

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

APPLE INC., AMAZON WEB SERVICES, INC., and  
AMAZON.COM SERVICES LLC

Petitioner,

v.

ZENTIAN LIMITED,  
Patent Owner.

---

IPR2023-00037<sup>1</sup>  
Patent 10,971,140 B2

---

Before KEVIN F. TURNER, JEFFREY S. SMITH, and  
CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge* SMITH.

Opinion Concurring filed by *Administrative Patent Judge* OGDEN

SMITH, *Administrative Patent Judge*.

JUDGMENT  
Final Written Decision  
Determining No Challenged Claims Unpatentable  
*35 U.S.C. § 318(a)*

---

<sup>1</sup> IPR2023-01197 has been joined with this proceeding.

## I. INTRODUCTION

### A. *Background and Summary*

Petitioner filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–8 of U.S. Patent No. 10,971,140 B2 (Ex. 1001, “the ’140 patent”). We issued an Institution Decision (Paper 10, “Dec.”) instituting the petitioned review. Patent Owner then filed a Patent Owner Response (Paper 19, “PO Resp.”) to the Petition. Petitioner filed a Reply (Paper 22, “Reply”) to the Patent Owner Response. Patent Owner filed a Sur-reply (Paper 27, “PO Sur-Reply”) to the Reply. An oral hearing was held on March 11, 2024, for which the transcript was entered into the record (Paper 33).

We have jurisdiction under 35 U.S.C. § 6(b)(4) and § 318(a). This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of claims 1–8 of the ’140 patent. We determine Petitioner has not shown by a preponderance of evidence that claims 1–8 are unpatentable.

### B. *Related Matters*

The parties indicate that the following matters relate to the ’140 patent: *Zentian Ltd v. Apple Inc.*, 6:22-cv-00122 (W.D. Tex. Feb. 2, 2022); *Zentian Ltd v. Amazon.com, Inc.*, 6:22-cv-00123 (W.D. Tex. Feb. 2, 2022); *Apple Inc. v. Zentian Ltd.*, *Inter Partes* Review No. IPR2023-00033; *Apple Inc. v. Zentian Ltd.*, *Inter Partes* Review No. IPR2023-00034; *Apple Inc. v. Zentian Ltd.*, *Inter Partes* Review No. IPR2023-00035; and *Apple Inc. v. Zentian Ltd.*, *Inter Partes* Review No. IPR2023-00036. Paper 4, 1; Pet. 64.

### *C. The '140 Patent*

The '140 patent is related to a speech recognition circuit which uses parallel processors for processing the input speech data in parallel.

Ex. 1001, 1:18–20.

The patent describes that in speech recognition, there are generally two processes: “front end processing to generate processed speech parameters such as feature vectors, followed by a search process which attempts to find the most likely set of words spoken from a given vocabulary (lexicon).” *Id.* at 1:21–26. According to the '140 patent, “for large vocabulary, speaker independent speech recognition, it is the search process that presents the biggest challenge.” *Id.* at 1:28–30.

The '140 patent describes that in order to speed up the search function, parallel processing techniques have been suggested. *Id.* at 1:45–47. The patent further describes that “one algorithm for performing the search is the Viterbi algorithm,” which “is a parallel or breadth first search through a transition network of states of Hidden Markov Models.” *Id.* at 1:36–39. This search algorithm is computationally intensive. *Id.* at 1:44. In one paper cited by the '140 patent, “a multi-threaded implementation of a fast beam search algorithm is disclosed.” *Id.* at 1:47–52. This “multi-threading implementation requires a significant amount of communication and synchronization among threads.” *Id.* at 1:52–54. In another cited paper, “the parallel processing of input speech parameters is disclosed in which a lexical network is split statically among processors.” *Id.* at 1:54–58.

To implement parallel processing of the search function, the '140 patent describes a special circuit, in which a “plurality of lexical tree processors are connected in parallel to the input port and perform parallel lexical tree processing for word recognition by accessing the lexical data in

the lexical memory arrangement.” *Id.* at 2:4–8. In addition, a “controller controls the lexical tree processors to process lexical trees identified in the results memory arrangement by performing parallel processing of a plurality of lexical tree data structures.” *Id.* at 2:12–15.

Figure 2 is a diagram of the circuit of the ’140 patent, and is reproduced below.

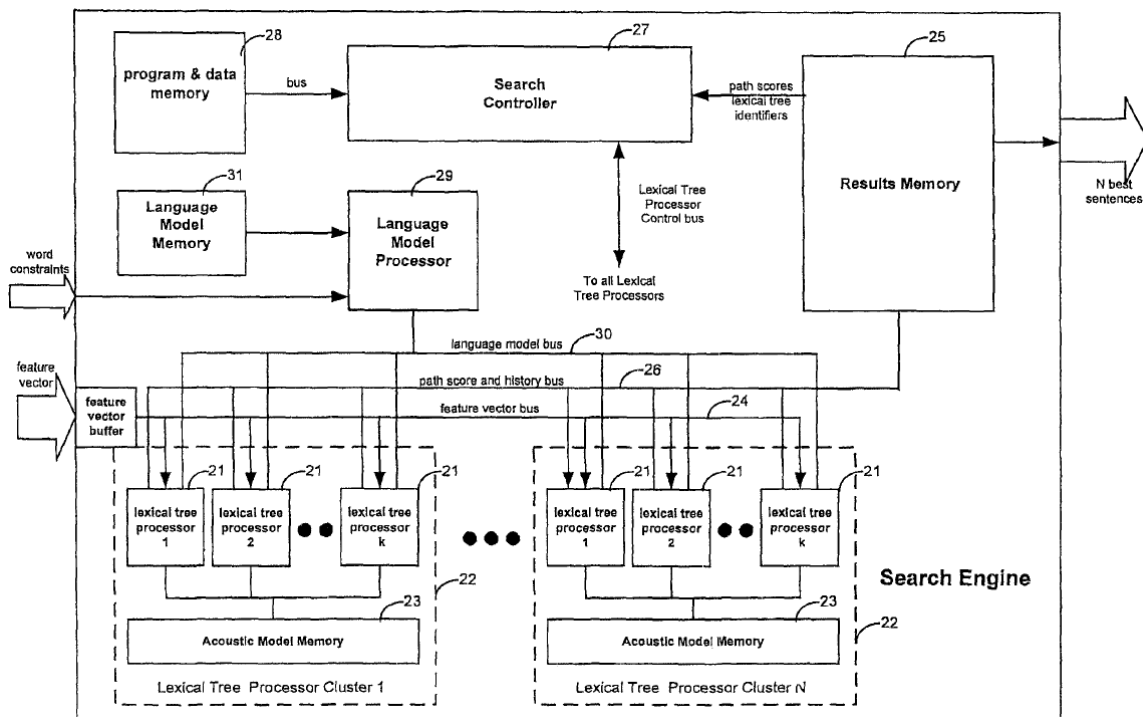


Figure 2, showing a plurality k of lexical tree processors 21, arranged in a lexical tree processor cluster 22, with acoustic model memory 23.

#### D. Illustrative Claim

Challenged claim 1 of the ’140 patent recites:

1. [Pre] A speech recognition circuit comprising:
  - [a] one or more clusters of processors, each of the one or more clusters of processors comprising:
    - a plurality of processors; and
    - [b] an acoustic model memory storing acoustic model data, [c] wherein each of the plurality of processors is configured to compute a probability using the

acoustic model data in the acoustic model memory,  
[d] wherein:

the speech recognition circuit is configured to  
generate an initial score for an audio sample;  
and

[e] the initial score is used to determine whether to  
continue processing to determine a final  
score via processing a larger amount of  
model data than that was processed to  
generate the initial score.

Ex. 1001, 12:13–26; Pet. 66–67 (showing Petitioner’s bracketed claim  
annotations).

#### *E. Evidence*

Petitioner relies on the following prior art:

U.S. Patent No. 6,374,219 B1, issued April 16, 2002 (Ex. 1004,  
“Jiang”);

U.S. Patent No. 5,428,803, issued June 27, 1995 (Ex. 1005, “Chen”);

U.S. Patent Appl. Publ. No. 2001/0053974 A1, published December  
20, 2001 (Ex. 1008, “Lucke”);

U.S. Patent No. 5,983,180, issued November 9, 1999 (Ex. 1009,  
“Robinson”);

U.S. Patent No. 5,036,539, issued July 30, 1991 (Ex. 1010,  
“Wrench”).

#### *F. Prior Art and Asserted Grounds*

Petitioner asserts that claims 1–8 of the ’140 patent are unpatentable  
on the following grounds:

| Claim(s) Challenged | 35 U.S.C. § | Reference(s)/Basis    |
|---------------------|-------------|-----------------------|
| 1–3, 5, 7, 8        | 103(a)      | Jiang, Chen           |
| 1–3, 5, 7, 8        | 103(a)      | Jiang, Chen, Lucke    |
| 4                   | 103(a)      | Jiang, Chen, Robinson |

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.