while automated bots may provide low-quality responses.	Hybrid crowd-assisted and machine-learning-based conversational system with automated response approval.	Increased automation, reduced latency, improved error handling, domain expansion, and scalable learning mechanisms.

Applications

- Smart home automation: Jarvis 2.0 can be used to control devices such as lights, fans, security systems Corporate Email Security: Protect organizations from spear-phishing and business email compromise attacks.
- Customer support systems: the assistant can function as an intelligent chatbot to handle user queries.
- Educational sector: Jarvis 2.0 can act as a virtual tutor by answering questions, providing explanations, and assisting students in learning concepts interactively. Government and Public Services: Strengthen digital security against large-scale phishing campaigns.
- Healthcare applications: the system can assist patients by providing basic medical information

Results/Output

Figure 1 - PhishGuard URL Risk Assessment Dashboard: In this image we see a screenshot of the PhishGuard URL Analysis Dashboard which shows the risk assessment score (73/100) of the URL that was submitted to be evaluated by the PhishGuard system. The PhishGuard machine learning model uses prior history of phishing patterns and highlights features of the URL (ex: too many hyphens in

the URL) that indicate the URL is likely to be a phishing URL. The PhishGuard URL Analysis Dashboard has an Explainable AI (XAI) analysis that shows how features like length of the URL, total number of digits in the URL, and whether or not the URL is HTTPS are influencing the prediction that the URL is a phishing URL, and therefore will assist the user in understanding why the URL was identified as a phishing URL.

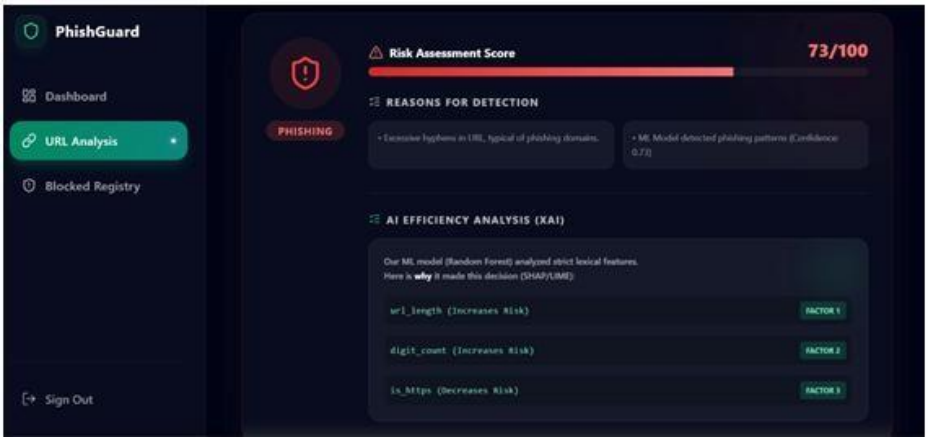


Fig. 1. *PhishGuard URL Risk Assessment Dashboard*

Figure 2 - Detection Of Suspicious HTML Code: This image contains a screenshot of the Suspicious HTML Snippet Detection Module. The PhishGuard system will scan the source code of the webpage and highlight any potentially malicious scripts or external resources. The presence of these highlighted scripts may indicate that phishing activity is taking place, or that there are hidden URL redirects or tracking mechanisms in use. This module will assist the security analyst to quickly identify suspicious code that may place the user's data at risk.

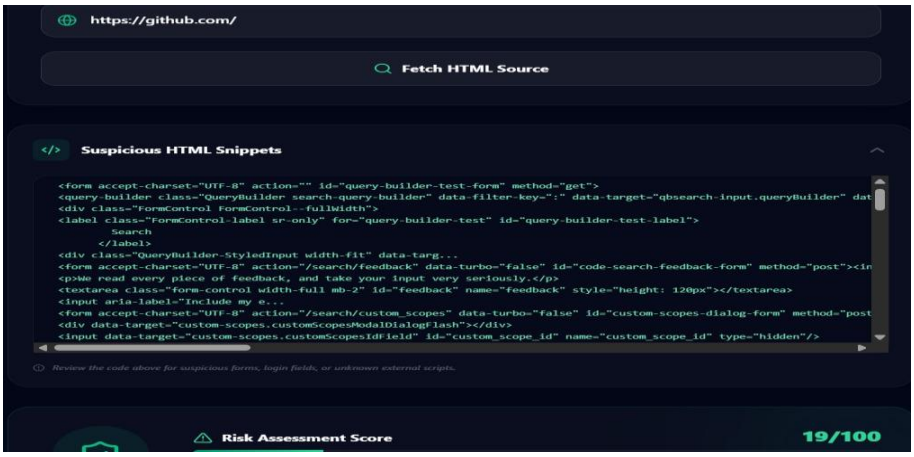


Fig. 2. *Suspicious HTML Code Detection Module*

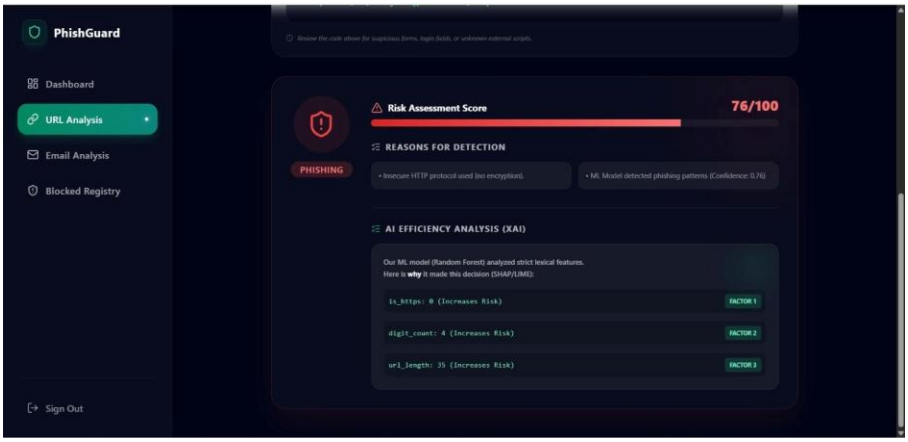


Fig. 3. *Phishing Detection Result with Risk Score*

Figure 3 - Phishing Detection Output With Risk Score: This image shows the output of the detection process of a live machine learning model. The PhishGuard system assigned a risk score of 76/100 to the analyzed URL indicating that it is a likely phishing URL. The PhishGuard Dashboard also provides the user with a summary of the reasons that the image was identified as a phishing URL such as: does not use a secure HTTP connection, uses suspicious URL formats, etc. In addition to providing the reasons for the identification.

Figure 4 - The Live DOM Tree Structure Analyzer is shown in the figure above. The analyzer visualizes the hierarchy of webpage elements and is able to inspect HTML tags, scripts and components that are embedded in an effort to identify any suspicious elements. The system employs an analysis of the DOM structure in order to identify any hidden scripts, malicious iframes or injected elements that are commonly used in phishing attacks.

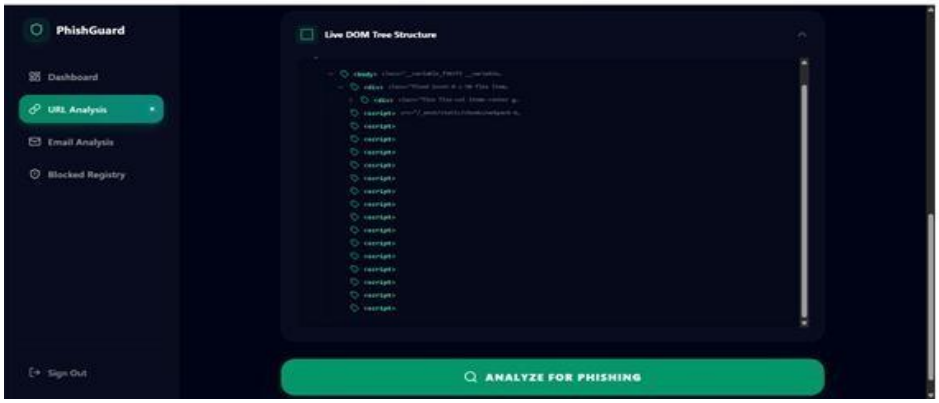
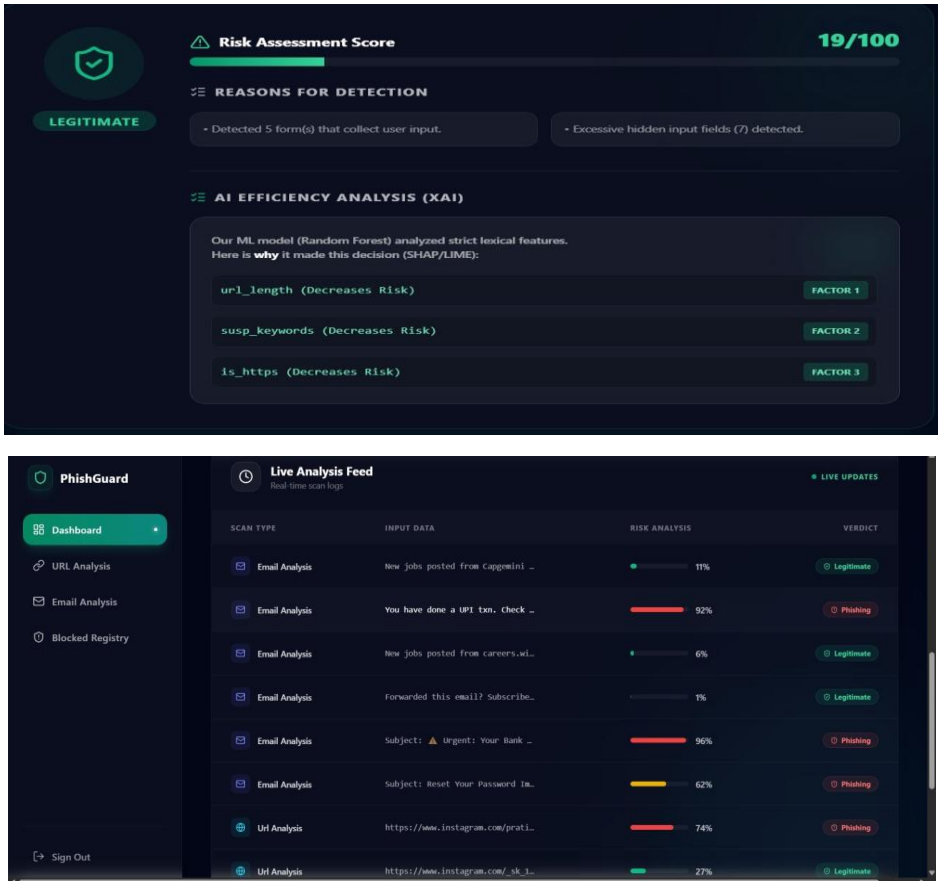


Fig. 4. *Live DOM Tree Structure Analysis*

Figure 5 - The Explainable AI (XAI) And Live Analysis Feed module in the phishing detection system is represented in the above figure. The Random Forest model provides an explanation of its predictions by showing how certain features such as HTTPS usage, digit count and URL length have contributed to its decision. Explainability of the model and its predictions will increase trust and interpretability for both users and security analysts by utilizing techniques such as SHAP and LIME to provide transparency into the decision-making process of the Random Forest model.



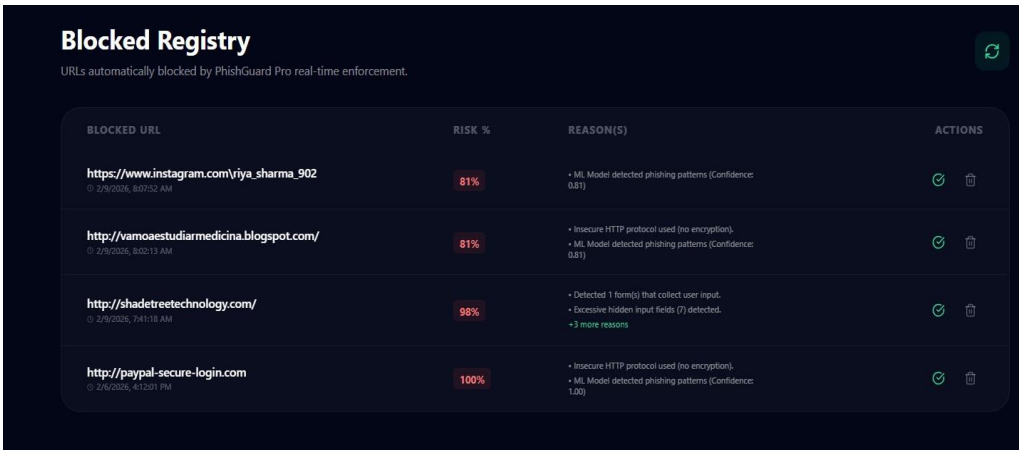


Fig. 5. *PhishGuard Dashboard Interfaces: Risk Assessment Analysis, Live Analysis Feed, and Blocked Registry*

Conclusion

Jarvis 2.0 integrates AI-driven voice interaction, NLP, and dashboard management into a browser-based MERN stack system. It is open-source, platform-independent, and customizable. While relying on third-party APIs and lacking offline support, it provides a foundation for future enhancements such as multilingual support, improved contextual understanding, and IoT integration. Our AI Voice Assistant, Jarvis, makes everyday tasks easier by enabling users to interact with the system through natural voice commands, thereby improving accessibility, convenience, and overall user experience.

It's easy to use, works smoothly with modern technologies like React, Node.js, and Gemini, and turns boring tasks into fun and useful experiences for learning, entertainment, and productivity.The Jarvis 2.0 AI-Powered Conversational Assistant with Voice and Chatbot Interaction and Dashboard Management project represents a comprehensive solution for modern human-computer interaction, successfully integrating advanced AI technologies with intuitive user interfaces. Through meticulous planning and implementation, the system demonstrates significant achievements in creating a versatile, intelligent personal assistant that revolutionizes how users interact with technology. In conclusion, the development of Jarvis 2.0 – AI-Powered Conversational Assistant with Voice and Chatbot Interaction and Dashboard Management successfully addresses the limitations of traditional voice-based virtual assistants by providing a more advanced, flexible, and user-friendly solution. The system integrates voice recognition, chatbot communication, and dashboard management into a single platform, enabling seamless and efficient human-computer interaction.

Unlike existing systems, Jarvis 2.0 enhances performance through improved natural language processing, real-time response capabilities, and machine learning-based adaptability, allowing it to understand user queries more accurately and respond intelligently. The addition of a dashboard interface further strengthens the system by offering monitoring, control, and analytical features, which were lacking in earlier models. The project demonstrates how combining multiple technologies can significantly improve system functionality, user experience, and productivity. It also highlights the importance of automation and intelligent systems in modern applications such as smart homes, education, healthcare, and customer support.

Overall, Jarvis 2.0 proves to be a scalable and efficient solution that bridges the gap between human communication and machine intelligence. With future enhancements, it has the potential to become an even more powerful and widely applicable AI assistant in various domains.

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