

CASE STUDY

NASA Uses Deepgram to Power the Next Generation of Space Tech

With Deepgram, NASA is doing things that weren't possible with any other technology available.



ORGANIZATION

As a leader in global space exploration, NASA employs people from a variety of backgrounds and differing expertises to make space missions happen, with more than 20 different facilities and centers across the US.

NEEDS

ASR systems that can handle background noise and garbled audio while still producing highly accurate transcripts.

SOLUTION

[Deepgram's AI Speech Platform](#), [Tailored Speech Models](#), and [Audio Search](#).

BENEFITS

- Word recall rates of 86-87
- Useable transcripts to improve NASA mission
- Searchable audio for training and validation purpose
- Reduced need for tedious human transcription

See how we stack up on real NASA audio:

[See the comparison →](#)

THE CHALLENGE

Noisy Audio Made Transcription Difficult

If you've ever listened to audio from space, you know how hard it can be to clearly understand what's being said. NASA wanted to use speech-to-text to improve their current processes and workflows. But even more than that, they wanted to be able to expand into use cases that simply weren't possible without fast, accurate, automatic transcription of what was being said.

NASA tried all the major speech-to-text providers—and even built their own solution using the open-source tool Kaldi. But nothing they tried reached the 80% word recognition rate (WRR) needed for the transcripts to be useful—until they tried Deepgram speech-to-text API.

THE SOLUTION

Flexible, Tailored Models

Deepgram's flexibility and the ability to quickly train a new model based on the kind of audio it would be transcribing—namely, space-to-ground communications—allowed for the creation of a model that outperformed all of the options that NASA tried and reached the accuracy threshold they needed for their work.

The outcome of having an accurate, easily deployable STT system for NASA has been groundbreaking, allowing them to do things that weren't previously possible. NASA is currently using Deepgram's speech-to-text API for four different use cases, described below.

USE CASE #1**Space-to-Ground Communications**

When the ISS and Mission Control are communicating, they have three people hand writing what is being said to reduce the chance of errors. But NASA wanted a fourth, AI system to give them input on what's being said as well. Deepgram was able to use space-to-ground audio to tailor a model for NASA to create transcripts that are now up to 86% accurate.

The transcripts generated by Deepgram will help NASA address some of the most common issues that come up in communications with the ISS. These include otherwise undetected readback errors—when an astronaut reads back an instruction to Mission Control to make sure they're about to do the right thing, but says the wrong thing, and no one at Mission Control notices.

Deepgram's ability to search through audio also makes it possible for NASA to parse historical records of previous missions to search for specific incidents during previous missions. For example, using Deepgram, NASA was able to search the 4 days of mission audio from the Gemini 4 mission for the moment when the flight controllers commanded James McDivitt to tell Ed White "to get back in!" the spacecraft before they passed into Earth's shadow. We found the one piece of data we needed—in moments instead of trying to find it blindly. [Give it a listen](#).

USE CASE #2**The Neutral Buoyancy Lab**

The Neutral Buoyancy Lab at NASA allows astronauts to train in full spacesuits, using the water to create a close analog to microgravity here on Earth. The audio from these training missions is low quality and noisy, like the audio from space, with the sounds of bubbles and breathing gear degrading the quality.

With an accurate ASR model from Deepgram, though, NASA will be able to overcome the noise issues to create transcripts and search through audio of previous missions. Deepgram's latest trained model has achieved ~87% WRR on multiple NASA validation sets, including from the Neutral Buoyancy Lab.

USE CASE #3**Medical Interactive Response Intelligent System (IRIS) Chatbot**

NASA's Medical Interactive Response Intelligence System (IRIS) is designed to provide guidance during potential medical emergencies on the International Space Station (ISS).

Using a chatbot powered by Deepgram, IRIS will be able to field questions from a crew member about the health of another, helping them triage and treat emergent situations.

IRIS has been created to run on a Raspberry Pi with an external GPU to power Deepgram's speech-to-text in a form factor that will make deployment on the ISS possible in the future.

USE CASE #4

Robotic Processing Automation (RPA)

NASA's fourth Deepgram use case is still in development, but relates to robotic processing automation (RPA). This system will allow computers to kick off the next steps in a process once an astronaut has verbally confirmed that they've completed the necessary prerequisite steps, improving mission efficiency.

About Deepgram

Deepgram is a foundational AI company on a mission to understand human language. We give any developer access to the most advanced speech AI transcription and understanding with just an API call. Our models deliver the fastest, most accurate transcription alongside contextual features like summarization, sentiment analysis, and topic detection. Contact us to learn more at deepgram.com/contact-us.