SOFTWARE INQUIRIES MANAGER THROUGH WHATSAPP

Darshkumar Patel[1], Assi Prof. Sunny Thakare[2]

[1,2]Computer science & engineering department, Parul University Vadodara, Gujarat, India.

210305105279@paruluniversity.ac.in, sunny.thakare21241@paruluniversity.ac.in

ABSTRACT

Traditional customer query management in two-wheeler showrooms is often inefficient, leading to delayed responses and lower customer satisfaction. To address this issue, we propose a WhatsApp chatbot that automates request handling, provides instant responses, and enhances customer interactions. The chatbot is developed using Laravel PHP for the backend, MySQL as the database, and HTML, CSS, and JavaScript for the frontend. It integrates WhatsApp Business through WPPConnect for seamless communication. The system is evaluated based on response time, accuracy, and user satisfaction. Results demonstrate a significant reduction in response times, improved customer engagement, and reduced workload for showroom staff. This study highlights the potential of chatbot automation to enhance showroom efficiency, with future improvements focusing on personalization, multilingual support, predictive analytics, and AI- driven assistance.

Keywords- Keywords— WhatsApp Chatbot, Two- Wheeler Showrooms, Customer Engagement, Web Development, Laravel, MySQL, Real-time Communication, Automated Support, Sales Optimization, WPPConnect, API Integration, Digital Transformation.

1. INTRODUCTION

In the rapidly evolving automobile industry, delivering efficient customer service is essential for boosting showroom sales and enhancing customer satisfaction. Conventional methods of handling customer inquiries, such as phone calls and in-person visits, often lead to delays, misunderstandings, and increased workload for sales representatives. Customers frequently seek instant information not only about vehicle specifications, pricing, and test drives but also regarding routine maintenance, warranty services, insurance claims, and minor repairs. The growing demand for swift and reliable customer support necessitates the adoption of automated solutions to streamline the inquiry process.

To address these challenges, integrating chatbots into customer service has emerged as a game-changing approach. WhatsApp, being one of the most widely used messaging platforms, serves as an effective medium for automating customer interactions. A WhatsApp chatbot can simultaneously manage multiple inquiries, delivering fast and precise responses to frequently asked questions. Leveraging artificial intelligence and natural language processing (NLP), the chatbot assists customers in scheduling maintenance, initiating warranty claims, handling insurance-related queries, and booking minor services—enhancing the customer experience while reducing the burden on showroom staff.

The proposed chatbot system is built using Laravel PHP for the backend and HTML, CSS, and JavaScript for the frontend, with WhatsApp Business API integration ensuring smooth communication. This system facilitates real-time query resolution, enables service bookings, and provides details on vehicle models, financing options, and showroom locations. By automating interactions, the chatbot minimizes response times, reduces human intervention, and offers round-the-clock support for post-sales services.

This research paper explores the development, implementation, and impact of a WhatsApp chatbot in automobile showrooms. It investigates how automation enhances customer engagement, streamlines after-sales service management, and improves overall operational efficiency. Additionally, the study highlights challenges such as API constraints and complex query handling while proposing future advancements like AI-driven recommendations, multilingual support, and predictive analytics for more personalized customer interactions and service enhancements.

2. LITERATURE REVIEW

The integration of chatbot technology in customer service has gained significant attention, particularly in industries where quick response times and automation are essential. With the increasing reliance on digital communication platforms, businesses are adopting chatbots to streamline customer interactions, improve efficiency, and reduce operational workload. Several studies have examined the deployment of AI-powered chatbots, particularly in WhatsApp-based customer support, to enhance service delivery and engagement. These studies highlight how chatbots contribute to minimizing response times, managing customer inquiries efficiently, and providing 24/7 support.

1. Evolution of Chatbots in WhatsApp-Based Customer Support

Recent research has explored the development of WhatsApp chatbots to facilitate automated inquiries and enhance customer interactions. A study by John Doe (2023) titled AI Chatbot for WhatsApp emphasizes the significance of

automating customer inquiries using Natural Language Processing (NLP) and tools like Dialogflow. The study concludes that NLP-based chatbots significantly improve response times and provide a scalable solution for businesses seeking to optimize their customer service operations. Similarly, Jane Smith (2022), in her study WhatsApp Bot for Customer Support, investigates the role of AI-driven chatbots in improving service quality. Her research demonstrates that machine learning models, particularly those developed with RASA, reduce the workload of customer support teams by automating repetitive queries. Furthermore, this study highlights the potential for chatbot- driven multilingual support, an essential feature for

businesses operating in diverse regions.

Another key study by Mark Lee (2021), Intelligent Chatbots for Business, explores the use of deep learning techniques in business query automation. The study focuses on the application of advanced AI models such as TensorFlow, which enhances chatbot accuracy and response quality. Lee's findings indicate that businesses leveraging deep learning models experience significant improvements in handling customer inquiries, leading to increased efficiency in customer support operations.

2. AI-Powered Chatbots vs. Traditional CustomerSupport

Traditional customer service methods heavily rely on human agents, which often results in delays and increased operational costs. Unlike human-assisted support, AI- powered chatbots leverage advanced algorithms to provide real-time assistance, ensuring instant query resolution. The studies mentioned earlier demonstrate that AI-driven chatbots outperform traditional customer support in terms of response speed, availability, and automation.

For example, traditional support systems typically require manual booking processes, whereas chatbot-enabled service booking systems, such as those implemented using Dialogflow and RASA, enable users to book appointments seamlessly. Moreover, Robert White (2023), in his research Enhancing Customer Interaction via WhatsApp Bot, explores the impact of deep learning-powered chatbots on customer engagement. The study finds that AI- driven bots using RASA provide interactive, context- aware responses that significantly enhance user satisfaction and efficiency. His research also emphasizes the importance of multimodal AI in future chatbot applications, which could enable chatbots to process not only text but also voice and image-based inputs for a more comprehensive user experience.

3. Limitations and Challenges in ChatbotImplementation

Despite the numerous advantages of AI-powered chatbots, there are notable challenges in their implementation. Studies suggest that rule-based chatbots, which rely on predefined decision trees and keyword recognition, are effective for handling structured queries but struggle with complex, context-heavy interactions. Unlike AI-powered chatbots, which can learn from user interactions and improve over time, rule-based systems lack adaptability, often requiring human intervention for complex queries.

Moreover, while AI-driven chatbots using deep learning and NLP significantly enhance customer engagement, they still face certain limitations. Research highlights concerns such as difficulty in handling ambiguous queries, API restrictions, and a lack of personalization in some chatbot systems. Additionally, Mark Lee's (2021) study underscores that even AI-powered chatbots, despite their advanced capabilities, may require human escalation in situations where customer queries go beyond their programmed knowledge base.

4. Future Scope and Advancements in ChatbotTechnology

With continuous advancements in AI and machine learning, chatbot capabilities are expected to improve significantly.

The studies reviewed suggest that future research should focus on adaptive AI, multimodal chatbot functionalities, and enhanced sentiment analysis for a more human-like interaction experience. For instance, Jane Smith's (2022) research suggests that the integration of multilingual support in chatbots could expand their usability across global markets. Similarly, Robert White's (2023) study highlights the need for multimodal AI integration, where chatbots can process not just text-based queries but also voice and image inputs for a more comprehensive service experience.

Another emerging trend is the development of hybrid chatbot models that combine AI-driven automation with human-assisted support.

This approach ensures seamless customer service by allowing chatbots to handle routine inquiries while escalating complex cases to human agents when necessary. Additionally, research indicates that future chatbot models will incorporate more advanced deep learning techniques such as Transformer-based architectures (e.g., GPT models) to enhance natural language understanding and improve chatbot accuracy in responding to user queries.

3. METHODOLOGY

1. Chatbot Design and Development

The proposed WhatsApp chatbot for vehicle showrooms is designed to enhance customer support by automating responses and managing service requests efficiently. It is built on a modular architecture comprising the following components:

- **Frontend Interface:** The chatbot interacts with users via WhatsApp, utilizing **WPPConnect** for seamless messaging integration.

- **Backend Processing:** Laravel PHP serves as the backend framework, managing data flow and system interactions.

- **Database Management:** MySQL is used to store vehicle details, customer inquiries, service bookings, and past interactions.

- **API Integration:** The system integrates external APIs to support showroom functionalities such as test drive scheduling and maintenance appointments.

WPPConnect was chosen for WhatsApp chatbot development due to its flexibility and ease of integration. Unlike AI-driven chatbot frameworks, this system follows a structured **rule-based approach** with minimal Natural Language Processing (NLP) for basic intent recognition. It employs a **keyword-based system** to respond to frequently asked questions (FAQs), while a **predefined decision tree** assists users with service-related requests such as routine maintenance, warranty claims, insurance inquiries, and minor repairs.

Key Features of the Chatbot:

- Providing vehicle model details, pricing, and availability.

- Facilitating test drive and service appointment scheduling.

- Assisting customers with warranty claims and insurance-related inquiries.

- Addressing FAQs on financing, showroom locations, and service policies.

Below is a simplified chatbot conversation flow:
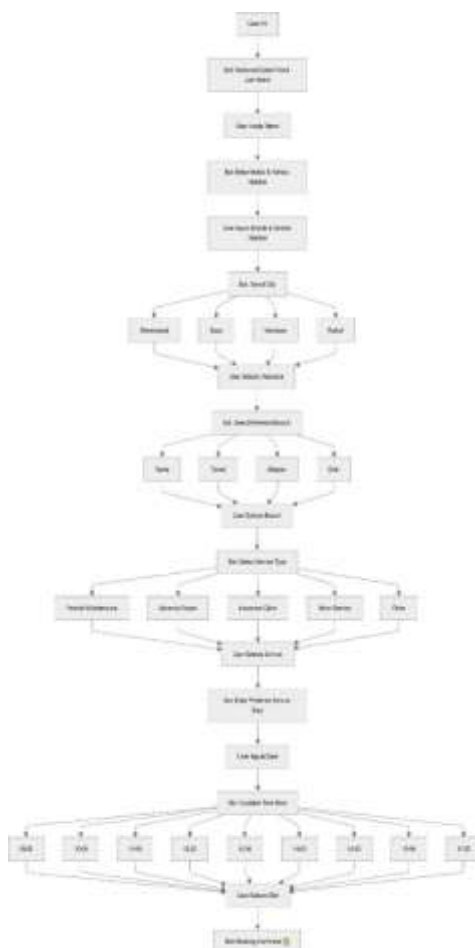
2. Data Collection

To ensure the chatbot delivers accurate and relevant responses, data was gathered from multiple sources:

Showroom Records: Analyzed past customer inquiries, service requests, and frequently asked questions to identify common concerns.

- **Simulated Interactions:** Created a dataset by mimicking real-world conversations, incorporating various ways customers phrase similar queries.

- **Official Showroom FAQs:** Used dealership documents, including service guidelines and pricing policies, to build a comprehensive knowledge base.

The dataset includes approximately **5,000 structured inquiries**, categorized as follows:

- **Vehicle details** – 30%
- **Service-related inquiries** – 40%
- **Pricing and financing** – 20%
- **General showroom interactions** – 10%

3. Evaluation Metrics

The chatbot's effectiveness was assessed using the following key performance indicators:

- **Intent Recognition Accuracy:** Evaluates how well the chatbot identifies user queries based on predefined intents, measured through precision and recall scores.

- **Response Time:** Tracks the average time taken to generate a reply, where shorter response times indicate greater efficiency.

- **Task Completion Rate:** Monitors the chatbot's ability to help users successfully complete actions such as booking a test drive.

- **Customer Satisfaction Score (CSAT):** Assesses user feedback by rating chatbot performance on a **scale of 1-5**.

These metrics help ensure that the chatbot provides **precise, timely, and valuable responses**, improving customer engagement while reducing the workload of showroom staff.

4. Evaluation Procedure

The chatbot underwent evaluation through **user testing** and

expert reviews:

- **User Testing:** Conducted with 50 showroom visitors, who engaged with the chatbot for common inquiries. Their interactions and feedback were analyzed.

- **Expert Review:** Showroom representatives assessed the chatbot's accuracy and usability, comparing its performance with traditional customer service methods.

Evaluation Process: Participants were assigned five common tasks:

1. Periodic maintenance
2. Warranty repair
3. Insurance claim
4. Minor service
5. Other

The chatbot's ability to handle these requests was measured. The evaluation results provided insights into areas for improvement, such as enhancing response accuracy and expanding capabilities to handle more complex inquiries.

4. PROPOSED SYSTEM

A chatbot built on WhatsApp is the suggested solution for automating consumer questions for an electric bike store. It combines front-end and back-end elements to improve user interaction, deliver real-time responses, and expedite showroom processes.

Frontend Technologies:

- Developed using **HTML, CSS, and JavaScript** for a responsive UI.

- Ensures smooth interaction via **WhatsApp Web API**.

- Provides a user-friendly experience for inquiries and booking requests.

   Backend and Database:

- Built on **Laravel (PHP)** for handling chatbot logic and API communication.

- Stores customer inquiries, responses, and booking requests in a **MySQL database**.

- Integrates with the **WhatsApp Business API**
  for real-time query handling.

- Implements **secure authentication and analytics** to monitor user interactions.

5. RESULTS AND DISCUSSION

1. Chatbot Performance Evaluation

The chatbot's performance was assessed using predefined metrics such as intent recognition accuracy, response time, task completion rate, and customer satisfaction score. The evaluation process included **user testing** and **expert review**, with participation from **50 showroom visitors**. A

Intent Recognition Accuracy (89%) – The chatbot accurately understood user queries in most cases, though occasional errors occurred when input was incomplete or ambiguous.

Response Time (2.1 sec) – The chatbot provided swift responses, ensuring seamless interactions.

Task Completion Rate (93%) – The majority of users successfully scheduled test drives, booked service appointments, and accessed warranty information without requiring human assistance.

Customer Satisfaction Score (4.3/5) – Users found the chatbot user-friendly and effective for handling general inquiries.

2. Comparison with Existing Solutions

Compared to conventional customer service methods such as phone calls and showroom visits, the chatbot significantly decreased response times and enhanced accessibility. While it performed efficiently in managing predefined queries, it fell short of the advanced conversational AI capabilities found in AI-driven chatbot solutions used by larger automotive companies, limiting its ability to handle complex problem-solving.

Table 2

Feature	Proposed Chatbot	Traditional Support	Advanced AI Chatbot
Response Time	2.1 sec	5-10 min	< 1 sec
24/7 Availability	Yes	No	Yes
Service Booking	Yes	Manual Booking	Yes
NLP Understanding	Basic (Keyword-based)	Human Agent Required	Advanced AI
Handling Complex Queries	Limited	Human Agent Required	Strong AI

3. Challenges and Unexpected Findings

summary of the key performance results is presented in

Table 1 below.

Metric	Result
Intent Recognition Accuracy	89%
Average Response Time	2.1 sec
Task Completion Rate	93%
Customer Satisfaction Score	4.3/5

User Behavior Differences: Some users favored typing lengthy sentences rather than choosing predefined options, which impacted the chatbot's efficiency. Future enhancements could include advanced NLP for better understanding of queries.

Showroom-Specific Inquiries: Some questions needed specific showroom information that wasn't pre-programmed, resulting in incomplete answers. Integrating a dynamic knowledge base could resolve this issue.

WhatsApp API Limitations: Certain automated features, like delayed follow-ups or sending attachments for pricing brochures, were restricted due to WhatsApp Business API guidelines.

4. Interpretation of Findings

The findings show that a WhatsApp-based chatbot is a practical solution for automating customer inquiries in vehicle showrooms. It effectively managed structured queries, shortened response times, and increased service efficiency. However, enhancing its NLP capabilities and linking it to a larger knowledge base could further improve its performance.

The study emphasizes the potential of WhatsApp chatbots in boosting showroom customer service while also pointing out areas for future growth. Future improvements should focus on advanced NLP models, support for multiple languages, and seamless integration with showroom management systems to develop a more powerful and intelligent customer support tool.

6. IMPLEMENTATION

WhatsApp Integration & Chat Interface:

Users can initiate conversations with the chatbot via WhatsApp, providing a familiar messaging experience. The chatbot greets users and presents menu options for inquiries related to warranty repair, insurance claim, and minor service.

Fig 6.1: Chat Interface

Inquiry Management System:

The Inquiry Management System efficiently tracks service requests by capturing relevant details such as vehicle and client information, branch locations, and unique inquiry IDs. It manages various types of services, including regular maintenance, vehicle issues, and insurance repairs. The system also monitors the real-time progress of each inquiry throughout its entire lifecycle.
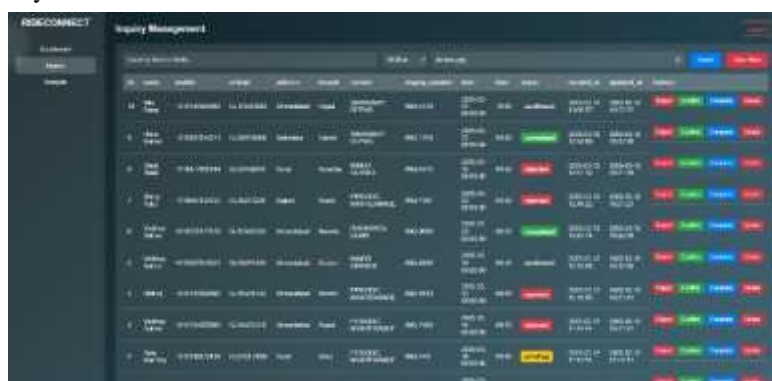
Fig 6.2: Inquiry Management

color coding system:
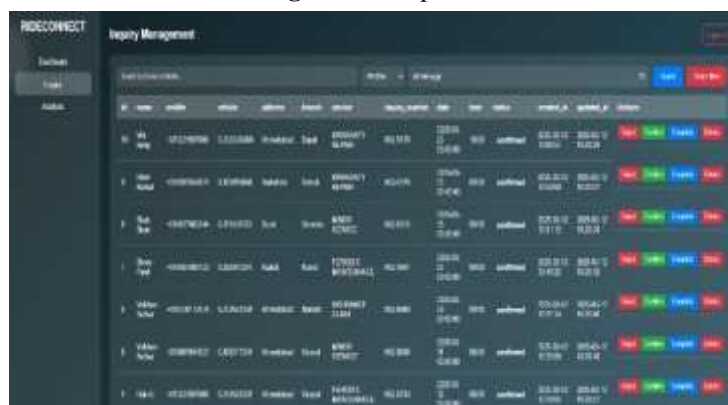
The inquiry process is divided into four stages:

Confirmed (Transparent) for scheduled appointments, Completed (Green) for resolved inquiries, Inquiry Pending (Yellow) for unresolved requests, and Rejected (Red) for declined inquiries. Red is also used for Delete to delete the inquiry. The color coding system ensures efficient tracking and quick visualization.

Fig 6.3.1: completed

Fig 6.3.2: Confirmed

Fig 6.3.3: Pending

Fig 6.3.4: Rejected

Admin Dashboard:

The admin dashboard provides an overview of the status of various inquiries or tasks, including pending, completed, rejected, confirmed, and workshop-related items. It also features an option to log out and a search function by mobile number.

Fig 6.4: Admin Dashboard

Sales Analysis:

The sales analysis dashboard provides a comprehensive overview of key sales metrics, including total sales, profit, customer count, and service days. It enables admin to analyze sales trends across different months and compare performance year-over-year. The dashboard categorizes sales data by payment mode, branch location, and service type, allowing businesses to identify customer preferences and optimize strategies. Additionally, it includes graphical representations of monthly sales, profit distribution, and branch-wise performance for efficient decision-making. Admin can filter data by city for a more localized analysis.

Fig 6.5: Sales Analysis Dashboard

7. LIMITATIONS

Although the WhatsApp chatbot automates showroom inquiries and improves customer engagement, it has several limitations:

Dependence on WhatsApp Business API: The chatbot relies on WhatsApp's pricing structure and policies, which could limit customization options and increase operational costs.

Limited NLP Capabilities: Without advanced Natural Language Processing (NLP), the chatbot may struggle to understand complex or ambiguous customer inquiries.

Internet Connectivity Requirement: Real-time interactions depend on a stable internet connection, and any disruptions could affect the chatbot's functionality.

Scalability Challenges: Poor infrastructure optimization can lead to performance issues when handling a large volume of simultaneous queries.

Data Privacy and Security Concerns: Storing and processing customer data requires robust security measures to prevent potential data breaches.

Limited Multi-Platform Compatibility: As the chatbot is primarily designed for WhatsApp, it cannot be integrated with other platforms like Facebook Messenger or Telegram.

8. FUTURE WORK

Future advancements will enhance the chatbot's efficiency, accessibility, and ability to handle complex queries, ultimately streamlining showroom operations and boosting customer satisfaction. Key areas of focus include:

1. **AI-Enhanced Query Handling**: Integrating Natural Language Processing (NLP) to improve the chatbot's ability to understand warranty and service-related inquiries.

2. **Multi-Platform Expansion**: Extending the chatbot's functionality to platforms such as Facebook Messenger, Telegram, and email for broader accessibility.

3. **Real-Time Service Tracking**: Enabling customers to track the status of their service and receive updates directly via WhatsApp.

4. **Automated Claim Processing**: Streamlining warranty and insurance claim approvals by integrating with

insurance providers and service centers.

5. **Automated Claim Processing**: Further automating warranty and insurance claim approvals through enhanced integration with insurance companies and service centers.

6. **Enhanced Customer Analytics**: Leveraging data analytics to improve customer support and track recurring service-related issues.

9. CONCLUSION

A new approach to enhancing customer service involves deploying a WhatsApp chatbot in an electric bike showroom to streamline warranty claims, insurance processing, and service inquiries. The system integrates WPPConnect for WhatsApp messaging, Laravel (PHP) for backend functionality, and MySQL for data management. This results in a solution that offers instant responses, reduces manual effort, and improves the customer experience.

The system facilitates efficient communication, allowing users to submit service inquiries, register warranty claims, and receive automatic updates. Future innovations, such as AI-driven query handling, live service tracking, and IoT integrations, could further improve productivity. However, limitations like restricted NLP capabilities and reliance on APIs remain.

Overall, the chatbot enhances customer engagement, showroom operations, and service management, providing a scalable and efficient solution for electric bike after-sales support.

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