

GenAI-POWERED VOICE ASSISTANT FOR TESLA

We developed and integrated a voice assistant powered by generative AI (GenAI) into the client's automotive infotainment system, streamlining interactions for Tesla drivers and increasing safety.

#artificial_intelligence



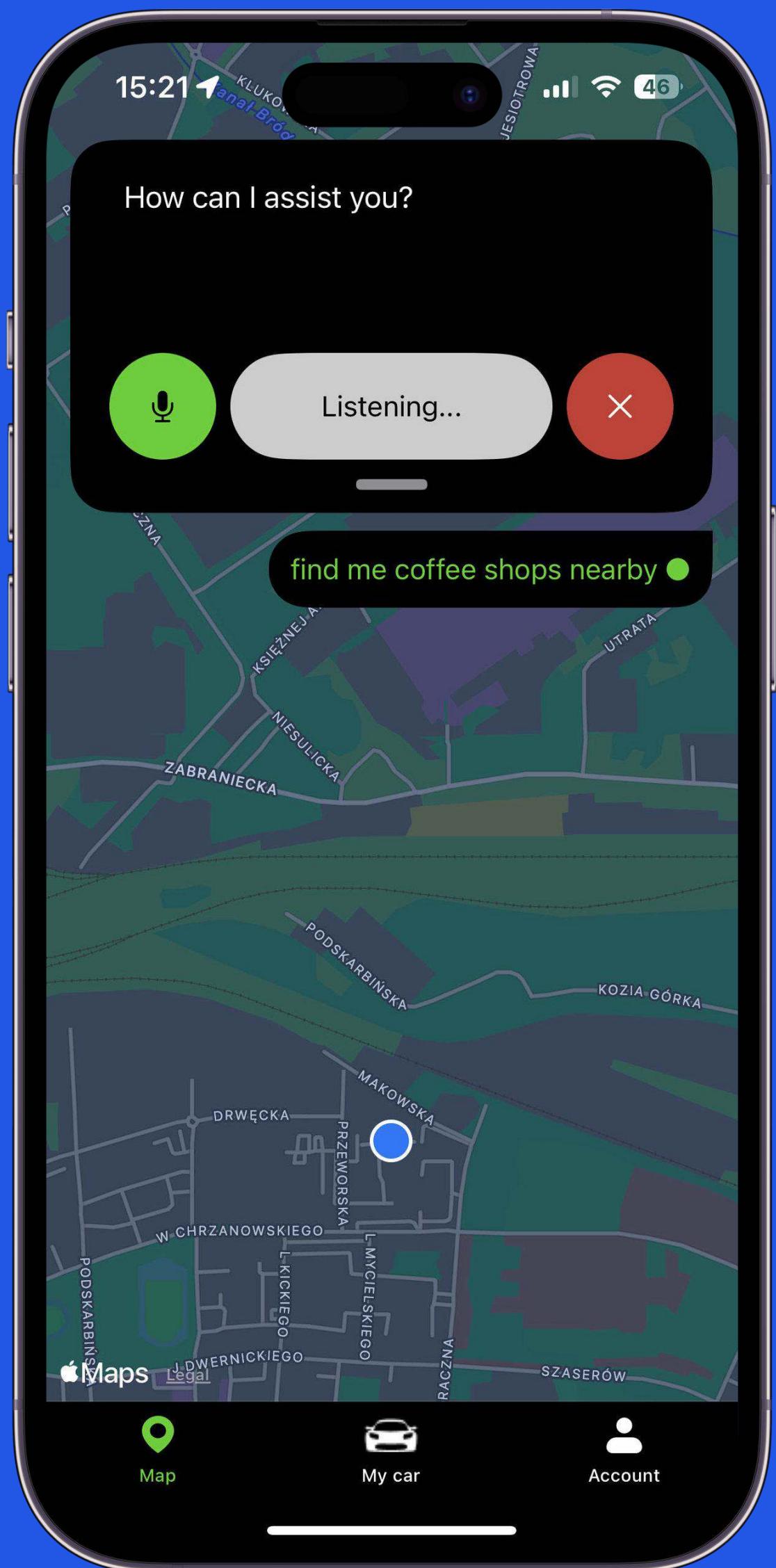
CLIENT AND CHALLENGE

Our client, Kilowatts Co., has developed an infotainment application that allows Tesla drivers to plan trips, find charging stations, and order items from nearby stores and restaurants. Despite its innovative features, the Kilowatts app posed critical usability and safety challenges. **To avoid these problems, the client wanted to integrate a GenAI-powered voice assistant into the software.** After examining several of our AI-focused projects, Kilowatts Co. confidently enlisted our expertise.

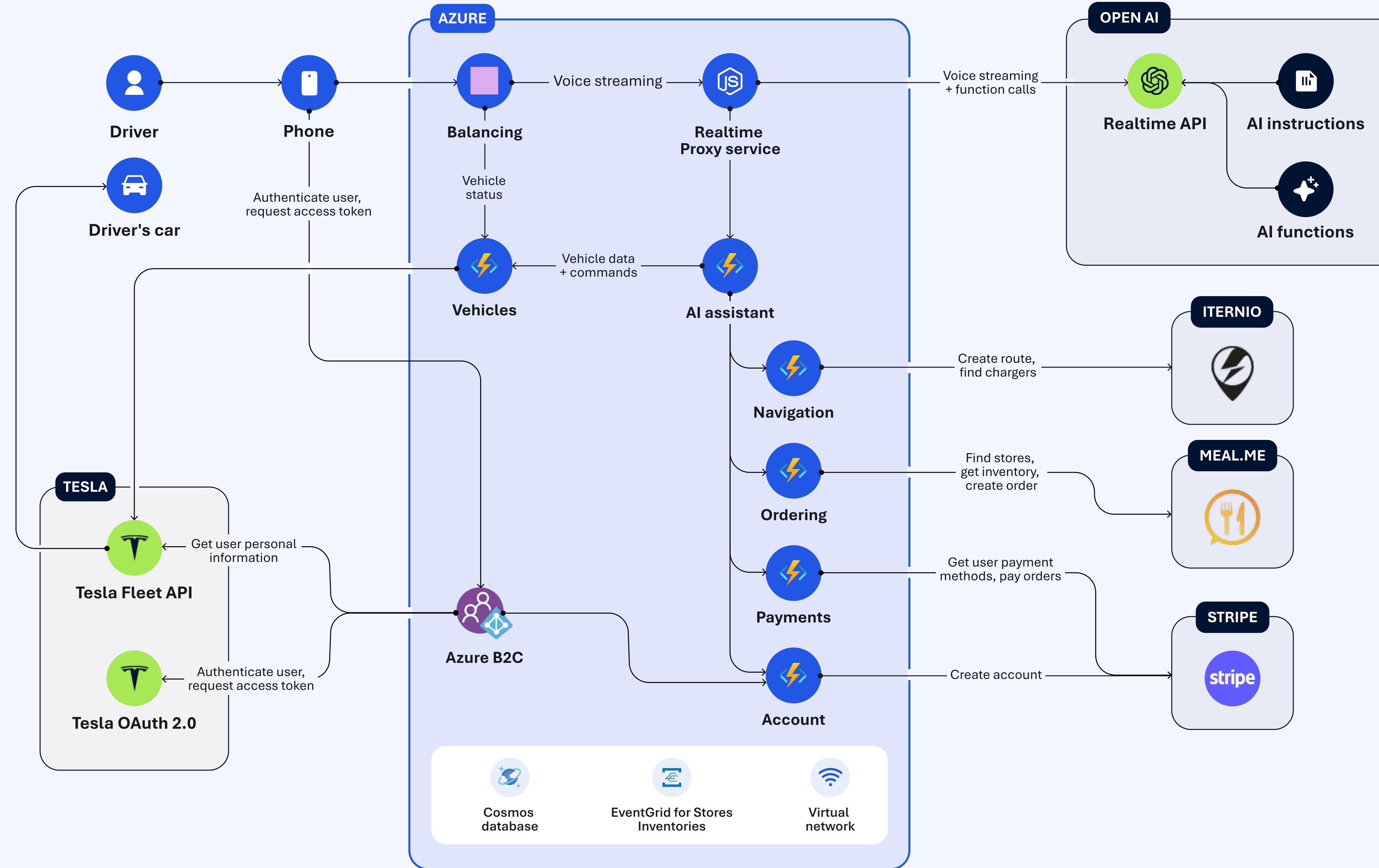


SOLUTION

Our developers created a voice assistant and integrated it into Kilowatts, expanding the app's existing functionality with additional features. The assistant's back-end architecture was built as microservices and deployed on Microsoft Azure. To enable **real-time voice streaming and processing**, our team incorporated the OpenAI Realtime API powered by GPT-4o-Realtime large language model (LLM) and natural language processing (NLP) techniques like sentiment analysis.



MICROSERVICES ARCHITECTURE



THE VOICE ASSISTANT, WITH THE REALTIME API AT ITS CORE:



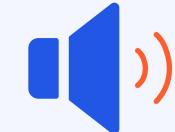
Supports function calling, enabling the voice assistant to interpret driver requests, identify underlying intent, and **create appropriate responses** tailored to drivers' emotional conditions.



Uses function calling to connect LLMs with third-party APIs to execute various commands—from ordering items and booking hotel rooms to finding charging stations and creating navigation routes.



Triggers continuous audio streaming while also transcribing audio to text with a built-in mechanism. This ability reduces latency, establishes natural conversation flow, and increases accuracy.



Ensures hands-free voice interactions, eliminating the need to tap the screen on the infotainment system, thereby increasing safety for drivers.



Demonstrates a solid understanding of various topics, contexts, idioms, indirect requests, and more.

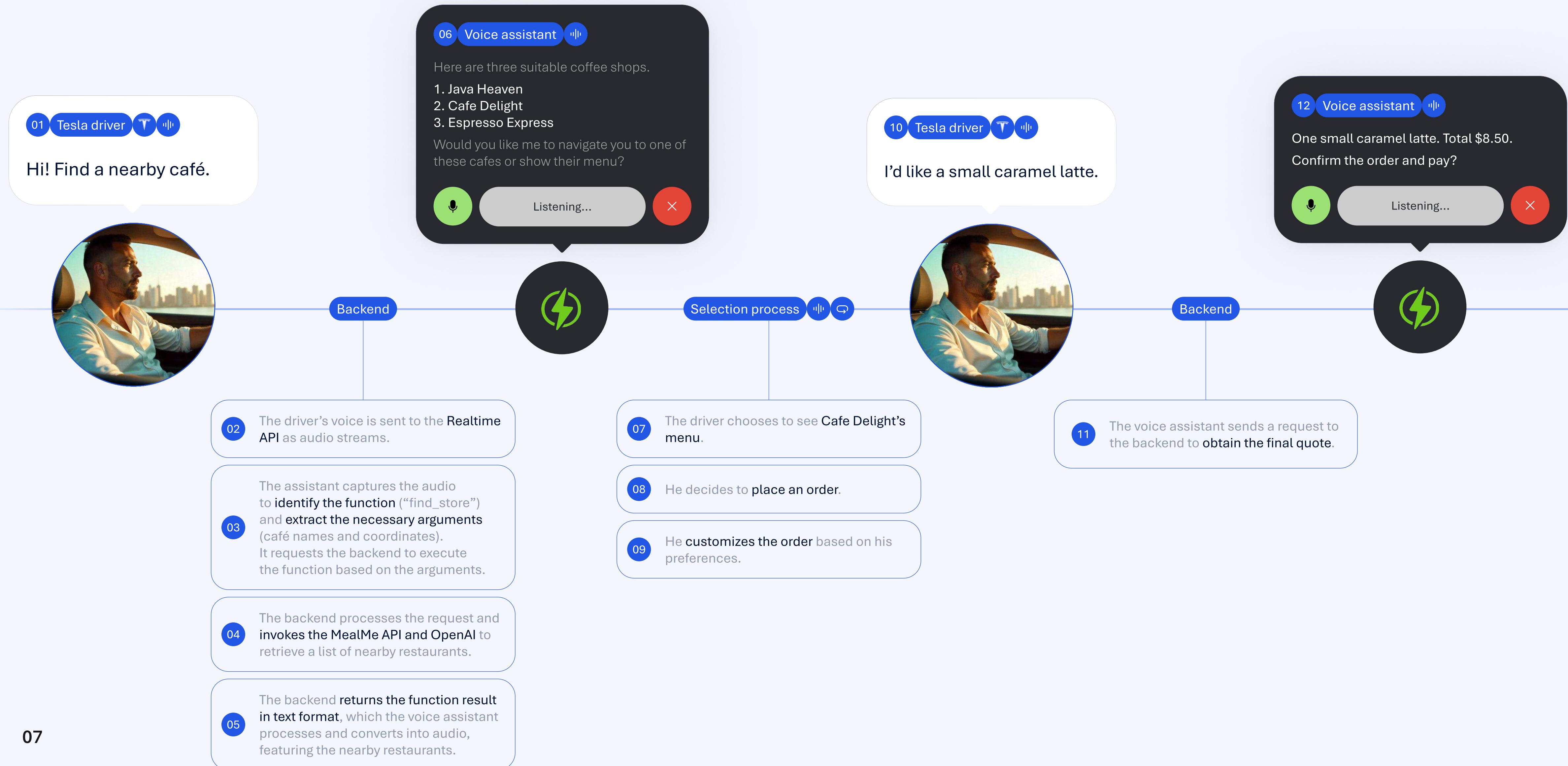


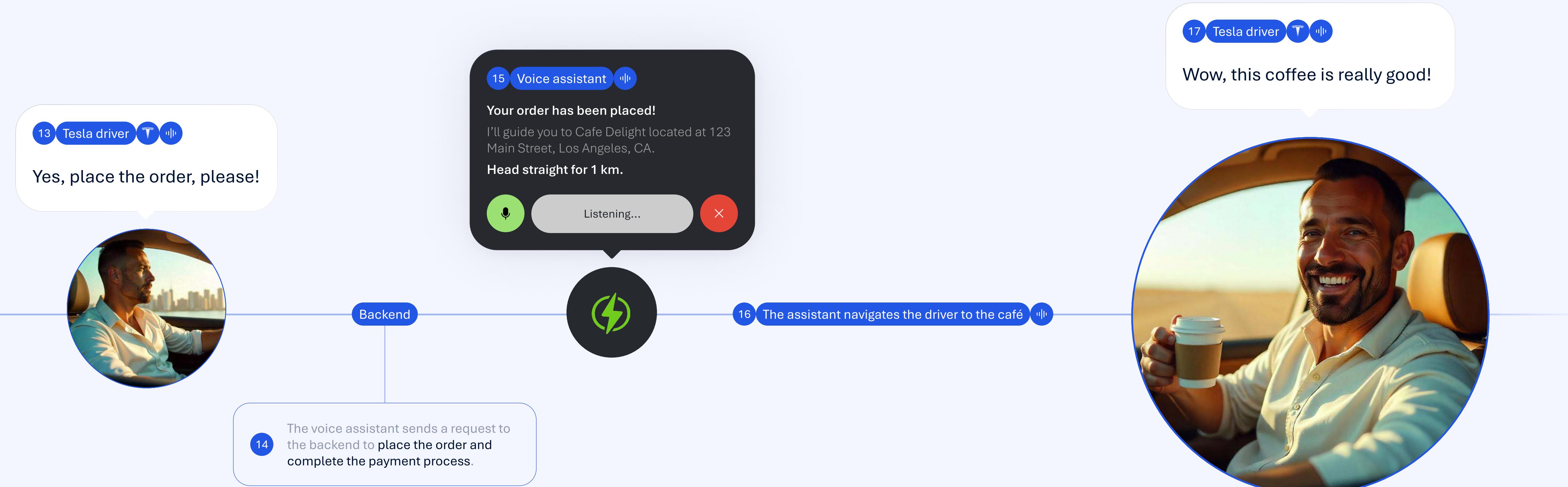
Captures and preserves distinctive phonetic features, such as intonation, pace, pitch, accent, and others.

ORDER CREATION

We incorporated an order creation feature that lets Tesla drivers use voice input to search for stores, hotels, and restaurants and order coffee or other take-out orders, which significantly saves time and increases convenience.

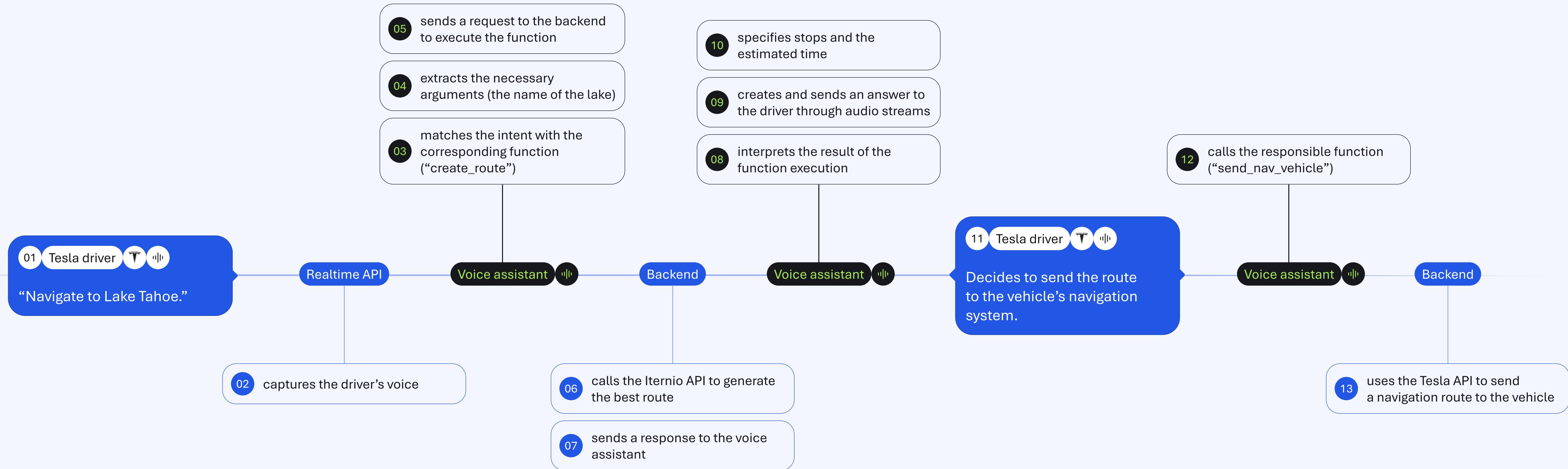






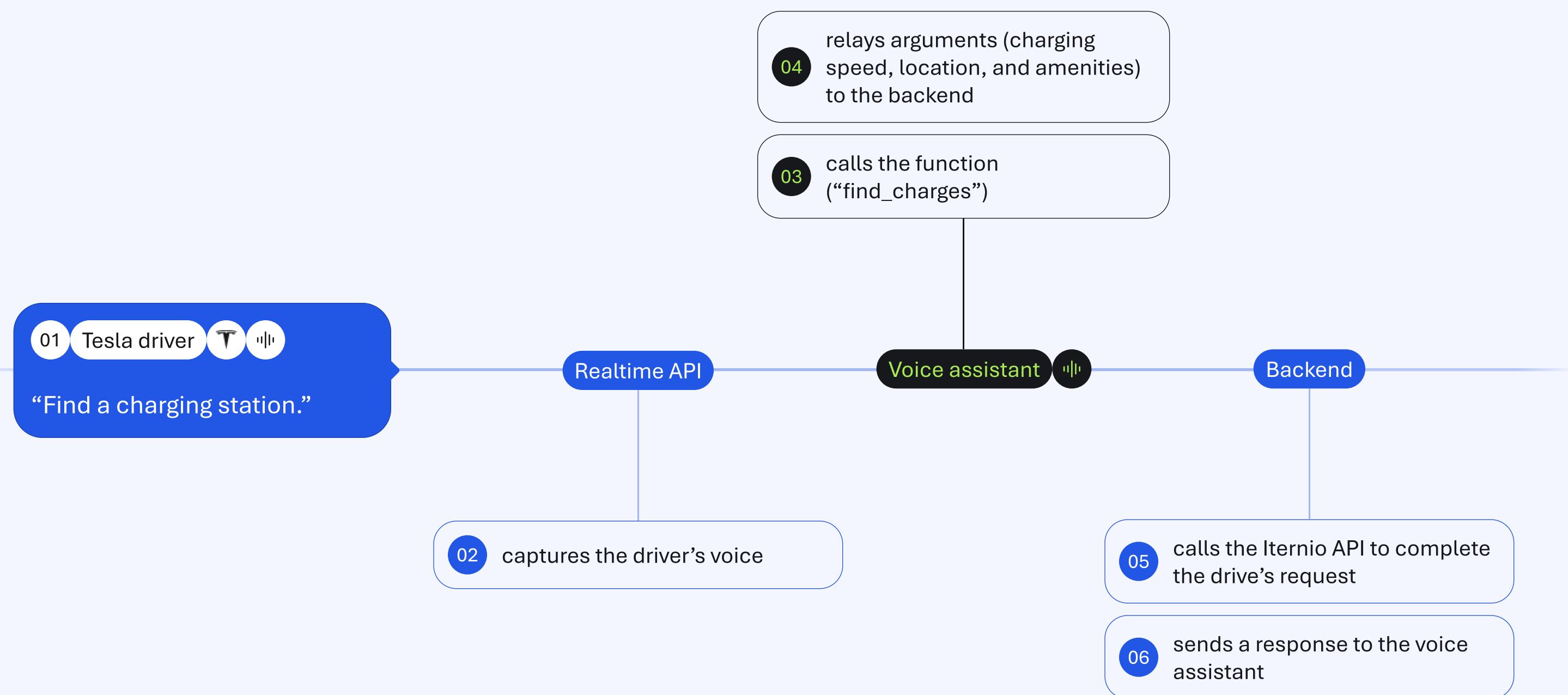
ROUTE CREATION AND NAVIGATION

We added a new feature that allows the GenAI-powered voice assistant to create routes and send them to the vehicle's navigation system. The assistant **recommends only the most efficient route in given conditions**, requiring no manual input and avoiding distractions.



NAVIGATION TO CHARGING STATIONS

Navigation to charging stations is another functionality our developers incorporated into Kilowatts. Capitalizing on this feature **allows drivers to easily identify the nearest charging station**, keeping their Teslas on the go as long as needed.



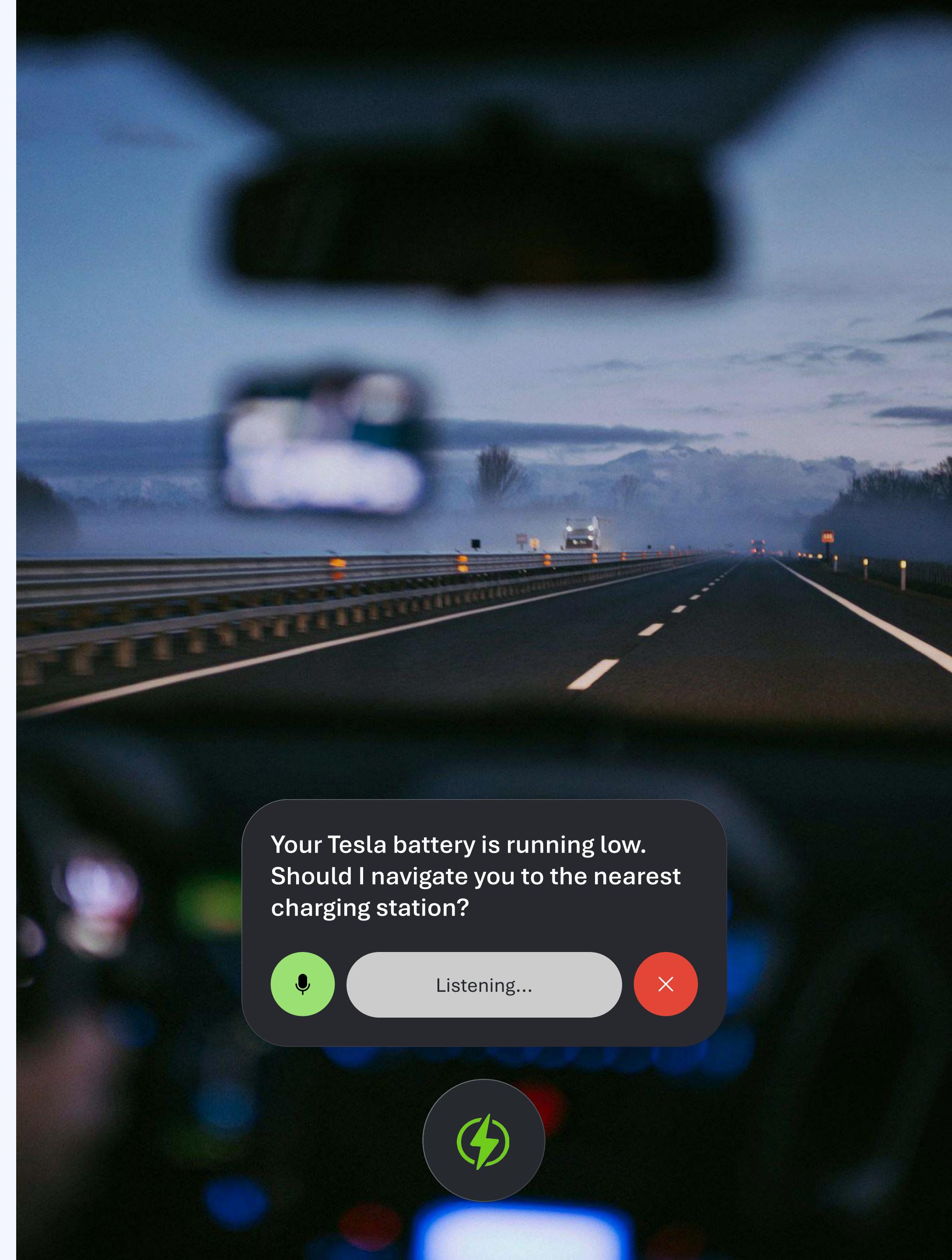
BATTERY LEVEL CONTROL

The GenAI-driven voice assistant we built includes a feature for battery level control. By asking the driver in advance about the desired energy level at the destination, the software **constructs the route to maintain battery capacity as requested**. This feature helps optimize routes, reduce energy consumption, and minimize the risk of power loss in remote areas.



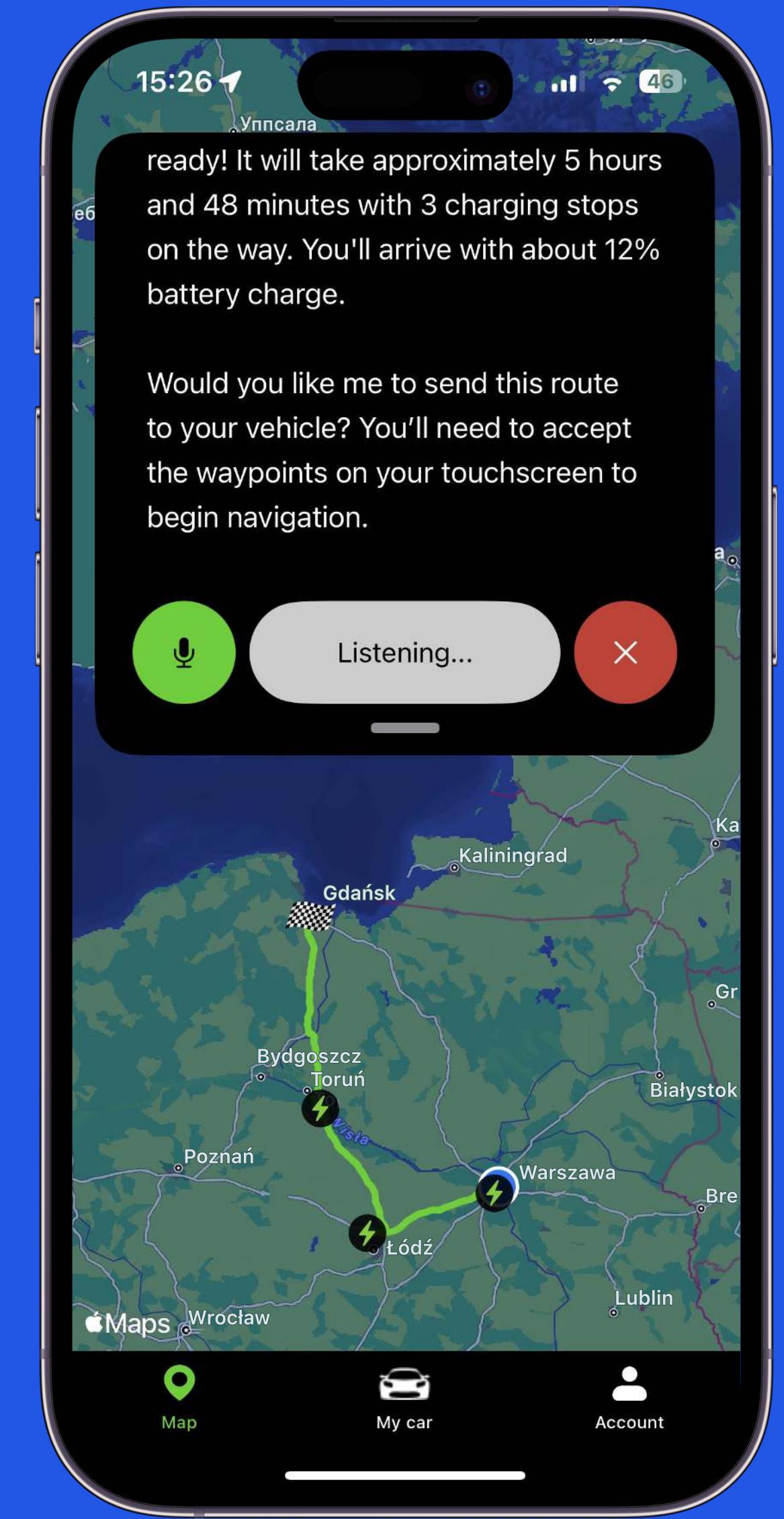
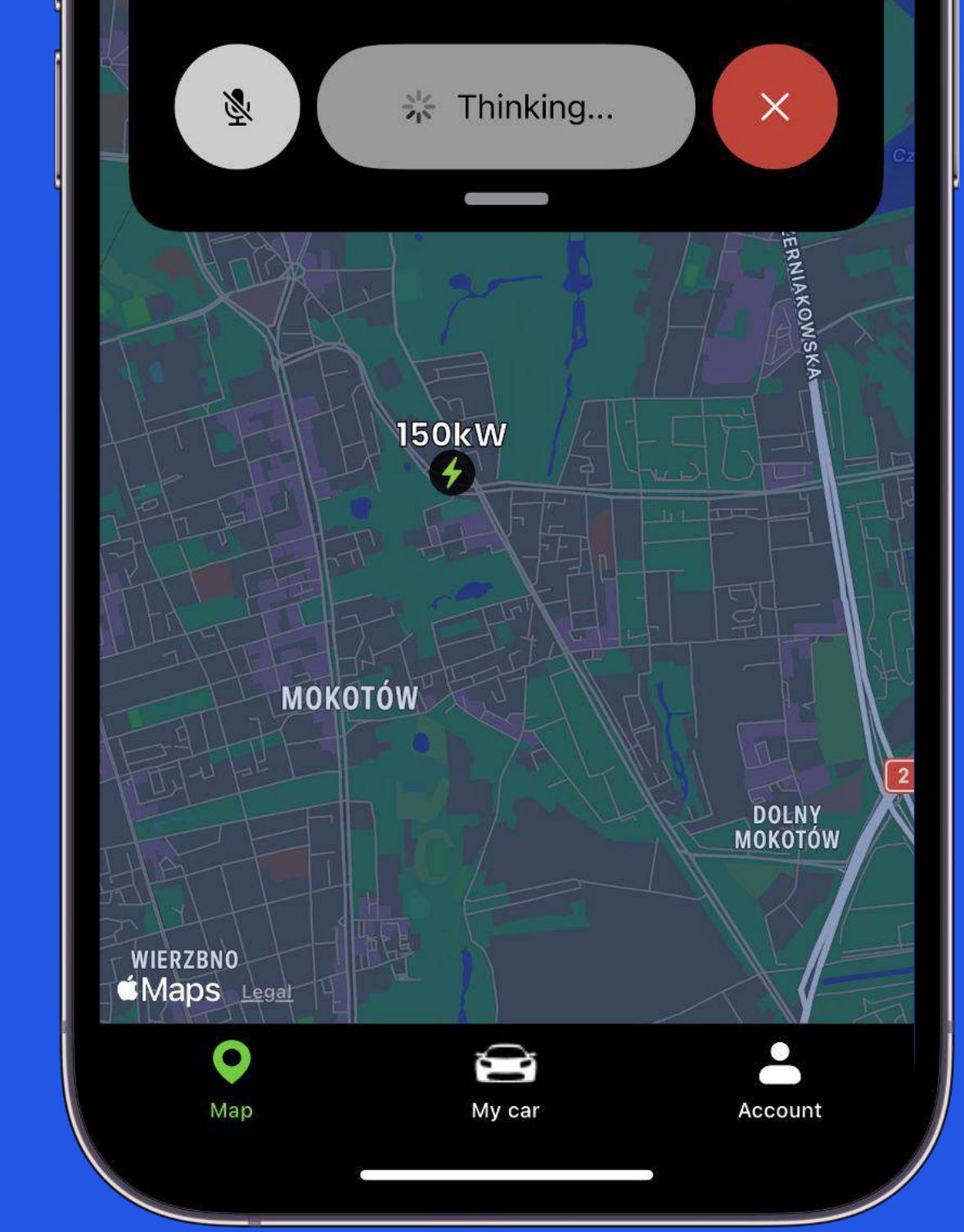
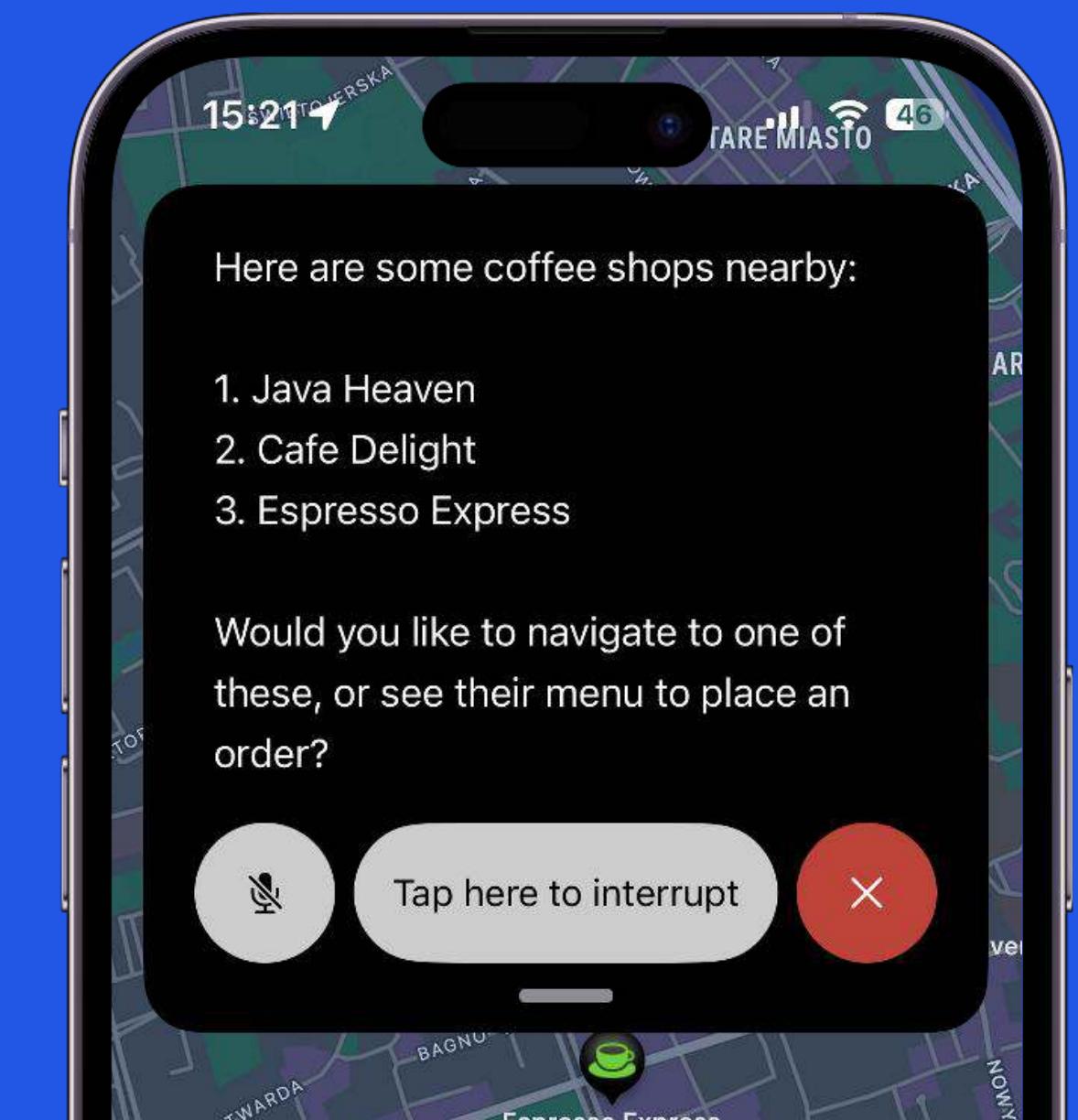
PROACTIVE SUGGESTIONS

Another feature the Kilowatts app now offers is the ability to anticipate driver needs. The voice assistant **adapts in real time to changing conditions and offers proactive suggestions**, which increases user engagement and improves the driving experience. For instance, the system can recommend nearby stores, charging stations, and restaurants based on the current location, battery level, and driver's previous preferences.



RESULTS

EffectiveSoft's team met all the client's objectives and successfully completed the project. We developed **an intelligent, GenAI-driven voice assistant**—fueled by the OpenAI Realtime API—that allows for **voice-based interactions and fulfills various requests for Tesla drivers, enabling them to stay focused on the road**. We evolved the Kilowatts app into not just a voice assistant that improves safety through hands-free interactions but an invisible AI companion that engages with drivers, deeply understands and anticipates their needs, and demonstrates empathy.



TECH STACK

OPERATING SYSTEMS	TECHNOLOGIES	PROGRAMMING LANGUAGES	EXTERNAL SERVICES	ARTIFICIAL INTELLIGENCE
 Linux	 RESTful APIs	 JavaScript	 Fleet API	 OpenAI Chat
FRAMEWORKS	 WebSockets	 Go	 Command SDK	 OpenAI Assistant
 .NET 8	 Azure Functions	 C#	 Iternio	 OpenAI Realtime
VIRTUALIZATION	EVENT AND MESSAGING	DATA STORAGE AND QUERYING	 MealMe	 LangChain
 Docker	 Azure EventGrid	 Azure Cosmos DB		
CLOUD	 Azure Event Hubs	 Azure Blob Storage		
 Azure	RUNTIME ENVIRONMENT	ARCHITECTURE		
PAYMENT PROVIDERS	 CLR	Microservices		
 Stripe	 Node.js	Event-Driven	 Tesla OAuth2	 Azure B2C

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