

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

APPLE INC.  
Petitioner

v.

ZENTIAN LIMITED,  
Patent Owner

---

*Inter Partes* Review Case No. IPR2023-00037  
U.S. Patent No. 10,971,140

**DECLARATION OF CHRISTOPHER SCHMANDT  
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF  
U.S. PATENT NO. 10,971,140**

**TABLE OF CONTENTS**

<b>I.</b>	<b>INTRODUCTION AND QUALIFICATIONS .....</b>	<b>8</b>
A.	EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.....	8
<b>II.</b>	<b>METHODOLOGY; MATERIALS CONSIDERED.....</b>	<b>11</b>
<b>III.</b>	<b>OVERVIEW AND LEGAL STANDARDS .....</b>	<b>13</b>
A.	PERSON OF ORDINARY SKILL IN THE ART.....	14
B.	OBVIOUSNESS.....	14
C.	ANALOGOUS ART .....	20
D.	CLAIM CONSTRUCTION .....	21
<b>IV.</b>	<b>LEVEL OF A PERSON OF ORDINARY SKILL.....</b>	<b>21</b>
<b>V.</b>	<b>OVERVIEW OF THE TECHNOLOGY .....</b>	<b>22</b>
A.	SPEECH RECOGNITION.....	22
B.	FEATURE VECTORS .....	30
C.	ACOUSTIC MODELS.....	34
D.	HIDDEN MARKOV MODELS .....	35
E.	PRIOR ART SPEECH RECOGNITION SYSTEMS .....	43
<b>VI.</b>	<b>OVERVIEW OF THE '140 PATENT.....</b>	<b>47</b>
<b>VII.</b>	<b>OVERVIEW OF THE PRIOR ART .....</b>	<b>48</b>
A.	OVERVIEW OF JIANG .....	48
B.	OVERVIEW OF CHEN.....	48
C.	OVERVIEW OF LUCKE.....	49
D.	OVERVIEW OF ROBINSON .....	49
E.	OVERVIEW OF WRENCH .....	50
<b>VIII.</b>	<b>OPINIONS REGARDING GROUND 1.....</b>	<b>50</b>
A.	MOTIVATION TO COMBINE <i>JIANG</i> AND <i>CHEN</i> .....	50
B.	MOTIVATION TO COMBINE <i>CHEN</i> AND <i>JIANG</i> .....	52
C.	OBVIOUSNESS OF MODIFYING ELECTRONIC HARDWARE AND SOFTWARE TO BE CIRCUITRY .....	52
D.	CLAIM 1 IS RENDERED OBVIOUS BY <i>JIANG</i> IN VIEW OF <i>CHEN</i> .....	53
1.	<i>Claim 1</i> .....	53
a)	Claim 1(Pre): “A speech recognition circuit comprising” .....	53

b)	Claim 1(a): “one or more clusters of processors, each of the one or more clusters of processors comprising: a plurality of processors;” .....	54
c)	Claim 1(b): “and [one or more clusters of processors, each of the one or more clusters of processors comprising:] an acoustic model memory storing acoustic model data” .....	59
d)	Claim 1(c): “wherein each of the plurality of processors is configured to compute a probability using the acoustic model data in the acoustic model memory” .....	62
e)	Claim 1(d): “[wherein] the speech recognition circuit is configured to generate an initial score for an audio sample” .....	70
f)	Claim 1(e): “[wherein] 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.” ..	77
2.	<i>Claim 2: “...wherein the probability is an input to an evaluation of a state transition of a model of states” .....</i>	<i>83</i>
3.	<i>Claim 5: “...further comprising: a buffer for storing one or more feature vectors coupled to at least one of the plurality of processors of the one or more clusters of processors” .....</i>	<i>85</i>
4.	<i>Claim 7: “...the one or more clusters of processors comprises a first cluster of processors and a second cluster of processors; the first cluster comprises a first acoustic model memory; and the second cluster comprises a second acoustic model memory that is distinct and separate from the first acoustic model memory” .....</i>	<i>87</i>

**IX. OPINIONS REGARDING GROUND 2..... 89**

A.	CLAIMS 1–3, 5, AND 7-8 ARE RENDERED OBVIOUS BY <i>JIANG</i> IN VIEW OF <i>CHEN</i> AND <i>LUCKE</i> .....	89
1.	<i>Claim 1</i> .....	<i>89</i>
a)	Claim 1(e): “[wherein] 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.” ..	89
2.	<i>Claim 5: “...further comprising: a buffer for storing one or more feature vectors coupled to at least one of the plurality of processors of the one or more clusters of processors” .....</i>	<i>91</i>

<b>X.</b>	<b>OPINIONS REGARDING GROUND 4.....</b>	<b>93</b>
A.	CLAIM 4 IS RENDERED OBVIOUS BY <i>JIANG</i> IN VIEW OF <i>CHEN</i> AND <i>ROBINSON</i> .....	93
1.	<i>Claim 4: “...wherein the probability is computed from a Gaussian mixture model and one or more feature vectors.”... 93</i>	
<b>XI.</b>	<b>OPINIONS REGARDING GROUND 6.....</b>	<b>94</b>
A.	CLAIM 4 IS RENDERED OBVIOUS BY <i>JIANG</i> IN VIEW OF <i>CHEN</i> AND <i>WRENCH</i> .....	94
<b>XII.</b>	<b>CONCLUSION.....</b>	<b>95</b>

**CLAIM LISTING**

**Claim 1:**

**Claim 1[Pre]** A speech recognition circuit comprising:

**1(a):** one or more clusters of processors, each of the one or more clusters of processors comprising: a plurality of processors;

**1(b):** and an acoustic model memory storing acoustic model data,

**1(c):** wherein each of the plurality of processors is configured to compute a probability using the acoustic model data in the acoustic model memory,

**1(d):** wherein: the speech recognition circuit is configured to generate an initial score for an audio sample;

**1(e):** and 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.

**Claim 2**

The speech recognition circuit of claim 1, wherein the probability is an input to an evaluation of a state transition of a model of states.

**Claim 3**

The speech recognition circuit of claim 2, wherein the model is a Hidden Markov Model.

**Claim 4**

# 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.