

# WHATSAPP BASED SMART APPLICATION SYSTEM FOR TRAFFIC MANAGEMENT

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**Abstract:** In today's world chatbot plays an important role in our society as it is relatively a new technology. It gives us information, entertain us and help us in lots of manners. Basically, we can define a chatbot as a program that is designed to counterfeit a smart communication on a text or spoken ground or it refers to a chatting robot (it is all about the conversation with the user; a robot answers to the questions asked by the user). It recognizes the user input as well as by using access information and pattern matching to provide a predefined acknowledgement. When the input is being given, a response from a predefined pattern from the database is given to the user in which the order of the sentence is recognized and a saved response pattern is acclimatized to the exclusive variables of the sentence. This paper addresses the design and implementation of a Chatbot System using the Whatsapp Application where it will detect and recognize the input image of the vehicle number plate and show the information of the vehicle owner as an output. It also focuses on the methodology which is being used for the extraction of characters from the vehicle number plate.

**Index Terms - Chatbot; Pattern Matching; Optical Character Recognition (OCR); Natural Language Understanding (NLU); Application Programming Interface (API)**

## I. INTRODUCTION

A chatbot is a smart application that interacts with the human and it provides an answer to the several questions of human in its domain. We can say that we are entering the era of chatbot. Companies like Google and Microsoft are all busy in improving and developing this innovative user experience technology. A chatbot is also known for messaging applications which are now more widely used than social media networks.

In technical terms, we can define a chatbot as a developed program that can have a discussion/conversation with a human. For example, any user could ask a query on a chatbot, and the chatbot will respond as appropriate. We can say a chatbot interacts on a format which is similar to instant messaging. The complexity of a chatbot can be determined by the sophistication of its underlying software and the data it can access.

In 1966, the first chatbot was developed which was named as ELIZA, whose sole purpose was to act as a psychotherapist returning the user utterances in a question form. A simple concept of pattern matching was used and a template-based response mechanism was created. Its conversational ability was not that good, but it was enough at a time to confuse people when they were not used to interact with computers and give them the impetus to start developing their own chatbot [1-3].

In 1995, an improvement over ELIZA chatbot named ALICE – “Artificial Linguistic Internet Computer Entity” was developed which utilizes the Artificial Intelligence Mark up Language (AIML) as dialect and mediator. In ALICE, the innovation was to relate user data with a reaction of the chatbot Knowledge Base (KB). In the writing that exhibits the AIML ideas, there are instructional exercises that are externally present, or present in the dialect ideas in point of interest. The two alternatives are most certainly not suitable for AIML apprentices since they can't adjust the measure of hypothesis and application [4-5].

The next step was the expanding and spreading of information through innovation and technology which has correspondence among clients in virtual situations. In this situation, the interfaces cooperate in the middle of human and machine. We developed a chatbot system using the Whatsapp Application. In this chatbot, we have given the input of the vehicle number plate image, which recognizes the characters of the image by Optical Character Recognition (OCR) and the details of a particular vehicle number plate are fetched from the open-access database using the technology of Artificial Intelligence (AI) and Machine Learning (ML). The vehicle owner's data is being extracted from the open-access database (including registering date and authority, fitness and insurance validity). Then the server is used for hosting the scripts that are involved in the transmitting and receiving of the vehicle owner's information as an output. In this paper, the purpose of a chatbot has been changed as it provides a nationwide search over the digitized data of Registered Vehicles using Image Processing Technology. This service will help enforcement agencies to detect any fake documents. The chatbot is intended to excite and to entertain the users while keeping up a rational conversation [6-7].

Now, using different domains chatbot can be classified as:

- **Knowledge-based:** The amount of data where it is trained upon is known as the knowledge-based domain and it is characterised into two categories i.e. Open-domain chatbot which can talk about general topics and respond appropriately, while closed domain chatbot is more focused on a particular knowledge domain and they might fail to respond to other questions.
- **Input processing and response generation method:** There are three models used to produce the appropriate responses in this domain that takes into account the method of processing inputs and generating responses:
  - **Rule-based model:** They choose the system response based on a set of rules which is predefined and recognizing the lexical form of the input text without creating any new text answers. The knowledge used in the chatbot is humanly hand-coded and is organized with conversational pattern matching. A more comprehensive rule-based model allows the chatbot to reply to more types of user input. However, this type

of model is not robust to grammatical and spelling mistakes in user input. In rule-based model most existing research on studies is that the response selection for single-turn conversation is only considered the last input message. In more humanlike chatbot, multi-turn response selection takes into consideration as the previous parts of the conversation to select a response relevant to the whole conversation context [8].

- **Retrieval-based model:** A little different from the rule-based model as it offers more flexibility to queries and analyzes available resources using APIs. A retrieval-based chatbot retrieves some response candidates from the database before it applies the pattern matching approach to the response selection [9].
- **Generative model:** It generates answers in a better way than the other models, based on current and previous user messages. The chatbot is more human-like and applies machine learning algorithms and artificial intelligence techniques. However, they are a bit difficult in building and train them [10].
- **Service-based:** It considers the amount of intimate interaction that takes place for the user, and it is also dependent upon the task the chatbot is performing. The service-based domain can also be characterised into two categories i.e. interpersonal chatbot which lies in the domain of communication and provide services such as Restaurant booking, Flight booking, and FAQ bots. They get information and pass them on to the user but they are not companions and will probably remember information about the user. Whereas intrapersonal chatbot exists within the personal domain of the user, such as messaging apps like Messenger and WhatsApp. They understand the user like a human does and are companions to the user [11].
- **Human-aided:** Another classification for chatbot considers the amount of human-aid which utilize human computation in at least one element from the chatbot. Crowd workers, freelancers, or full-time employees can incorporate their intelligence in the logic to fill the gaps caused by limitations of a fully automated chatbot. While compared to rule-based algorithms and machine learning human computation provides more flexibility and robustness and still, it cannot process given information as fast as a machine can, which makes it hard to scale to more user requests [12].

## II. DESIGN AND REVIEW

A chatbot is a system that provides the interpreter, as well as a set of integrated technologies, to reduce the cost and the complexity of development, deployment, and management of such systems. Some of the technologies that are being used are the database integration, web services for the chatbot and the log recording of the conversations with the users. These interventions will facilitate people who can get limited access to the vehicle owner's detail free of cost.

The program consists of an API (Application Programming Interface) implemented in Python Language and Java Script. Among the advantages of using the program, there are (i) real-time vehicle data is being fetched using Artificial Intelligence (AI) and Machine Learning (ML) technology with the help of image processing; (ii) helps the enforcement agencies to detect any fake documents [13-15].

The basic design of a chatbot is shown below in Fig. 01.

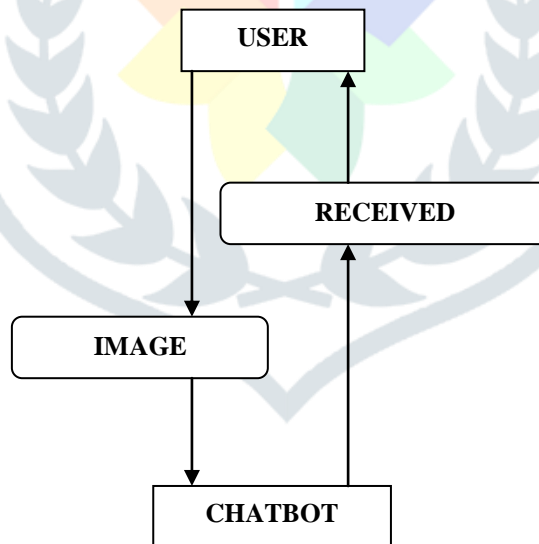


Fig.01: Basic design of a chatbot

A chatbot is also called as smart bots, digital assistants, interactive agents, or artificial conversation entities. They are useful in applications such as information retrieval (example: parking and traffic management), educational purpose (example: monthly progress report), business, and e-commerce (example: customer care service) [16].

There are also many advantages of a chatbot for users and as well as for developers too. Nowadays, most implementations are done on a platform which is independent and instantly available to users without needed installations. Such application programming interfaces (API) are used where a chatbot can work without leaving the messaging app, which provides and guarantees the user's identity with authentication and security having secure sessions and there are limited data requirements for the users. Moreover, payment services are integrated into the whatsapp chatbot and can be used safely and reliably with a reminder system which will re-engage inactive users. So communication reliability, fast and uncomplicated development, lack of fragmentation in version, and limited design efforts for the interface and open-source platforms provide the ability to intervene in most aspects of implementation are some of the advantages for developers too [17].

### III. RESEARCH METHODOLOGY

The objective of this paper is to design and implement a chatbot system using the Whatsapp Application which will retrieve the information about the vehicle and its owner through Artificial Intelligence (AI) and Machine Learning (ML). [18-19]. A program has been written for creating a chatbot using Visual Studio Code Software which is used for programming in this paper because it contains basic workspace and it is mostly used for programming languages. Python Language and Java Script are used for programming. An Application Program Interface (API) Twilio is being used for Whatsapp based Chatbot. A technique of AI and ML is created using a pattern matching that is known to the user and could be easy to understand. The input image is matched with the inputs saved in the open-source database and corresponding information is returned as a response. The following flowchart of the chatbot process is shown in Fig. 02.

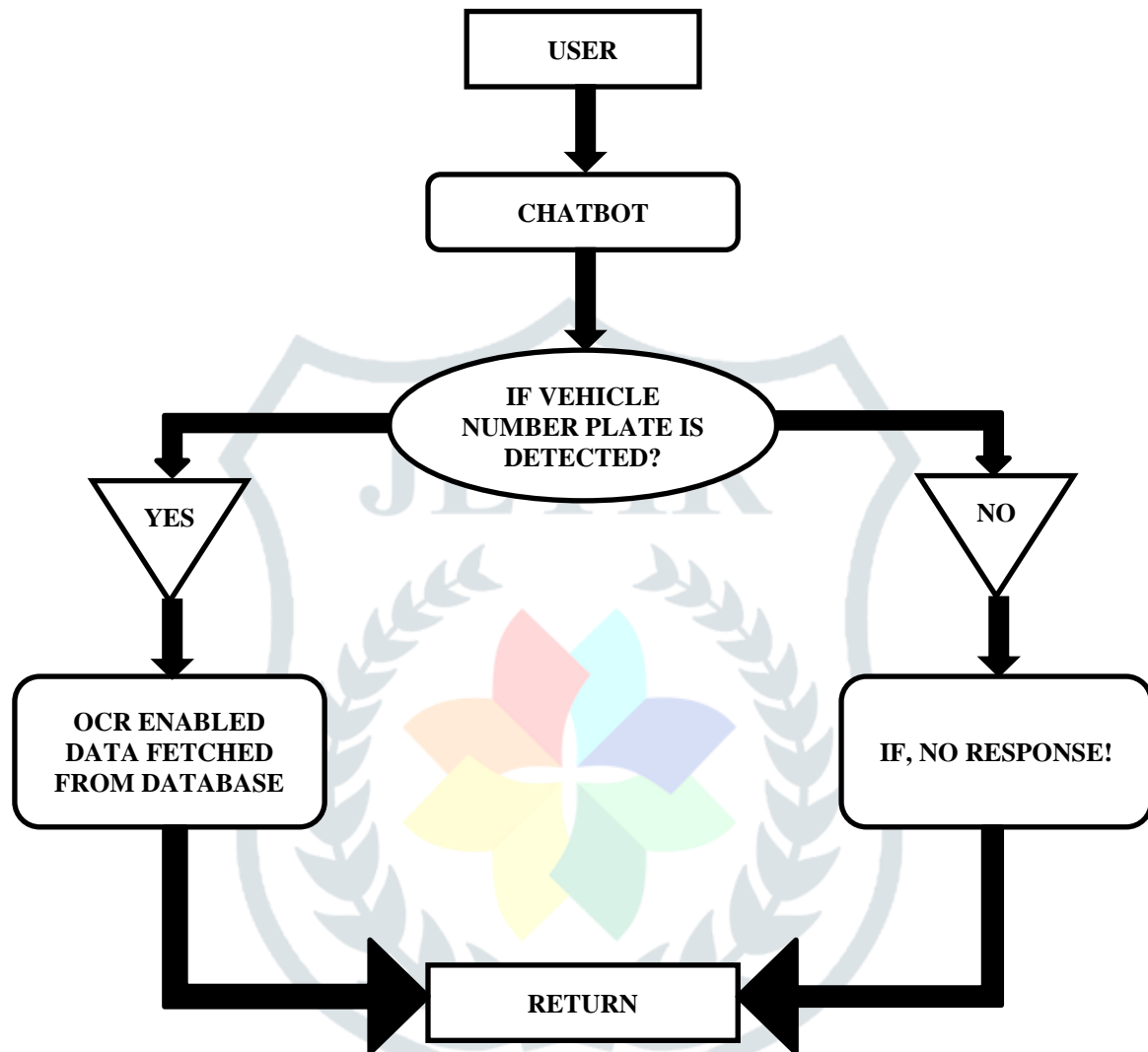


Fig.02: Flowchart of chatbot system

Natural Language Understanding (NLU) is the task of Natural Language Processing (NLP) which is an area of artificial intelligence. As it uses the human language and knowledge of the understanding which is being gathered to develop a program that will make computers understand and manipulate natural language to perform desired tasks. And NLU aims at the extraction of the context and meaning from natural language user inputs, which responds appropriately and extracts the domain-specific entities [20].

Vehicle number plate detection and Optical character recognition (OCR) are the fundamental modules used in the implementation of the chatbot system. The input image from the user is taken and extraction of the vehicle number plate is being processed from the open-source database using AI and ML. Then a corresponding response is being generated as the vehicle information in return [21-22].

Basically, the framework which is being used for vehicle number plate detection and recognition is based on Image Processing, where it first captures the image and a set of an algorithm is applied to enhance its quality known as pre-processing. With the help of the threshold technique, the image is converted into black and white. Localization is done when it recognizes the characters from the vehicle number plate image and it traverses through the image and finds the connected pixels. Segmentation takes place with cropping out the labelled connected components. At last, all the connected components are sent to an Optical Character Recognition Engine, which returns the ASCII of the vehicle number.

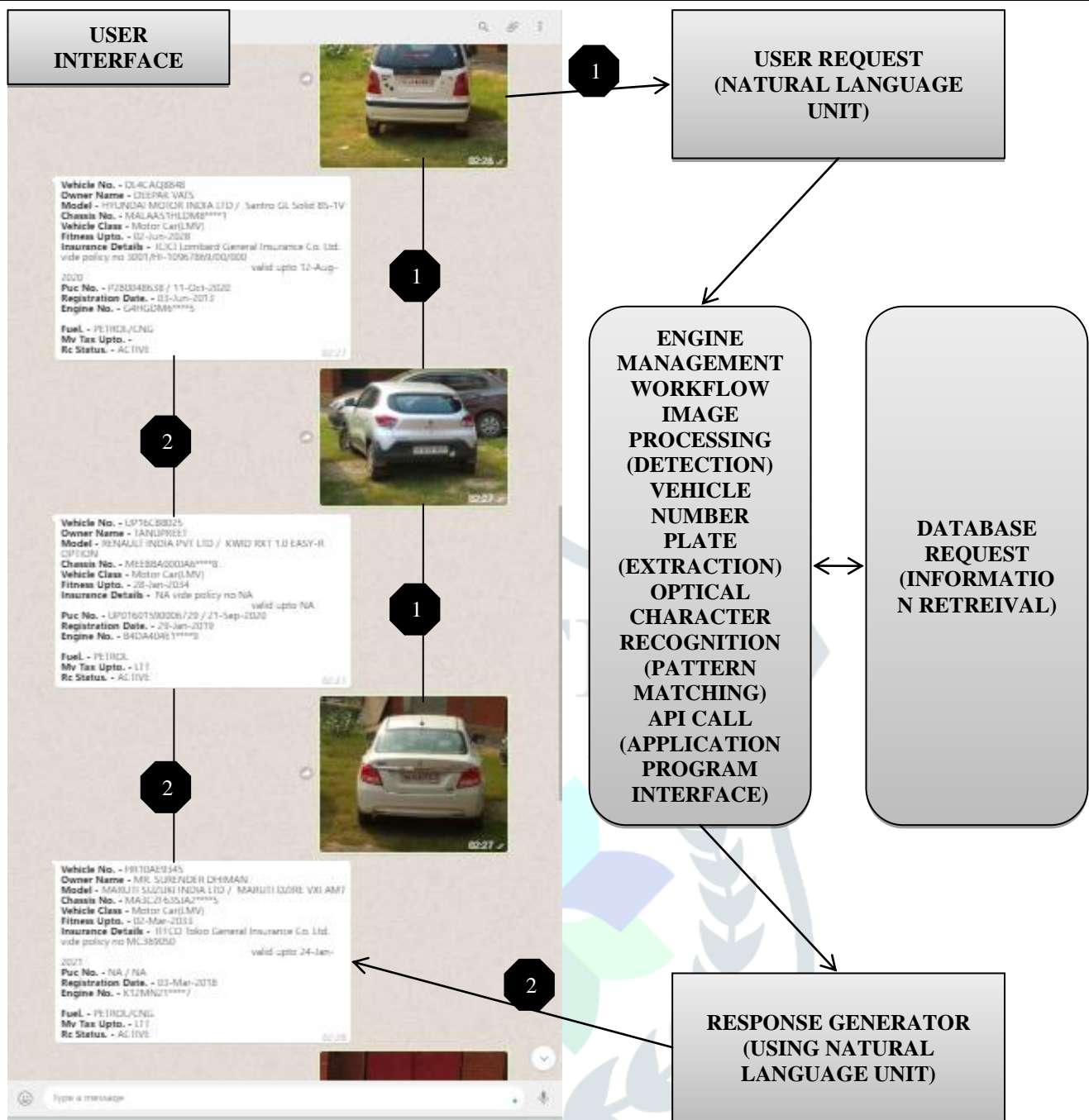


Fig.03: Architecture of chatbot system

So, as you can see above in Fig. 03 the architecture of chatbot system shows that the user is requesting by using Natural Language Unit (NLU) to send the image of the vehicle with number plate in the chat. Then after that, the engine management workflow processes the detection of number plate using image processing technique and after that, the intent entities of vehicle number plate gets extracted. Next optical character recognition (OCR) is the technique which classifies the input character according to the predefined character class which is also known as pattern matching and after that database requests for information retrieval. Lastly, the application program interface(API) is processed and the response generated from the information retrieved is sent back to the user interface.

#### IV. RESULT AND CONCLUSION

This work is based on server scripting. And Puppeteer Library is used in Java programming for the database which is known as the receiving output. Tesseract Library is used for Image Processing in which Optical Character Recognition (OCR) is generated.

Earlier, the National Informatics Centre (NIC) developed SMS and web-based applications for the people who take vehicles on hire to check the credentials of drivers and the vehicle as well. This service also helps in the enforcement agencies to detect any fake documents. Users can view the real-time received output details of Registered Vehicles on Whatsapp based chatbot by uploading an input image on it.

In this paper, we have presented a Whatsapp Based Smart Application System for Traffic Management by using Python Language and Java Script. A chatbot has the capability of responding automatically with the help of artificial intelligence and machine learning algorithms to produce different types of responses. It becomes easy for a developer to create a chatbot and automate the conversations with the users. Each time when a user sent an image, the library saves the image automatically that the user has sent. The program searches for the closest matching response by the technique of AI and ML that matches the input, and then it returns the most likely response to that image based on how the user shares each response.

A chatbot is one of the simple ways for the users where they can easily type their queries and retrieve information. It is a great tool for quick interaction and helps the user by providing answers to their questions that are hard to find. We worked on how chatbot is developed and the applications of chatbot in various fields. By understanding the general purpose of a chatbot it must be simple, user-friendly, must be understood by the user and the knowledge base must be compact. In addition, a comparison has been discussed with the earlier methods of extracting vehicle owner data. [23-26]

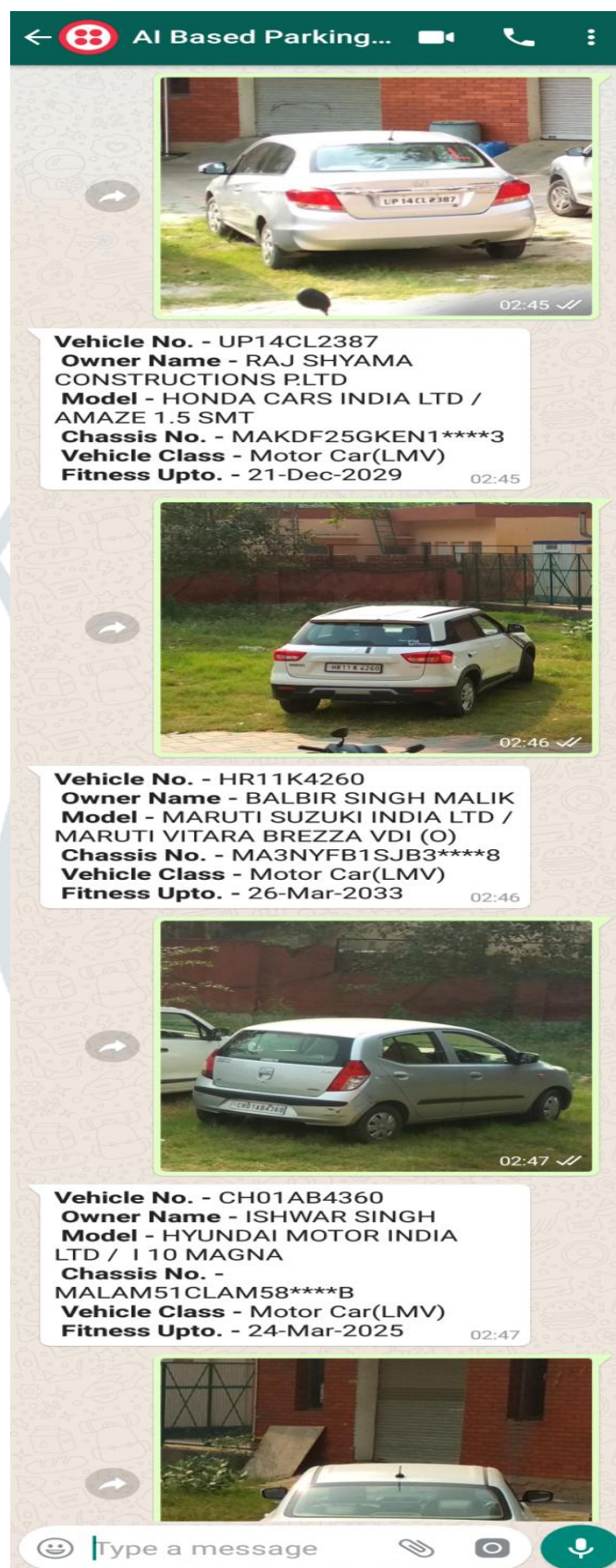


Fig. 03 Whatsapp chatbot (Screenshot)

## REFERENCES

- [1] Weizenbaum, J.: ELIZA—a computer program for the study of natural language communication between man and machine. *Commun. ACM* **9**, 36–45 (1966). <https://doi.org/10.1145/365153.365168>

- [2] Brandtzaeg, P.B., Følstad, A.: Why people use chatbots. In: Kompatsiaris, I., et al. (eds.) *Internet Science*, pp. 377–392. Springer, Cham (2017). [https://doi.org/10.1007/978-3-319-70284-1\\_30](https://doi.org/10.1007/978-3-319-70284-1_30)
- [3] Klopfenstein, L., Delpriori, S., Malatini, S., Bogliolo, A.: The rise of bots: a survey of conversational interfaces, patterns, and paradigms. In: *Proceedings of the 2017 Conference on Designing Interactive Systems*, pp. 555–565. Association for Computing Machinery (2017)
- [4] Rinkal Devendrakumar Dharani: “Integration of AIML Bot on Conversational Agent for the Different Application” National Conference on Emerging Research Trends in Engineering -NCERTE 2016. Pages 444-448
- [5] Maria das graças bruno marietto, rafael varago de aguiar, gislene de oliveira barbosa, wagner tanakabotelho, edson Pimentel, “Artificial Intelligence Mark up Language: A Brief Tutorial” *International journals of Computer science and Engineering survey (TIN2013-68125-C02-02).IJCSSES 2013*
- [6] <https://www.irjet.net/archives/V3/i5/IRJET-V3I5439.pdf>
- [7] <https://vahan.nic.in/nrservices/>
- [8] Ramesh, K., Ravishankaran, S., Joshi, A., Chandrasekaran, K.: A survey of design techniques for conversational agents. In: Kaushik, S., Gupta, D., Kharb, L., Chahal, D. (eds.) *ICICCT 2017. CCIS*, vol. 750, pp. 336–350. Springer, Singapore (2017). [https://doi.org/10.1007/978-981-10-6544-6\\_31](https://doi.org/10.1007/978-981-10-6544-6_31)
- [9] Wu, Y., Wu, W., Xing, C., Zhou, M., Li, Z.: *Sequential Matching Network: A New Architecture for Multi-turn Response Selection in Retrieval-based Chatbots*. arXiv:1612.01627 [cs] (2016)
- [10] Hien, H.T., Cuong, P.-N., Nam, L.N.H., Nhung, H.L.T.K., Thang, L.D.: Intelligent assistants in higher-education environments: the FIT-EBot, a chatbot for administrative and learning support. In: *Proceedings of the Ninth International Symposium on Information and Communication Technology*, pp. 69–76. ACM, New York (2018)
- [11] Nimavat, K., Champaneria, T.: Chatbots: an overview types, architecture, tools and future possibilities. *Int. J. Sci. Res. Dev.* **5**, 1019-1024 (2017)
- [12] Kucherbaev, P., Bozzon, A., Houben, G.-J.: Human-aided bots. *IEEE Internet Comput.* **22**, 36–43 (2018). <https://doi.org/10.1109/MIC.2018.252095348>
- [13] [https://www.researchgate.net/profile/Menal\\_Dahiya/publication/321864990\\_A\\_Tool\\_of\\_Conversation\\_Chatbot/links/5a360b02aca27247eddea031/A-Tool-of-Conversation-Chatbot.pdf](https://www.researchgate.net/profile/Menal_Dahiya/publication/321864990_A_Tool_of_Conversation_Chatbot/links/5a360b02aca27247eddea031/A-Tool-of-Conversation-Chatbot.pdf)
- [14] R. S. Russell, “Language Use, Personality and True Conversational Interfaces”, Project Report of AI and CS University of Edinburgh, Edinburgh, pp.1-80, 2002.
- [15] Y. Zhou, X. Ziyu, A. W. Black, A. I. Rudnicky, “Chatbot Evaluation and Database Expansion via Crowd sourcing”, *Proc. Of the Chatbot Workshop of LREC, US*, pp. 16-19, 2016.
- [16] Abu Shavar, B.A., Atwell, E.S.: Chatbots: are they really useful? *J. Lang. Technol. Comput. Linguist.* **22**, 29–49 (2007)
- [17] Klopfenstein, L., Delpriori, S., Malatini, S., Bogliolo, A.: The rise of bots: a survey of conversational interfaces, patterns, and paradigms. In: *Proceedings of the 2017 Conference on Designing Interactive Systems*, pp. 555–565. Association for Computing Machinery (2017)
- [18] C. R. Anik, C. Jacob, A. Mohanan, “A Survey on Web Based Conversational Bot Design”, *JETIR*, Vol.3, Issue.10, pp. 96-99, 2016.
- [19] R. P. Schumaker, H. Chen, “Leveraging Question Answer Technology to Address Terrorism Inquiry”, *Decision Support Systems*, Vol.4, Issue.3, pp. 1419-1430, 2007.
- [20] Jung, S.: Semantic vector learning for natural language understanding. *Comput. Speech Lang.* **56**, 130–145 (2019). <https://doi.org/10.1016/j.csl.2018.12.008>
- [21] B. P. Kiptonui, “Chatbot Technology: A Possible Means of Unlocking Student Potential to Learn How to Learn, Educational Research”, Vol.4, Issue.2, pp. 218-221, 2013.
- [22] S. Ghose, J. J. Barua, “Toward the Implementation of a Topic Specific Dialogue Based Natural Language Chatbot as an Undergraduate Advisor”, *International Conference on Informatics, Electronics & Vision, India*, pp. 1-5, 2013.
- [23] J. Jia, “The Study of the Application of a Keywords-based Chatbot System on the Teaching of Foreign Languages”, Report of University of Augsburg, Augsburg, pp.1-36, 2003.
- [24] [https://www.iaeme.com/MasterAdmin/uploadfolder/IJCET\\_08\\_05\\_003/IJCET\\_08\\_05\\_003.pdf](https://www.iaeme.com/MasterAdmin/uploadfolder/IJCET_08_05_003/IJCET_08_05_003.pdf)
- [25] I. Maglogiannis et al. (Eds.): *AIAI 2020, IFIP AICT 584*, pp. 373–383, 2020. [https://doi.org/10.1007/978-3-030-49186-4\\_31](https://doi.org/10.1007/978-3-030-49186-4_31)
- [26] *International Journal of Computer Sciences and Engineering* Vol.5(5), May 2017, E-ISSN: 2347-2693