

Chapter 23

NLP Voice Assistance for IoT Autonomous Vehicles Using ML Algorithms for Seamless Navigation

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ABSTRACT

The goal of this research project is to ascertain whether or not combining Internet of Things (IoT) and Natural Language Processing (NLP) technology could improve the caliber of voice-assisted navigation in self-driving cars. The system under consideration utilizes machine learning techniques to provide smooth navigation and an easy-to-understand voice-based interface for car administration. The preprocessing step includes speech-to-text conversion, which is the process of converting spoken commands into text for additional analysis. The preparatory processing step is another name for this stage. Utilizing time-series data analysis is essential to completing the feature selection process. Finding important patterns that are necessary for navigational judgments requires a study of the vehicle's sensor data, which includes GPS, speed, and ambient inputs. To find important trends, this analysis is required. Sequence models—more especially, Recurrent Neural Networks (RNNs) or Long Short-Term Memory (LSTM) networks—are used during the classification process.

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I. INTRODUCTION

The introduction of autonomous vehicles (AVs), the transportation industry has experienced a significant transformation. These cars can now navigate and make judgments with minimal assistance from human drivers. Voice assistance technologies are now a crucial component of the process of improving the sector's operational efficiency and user experience as it shifts toward increased automation. (Anjum, M., & Shahab, S., 2023) explains voice assistance based on Natural Language Processing (NLP) provides consumers with a more user-friendly and hands-free interface for engaging with autonomous vehicles (AVs), allowing them to continuously control the navigation of their vehicles. (Putri, T. D. (2021), investigate the possibilities of integrating machine learning algorithms, Internet of Things (IoT) technology, and natural language processing (NLP) to develop an effective, user-friendly, and streamlined voice-driven navigation system for autonomous vehicles.

Figure 1. Block diagram for voice assistant using raspberry pi in multi- language.

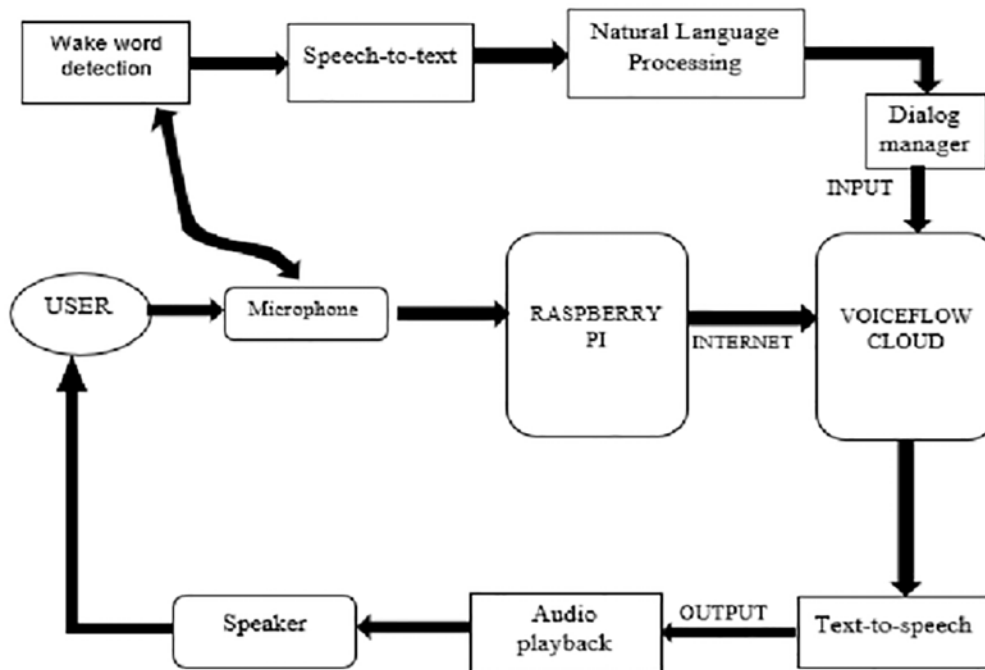


Figure 1 presents an illustration of the architecture of a voice assistant system that involves the utilization of a Raspberry Pi (Pandey, B. K., & Pandey, D., 2025) and Voice flow Cloud. After the user has spoken a command, which is then picked up by a wake word detection module (Sheela, M. S. et al., 2025), the process will start. The speech-to-text module, once engaged, is responsible for converting spoken words into text. This text is subsequently processed by a natural language processing (NLP) system in

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