

Voice Recognition– Controlling mobile devices using voice commands



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Voice Recognition and Commands - Background

- Speech recognition (SR) is the translation of spoken words into text. It is also known as automatic speech recognition (ASR), computer speech recognition, speech to text (STT)
- Speech recognition applications include voice user interfaces such as voice dialing, call routing (hands free communication), domotic appliance control, search (find a podcast where particular words were spoken), data entry (transcription), preparation of structured documents (radiology report), speech-to-text processing (word processors or emails), and aircraft (Direct Voice Input)
- Speech recognition systems made more than 10 years ago also faced a choice between discrete and continuous speech. It is much easier for the program to understand words when we speak them separately, with a distinct pause between each one. However, most users prefer to speak in a normal, conversational speed. Most modern systems are capable of understanding continuous speech.
- This report looks at the patenting activity around voice control of mobile devices and also captures key litigations and NPE's operating in this area.



Search Strategy

Using [PatSeer](#) as our database, we used the following search query to create our patent set. We searched within the US collection and restricted the search to Mobile Devices and to last 20 years.

TAC – Title Abstract Claims C-Claims UC- US Classification PBY- Publication Year PBC- Publication Country

PBC:(US)

AND

TAC: (((speak* or speech* or voice*) w3 (recogni* or detect* or verif*)) or (input* w3 (voice or oral or direct or spoken or speech)) or ((speech or voice) w2 synthesi*) or natural wd3 language or (speech wd3 text) or (modal* wd2 communicat*) or ((voice or spoken or oral or speech) w3 control*) or ((voice or speech or spoken or oral) wd3 command*) or ((aural or audit?ry) wd3 feedback))

AND

C: (((memory or mobile or handheld or wireless or portable) wd3 device*) or telecom* or (mobile* wd3 phone*) or (cell* wd2 phone*) or phone* or (portable wd3 comput*) or smartphone* or (smart* wd2 phone*) or PDA or "personal digital assistant*" or palmtop* or "personal data assistant*" or "portable telephone" or (portable wd3 communication))

AND

(UC:(704/1 or 704/256 or 704/208 or 704/214 or 704/233 or 704/246 or 704/251 or 704/257 or 704/235 or 704/E15.001 or 704/270.1 or 704/258 or 704/259 or 704/260 or 704/275 or 379/88.01 or 379/88.13 or 379/88.16 or 379/88.18 or 715/727 or 455/563 or 434/167 or 434/159) OR UCMN:(1/1 or 364 or 395))

AND

PBY:[1993 TO 2013]

The records were deduplicated by Patent-Application to remove duplicates from result list to get count of 3275 Unique Records. The publications included in the report are updated as of **27th June, 2013**.



Speech Recognition Technology Categorization

The records were added to a PatSeer Project and further classified around the following 2 key areas:

➤ By Algorithms

- Hidden Markov models
- Dynamic time warping
- Neural networks

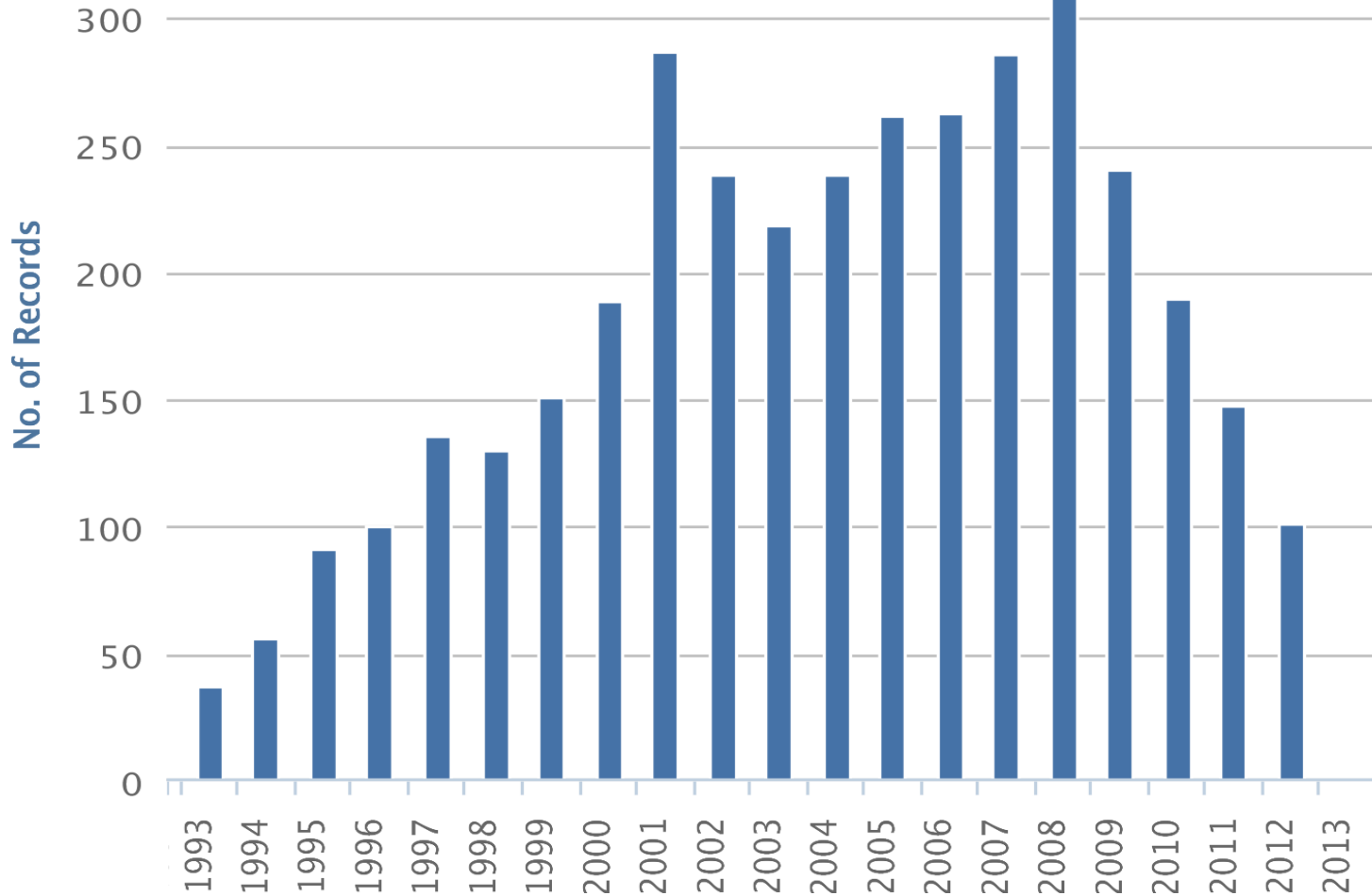
➤ By Application Area

- Defence
- Healthcare
- Navigation
- Telematics
- Home Automation
- Games
- Hands-Free Communication
- Multimodal Interaction
- Speech-To-Text Reporter
- Robotics
- Pronunciation
- Transcription



Filing Trend

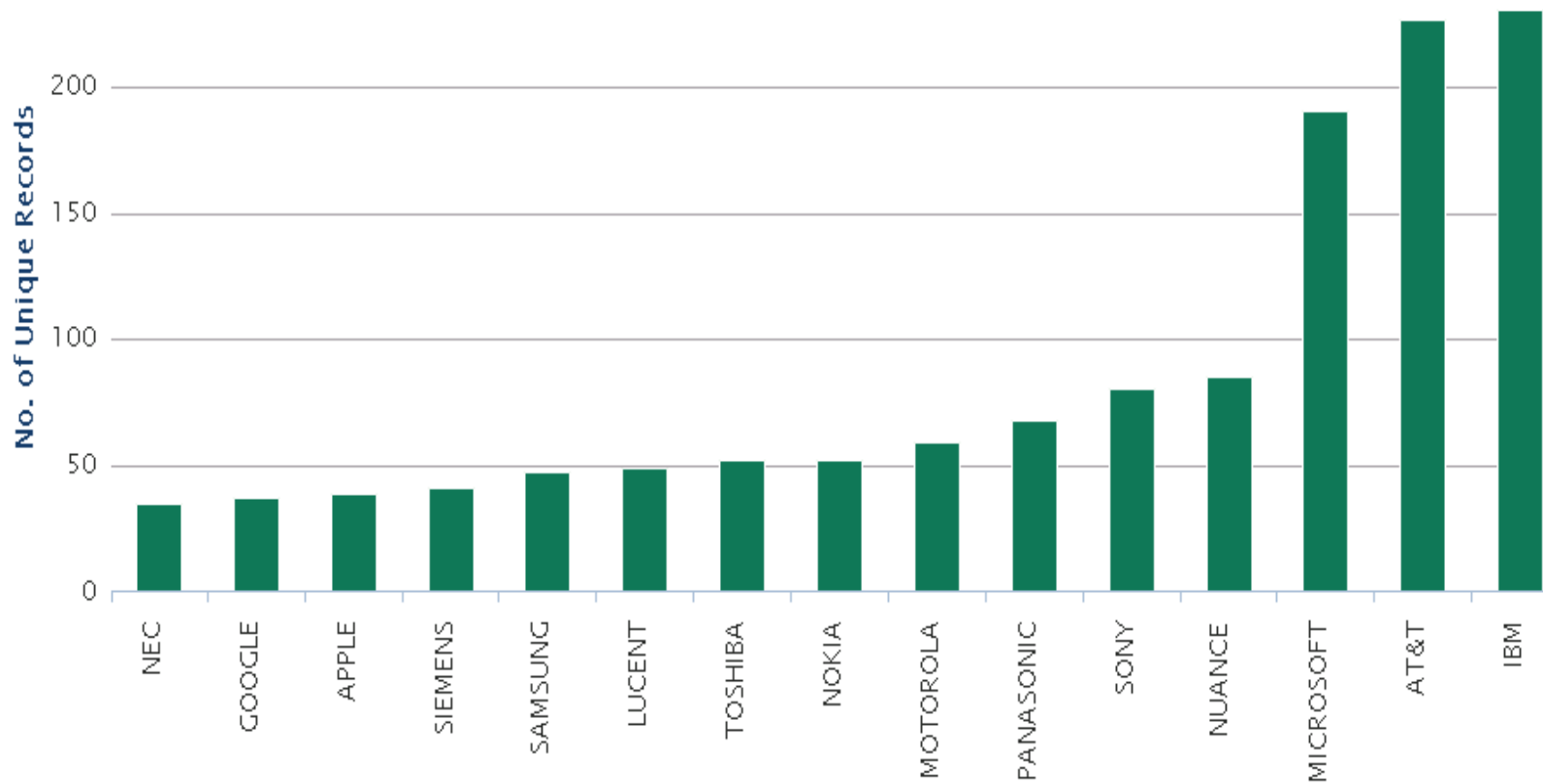
- Chart shows the filing trends for the last 20 years
- Number of new filing have been increasing steadily since 1993 with maximum activity between 2001-2008. New filing are showing a declining trend from 2009.



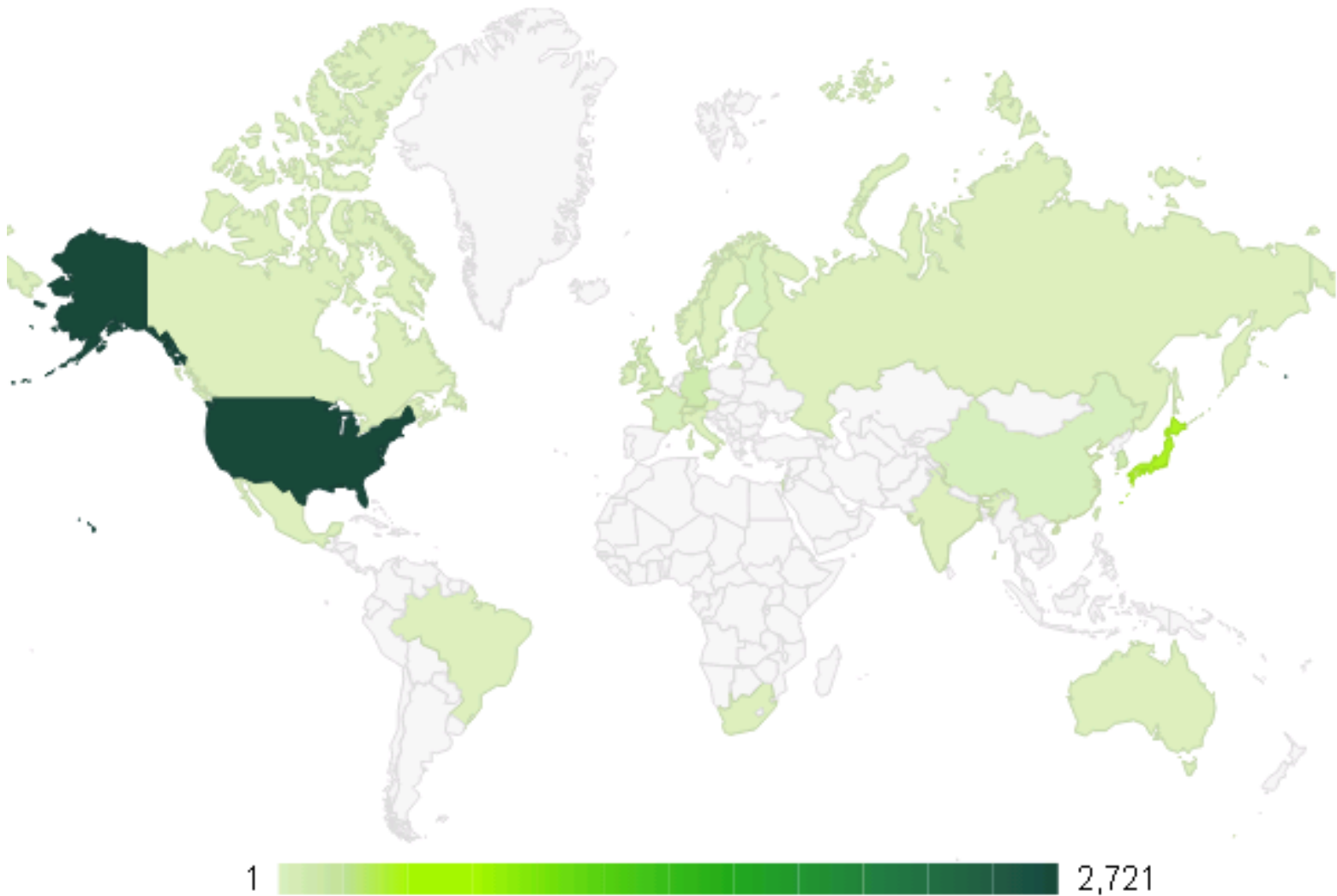


Key Companies

- The chart shows top 15 companies for voice recognition.
- IBM has the maximum number of filings followed by AT&T and MICROSOFT



Priority Country Map – Where is research being done?



- The map shows the geographical distribution of filings for voice recognition
- Patent protection is being sought mostly from US followed by JP



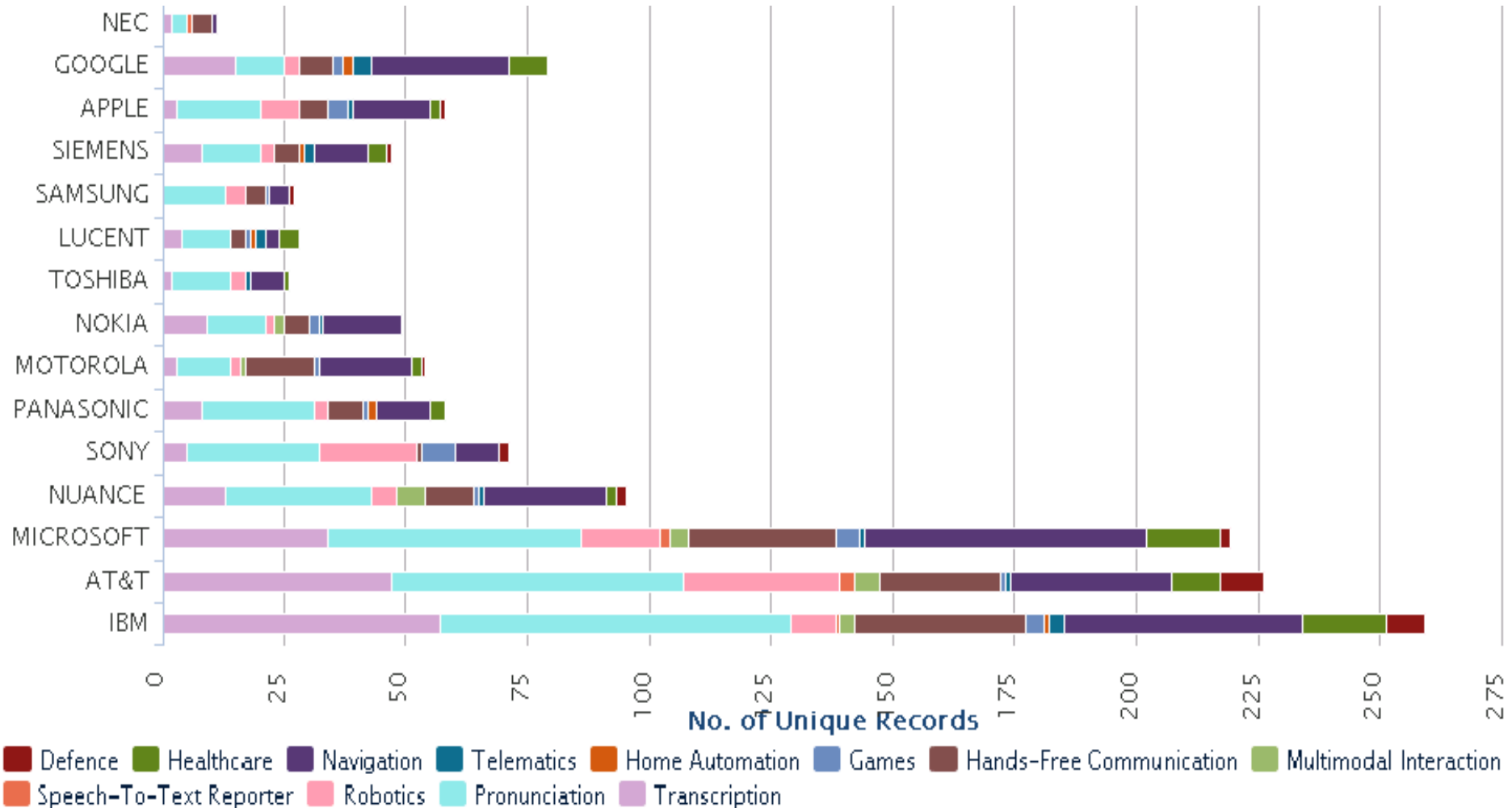
Major Mobile Manufacturers vs Priority Country

- Most of the innovation on Voice Recognition in mobile devices is being done in US
- Foreign (non-US) companies like Nokia, Sony, Panasonic also have active research being done in US and new filings from their US locations exceed home locations. This may be also because much of the voice recognition technology is focused on the English language presently

◆ Assignees	▼ Total	◆ US	◆ JP	◆ DE	◆ KR	◆ GB	◆ CN	◆ FI	◆ CA
AT&T	226	226	0	0	0	0	0	0	0
MICROSOFT	190	189	0	0	0	0	0	0	0
SONY	80	41	32	0	0	0	0	0	0
PANASONIC	68	37	31	0	0	0	0	0	0
MOTOROLA	59	57	0	0	0	0	0	0	0
NOKIA	52	29	0	1	0	4	0	15	0
SAMSUNG	47	0	0	0	43	2	1	0	0
APPLE	39	38	0	0	0	0	0	0	0
GOOGLE	37	37	0	0	0	0	0	0	0
SONY ERICSSON	18	14	0	0	0	0	1	0	0
RIM	13	12	0	0	0	0	0	0	1

Top companies across different Applications

- The chart shows research activity of leading companies across different applications
- IBM has presence across all the application areas, as compared to others. AT&T is filing across all the major applications (Navigation, Pronunciation, Hands-Free-Communication)





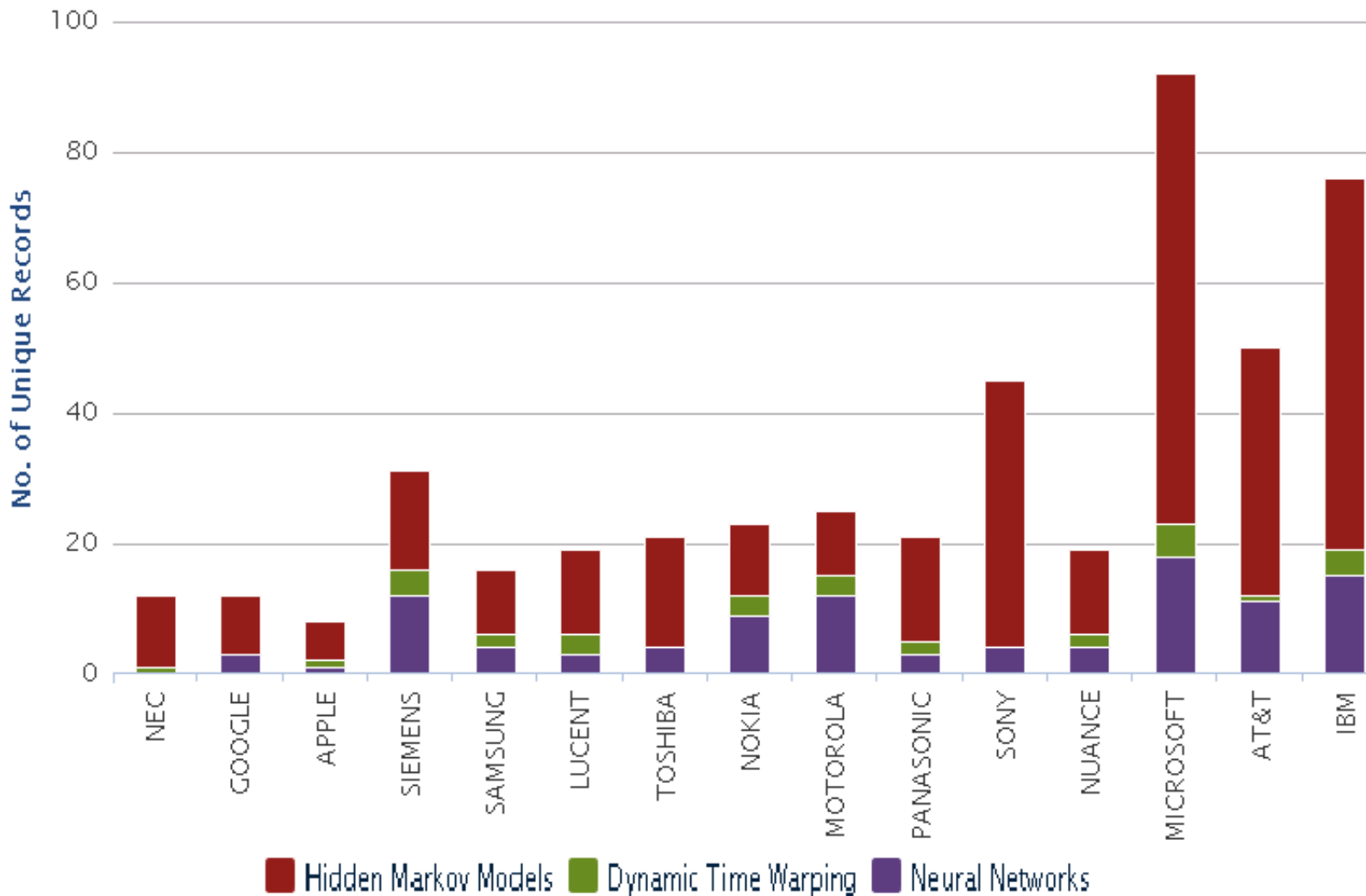
Major Mobile Manufacturers vs Application Areas

- The chart shows research activity of leading mobile manufacturers across various applications
- RIM focuses predominantly on Navigation & Hands-Free Communication
- Apple & Google are active across all application areas

Assignees	Total	Transcription	Healthcare	Navigation	Hands-Free Communication	Robotics	Pronunciation
SONY	80	5	0	9	1	20	27
PANASONIC	68	8	0	11	7	0	23
MOTOROLA	59	0	2	19	14	2	11
NOKIA	52	9	0	16	5	2	12
SAMSUNG	47	0	0	4	4	4	13
APPLE	39	0	2	16	6	8	17
GOOGLE	37	15	8	28	7	0	10
SONY ERICSSON	18	0	1	7	0	0	2
RIM	13	1	0	8	7	1	0

Top Companies across different Voice Recognition Algorithms

- The chart shows research activity of leading companies across algorithms
- Microsoft followed by IBM lead in research activity across Hidden Markov Models

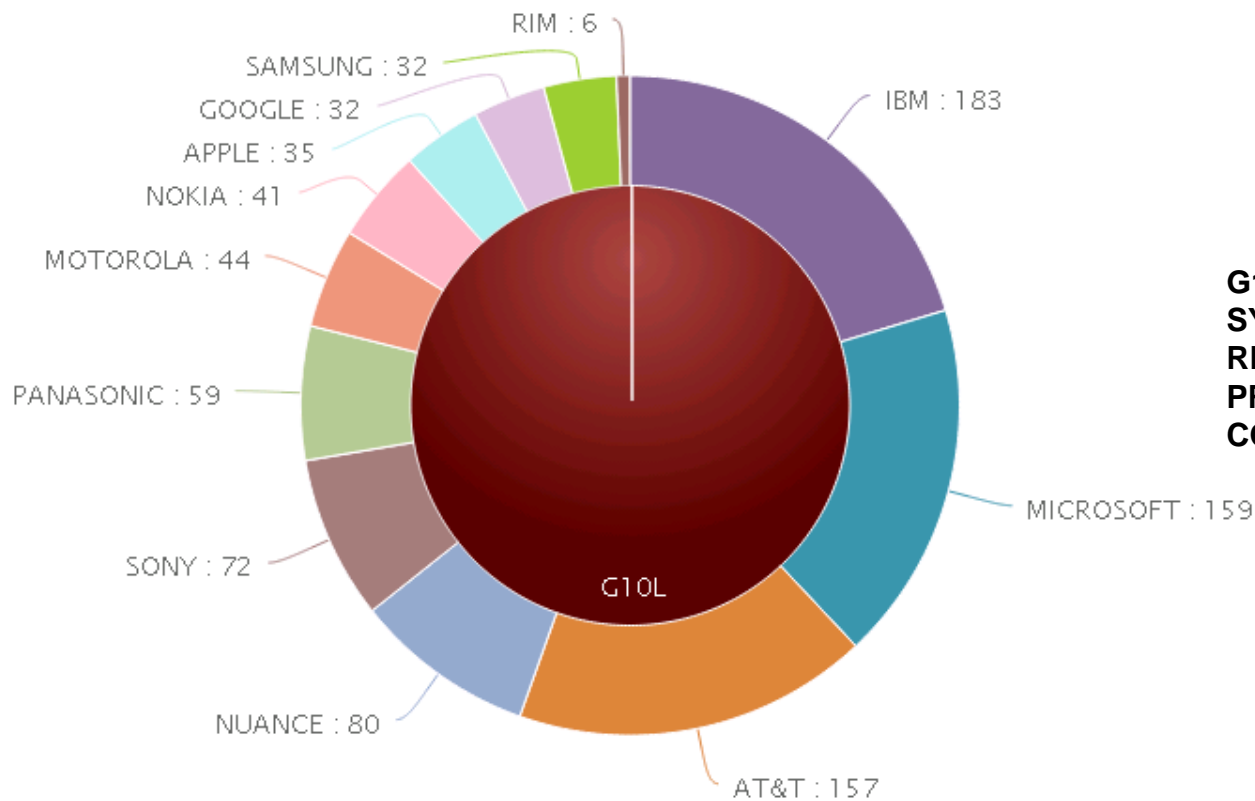


Major Mobile Manufacturers vs Voice Recognition Algorithms

- The chart shows research activity of leading mobile manufacturers across algorithms
- Nokia & Samsung actively use all the algorithms which are used across different applications
- Motorola has most number of filings in Neural Network Algorithm as compared to others

Assignees	Total	Hidden Markov Models	Dynamic Time Warping	Neural Networks
SONY	80	41	0	4
PANASONIC	68	16	2	3
MOTOROLA	59	10	3	12
NOKIA	52	11	3	9
SAMSUNG	47	10	2	4
APPLE	39	6	1	1
GOOGLE	37	9	0	3
SONY ERICSSON	18	1	0	0
RIM	13	1	0	1

Company wise Distribution for Key IPC Class – G10L



G10L: SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH OR AUDIO CODING OR DECODING



Year wise filings across top IPC Full Classes

◆ IC Full Class	▼ Total	◆ 1999-2001	◆ 2002-2004	◆ 2005-2007	◆ 2008-2010	◆ 2011-2013
G10L15/00	658	101	146	128	173	57
G10L15/26	508	104	118	76	117	47
G10L13/08	405	61	80	109	70	23
G10L21/00	361	33	67	117	107	35
G10L15/18	339	72	72	64	46	12
G10L13/00	289	47	54	81	68	14
G10L15/06	259	56	61	24	41	8
H04M3/42	253	51	70	28	23	5
G10L15/28	241	63	88	25	22	5
G10L15/22	235	90	70	18	16	3

G10L15/00 - Speech recognition

G10L15/26 - Speech recognition - Speech to text systems

G10L13/08 - Speech synthesis - Text to speech systems - Text analysis or generation of parameters for speech synthesis out of text

G10L21/00 - Processing of the speech signal to produce another audible or non-audible signal

G10L15/18 - Speech recognition - Speech classification or search - using natural language modelling

G10L13/00 - Speech synthesis -Text to speech systems

G10L15/06 – Speech recognition - Creation of reference templates; Training of speech recognition systems

H04M 3/42- Automatic or semi-automatic exchanges - Systems providing special services or facilities to subscribers

G10L15/28 - Speech Recognition - Constructional details of speech recognition systems

G10L15/22 - Speech Recognition - Procedures used during a speech recognition process

- The table shows filings across top 10 IPC full classes sampled every 2 years for the last 12 years

US Patent Litigations in Voice Recognition

Case No Filing Date	Plaintiff	Defendants	Court	Patents in case (Plaintiff's patents are shown in Red)
1:12-cv-01096 April 25, 2012	Potter Voice Technologies	Google, Research In Motion, Sony, Research In Motion, Nokia, ZTE, HTC, Huawei Technologies, Sharp, Sony Mobile Communications AB LG Mobilecomm, Sony Corporation of America Sharp Electronics, Kyocera, HTC America, Samsung Electronics America, Motorola Solutions, Pantech Wireless, Apple, Microsoft, Nokia, LG Electronics Huawei America, Samsung Electronics Motorola Mobility	District of Colorado	6,859,931: "Extensible software-based architecture for communication and cooperation within and between communities of distributed agents and." 5,729,659: "Method and apparatus for controlling a digital computer using oral input" 6,742,021: "Navigating network-based electronic information using spoken input with multimodal error feedback" 6,691,151: "Unified messaging methods and systems for communication and cooperation among distributed agents in a computing." 7,036,128: "Using a community of distributed electronic agents to support a highly mobile, ambient computing environment" 6,523,061: "System, method, and article of manufacture for agent-based navigation in a speech-based data navigation system" 7,069,560: "Highly scalable software-based architecture for communication and cooperation among distributed electronic agents" 6,757,718: "Mobile navigation of network-based electronic information using spoken input" 6,513,063: "Accessing network-based electronic information through scripted online interfaces using spoken input"
1:11-cv-00504-UNA June 7, 2011	Nuance Communications	Vlingo Corporation	District of Delaware	7,058,573: "Speech recognition system to selectively utilize different speech recognition techniques over multiple speech recognition passes" 6,785,653: "Distributed voice web architecture and associated components and methods" 7,127,393: "Dynamic semantic control of a speech recognition system" 6,839,669: "Performing actions identified in recognized speech"
1:12-cv-01795-UNA Dec. 28, 2012	Voice Integration Technologies LLC	Netgear Inc	Delaware District Court	6,487,534: "Distributed client-server speech recognition system"
2:12-cv-00416 July 27, 2012	National Cheng Kung Univ	Apple	Eastern District of Texas	7,707,032: "Method and system for matching speech data" 7,266,496: "Speech recognition system"
1:12-cv-01579-GLS-CFH Oct. 19, 2012	Dynamic Advances LLC	Apple	Northern District of New York	8,289,283: "Language input interface on a device" 7,177,798: "Natural language interface using constrained intermediate dictionary of results"



Sample Litigation Study - Potter Voice Technologies LLC v. Apple, Inc. et. al.

We considered Patent No. US5729659 (Potter Jerry L) for citation analysis as this patent formed a base for Potter Voice Technologies to sue major mobile and chip manufacturers.

For more details see <http://news.priorsmart.com/potter-voice-technologies-v-apple-15VV/>

Potter Voice Technologies claim that Apple, Google, Microsoft, Nokia, RIM, Samsung Electronics, Sony, LG Electronics, Motorola Mobility, ZTE, Huawei Technologies, Kyocera, Sharp, and Pantech have infringed its patent on natural-language voice control of a computer.

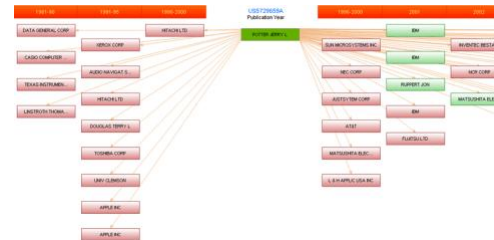
The patent in dispute “Method and apparatus for controlling a digital computer using oral input,” issued in 1998 to Potter Jerry L. which was cited by SRI international, developer of SIRI in 2004.

Patent Infringement Case Details:

Civil Action No. 1:12-cv-01096

Filed on April 25, 2012

Please click on image for full size image of forward and backward citation tree for patent US5729659



The details for the forward cited patents were exported to Excel. The table is shown in further slides:



Patent No	Title	Filling Date Issue Date
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Assignee : AgileTV Corporation (3 patents)

US7047196	System and method of voice recognition near a wireline node of a network supporting cable television and/or video delivery	16/Feb/2001 16/May/2006
US7685523	System and method of voice recognition near a wireline node of network supporting cable television and/or video delivery	17/Nov/2005 23/Mar/2010
US8095370	Dual compression voice recordation non-repudiation system	17/Sep/2004 10/Jan/2012

Assignee : Alpine Electronics Inc. (1 patent)

US7379876	Method and apparatus for speech input guidance	14/Feb/2002 27/May/2008
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Assignee : AT&T Corp. (6 patents)

US6108629	Method and apparatus for voice interaction over a network using an information flow controller	25/Apr/1997 22/Aug/2000
US7212964	Language-understanding systems employing machine translation components	22/Mar/2002 01/May/2007
US7467081	Language-understanding training database action pair augmentation using bidirectional translation	22/Jan/2007 16/Dec/2008
US7912726	Method and apparatus for creation and user-customization of speech-enabled services	30/Aug/2005 22/Mar/2011
US8073683	Language-understanding training database action pair augmentation using bidirectional translation	16/Dec/2008 06/Dec/2011
US8209184	System and method of providing generated speech via a network	12/Oct/2006 26/Jun/2012

Assignee : Computer Motion Inc. (1 patent)

US6642836	General purpose distributed operating room control system	28/Oct/1997 04/Nov/2003
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Assignee : Comverse Inc. (1 patent)

US7085709	Method and system for pronoun disambiguation	30/Oct/2001 01/Aug/2006
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Assignee : Fujitsu Limited (1 patent)

US6330539	Dialog interface system	21/Jan/1999 11/Dec/2001
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**Assignee : International Business Machines Corporation (5 patents)**

US6192343	Speech command input recognition system for interactive computer display with term weighting means used in interpreting potential commands from relevant speech terms	17/Dec/1998 20/Feb/2001
US6233560	Method and apparatus for presenting proximal feedback in voice command systems	16/Dec/1998 15/May/2001
US6311150	Method and system for hierarchical natural language understanding	03/Sep/1999 30/Oct/2001
US6937984	Speech command input recognition system for interactive computer display with speech controlled display of recognized commands	17/Dec/1998 30/Aug/2005
US7206747	Speech command input recognition system for interactive computer display with means for concurrent and modeless distinguishing between speech commands and speech queries for locating commands	16/Dec/1998 17/Apr/2007

Assignee : Intuitive Surgical Inc. (7 patents)

US6943663	General purpose distributed operating room control system	09/Dec/2002 13/Sep/2005
US7053752	General purpose distributed operating room control system	18/Sep/2003 30/May/2006
US7097640	Multi-functional surgical control system and switching interface	26/Nov/2003 29/Aug/2006
US7259652	General purpose distributed operating room control system	23/Jun/2005 21/Aug/2007
US7395249	Speech interface for an automated endoscope system	15/Sep/2004 01/Jul/2008
US7408439	Method and apparatus for accessing medical data over a network	03/Sep/2004 05/Aug/2008
US7543588	Multi-functional surgical control system switching interface	21/Jun/2006 09/Jun/2009

Assignee : Intuitive Surgical Inc., The Cleveland Clinic Foundation (1 patent)

US6911916	Method and apparatus for accessing medical data over a network	13/Jul/2000 28/Jun/2005
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Assignee : Inventec Besta Co. Ltd. (1 patent)

US6341959	Method and system for learning a language	23/Mar/2000 29/Jan/2002
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**Assignee : Justsystem Corporation (1 patent)**

US6065023	Spread sheet reading-out/collating apparatus, spread sheet reading-out/collating method, and a computer-readable recording medium with program making computer execute method stored therein	28/Jan/1998 16/May/2000
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Assignee : Kabushikikaisha Kenwood (1 patent)

US8103510	Device control device, speech recognition device, agent device, on-vehicle device control device, navigation device, audio device, device control method, speech recognition method, agent processing method, on-vehicle device control method, navigation method, and audio device control method, and program	24/Dec/2004 24/Jan/2012
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Assignee : L & H Applications USA Inc. (1 patent)

US6125342	Pronoun semantic analysis system and method	18/Nov/1997 26/Sep/2000
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Assignee : Matsushita Electric Industrial Co. Ltd. (1 patent)

US6480819	Automatic search of audio channels by matching viewer-spoken words against closed-caption/audio content for interactive television	25/Feb/1999 12/Nov/2002
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Assignee : Microsoft Corporation (1 patent)

US7299181	Homonym processing in the context of voice-activated command systems	30/Jun/2004 20/Nov/2007
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Assignee : Interactive Advisory Software, Inc.(3 patents)

US6253184	Interactive voice controlled copier apparatus	14/Dec/1998 26/Jun/2001
US6718386	Methods, system, and article for displaying privilege state data	18/Jul/2000 06/Apr/2004
US8464152	Method and apparatus for providing instructional help, at multiple levels of sophistication, in a learning application	31/Oct/2007 11/Jun/2013

Assignee : NCR Corporation (1 patent)

US6347299	System for navigation and editing of electronic records through speech and audio	29/Jul/1998 12/Feb/2002
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Assignee : NEC Corporation (1 patent)

US6026407	Language data storage and reproduction apparatus	27/Nov/1996 15/Feb/2000
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Assignee : News Datacom Limited (1 patent)

US6654721	Voice activated communication system and program guide	20/Aug/2001 25/Nov/2003
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Assignee : Nippon Telegraph and Telephone Company (1 patent)

US6885990	Speech recognition based on interactive information retrieval scheme using dialogue control to reduce user stress	30/May/2000 26/Apr/2005
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Assignee : Nuance Communications Inc. (1 patent)

US8275617	Speech command input recognition system for interactive computer display with interpretation of ancillary relevant speech query terms into commands	17/Dec/1998 25/Sep/2012
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Assignee : Sony Corporation (2 patents)

US7158934	Speech recognition with feedback from natural language processing for adaptation of acoustic model	08/Mar/2005 02/Jan/2007
US7249017	Speech recognition with score calculation	24/Feb/2004 24/Jul/2007

Assignee : SRI International (8 patents)

US6513063	Accessing network-based electronic information through scripted online interfaces using spoken input	14/Mar/2000 28/Jan/2003
US6523061	System, method, and article of manufacture for agent-based navigation in a speech-based data navigation system	30/Jun/2000 18/Feb/2003
US6691151	Unified messaging methods and systems for communication and cooperation among distributed agents in a computing environment	15/Nov/1999 10/Feb/2004
US6742021	Navigating network-based electronic information using spoken input with multimodal error feedback	13/Mar/2000 25/May/2004
US6757718	Mobile navigation of network-based electronic information using spoken input	30/Jun/2000 29/Jun/2004
US6859931	Extensible software-based architecture for communication and cooperation within and between communities of distributed agents and distributed objects	17/Mar/1999 22/Feb/2005
US7036128	Using a community of distributed electronic agents to support a highly mobile, ambient computing environment	09/Aug/2000 25/Apr/2006
US7069560	Highly scalable software-based architecture for communication and cooperation among distributed electronic agents	17/Mar/1999 27/Jun/2006



Assignee : Steris Inc. (1 patent)

US6591239	Voice controlled surgical suite	09/Dec/1999 08/Jul/2003
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Assignee : Sun Microsystems Inc. (1 patent)

US5991712	Method, apparatus, and product for automatic generation of lexical features for speech recognition systems	05/Dec/1996 23/Nov/1999
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Assignee : The Board of Trustees of the Leland Stanford Junior University (1 patent)

US7480619	Integration manager and natural interaction processor	04/Mar/2004 20/Jan/2009
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Voice Recognition: Non Practicing Entities

Non-practicing entity (NPE) refers to a patent owner who does not manufacture or use the patented invention.

Following table lists some of the Non Practicing Entities in Voice Recognition along with their Patent Numbers

Non Practicing Entity	Patent Numbers	Defendants	Summary	Status
Brandywine Communications Technologies	<u>US 6,236,717</u> <u>US 5,719,922</u>	Apple	Simultaneous voice/data answering machine	
Accredited Transcription Corp	<u>US 6,298,326</u>	Google's Voice Recognition and Apple's Siri	Off-site data entry system	
AllVoice Developments US LLC	<u>US 5,799,273</u>	Microsoft Corp	Voice recognition in word processing applications	
Vlingo	<u>US7,058,573</u> <u>US 6,785,653</u>	Nuance Communications	Method for multi-pass speech recognition	Vlingo has been acquired by Nuance



Non Practicing Entity	Patent Numbers	Defendants	Summary	Status
Potter Voice Technologies	<u>US 5,729,659</u>	Apple, Google, Microsoft, Nokia, RIM, Samsung Electronics, Sony, LG Electronics, Motorola Mobility, ZTE, Huawei Technologies, Kyocera, Sharp, and Pantech	Method and apparatus for controlling a digital computer using oral input	
Phoenix Solutions Inc	<u>US 6,615,172</u> <u>US 6,633,846</u> <u>US 7,225,125</u>	PG&E, Sony, Wells Fargo and West Interactive	Speech recognition system trained to process voice based queries	
Bareis Technologies	<u>US 5,617,407</u>	Ubisoft, Sony Computer Entertainment, Electronic Arts Inc., Disney Interactive Studios	Optical disks with speech recognition templates	

Voice Recognition: New Companies in last 5 years

Companies	Count	Patent/Application Nos
VOICEBOX TECHNOLOGIES INC	20	US20070050191, US20100023320, US20100049501, US20100049514, US20100057443, US20100204994, US7398209, US7620549, US7634409, , US7693720, US7818176, US7917367, US7949529, US7983917, US8015006, US8069046, US8112275, US8195468, US8326634, US8332224
SENSORY INC	12	US20130054235, US20130054242, US20090132255, US20090204409, US20090204410, US20120052907, US7487089, US7720683, US7801729, US8024195, US8099289, US8195467
PARUS HOLDINGS INC	9	US20080189113, US2011009102, US7076431, US7327723, US7386455, US7516190, US7881941, US8098600, US8185402
AURIX LTD	4	US20080294439, US20090043581, US8121845, US8209171
DIGITAL VOICE SYSTEMS INC	4	US20100088089, US20110257965, US8200497, US8315860
YAP INC	4	US20070239837, US20090228274, US20090248415, US20100049525
CENTURYLINK IP LLC	3	US20130003946, US8208609, US8290126
BLUEANT WIRELESS PTY LTD	2	US20100330908, US20100332236
AUTONOMY CORP LTD	2	US20100223056, US20120232901
ARUZE GAMING AMERICA INC	2	US20090203427, US8083587
3DIVI	1	US20130010207



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Search

- Search full-text in Original Language and English. (English title and abstract taken from equivalent family member where not available)
- Legal Status Search enhancements include date range, Event, Event Country (Incl. Designated Country Code events for EP,WO)
- No compromise on search techniques –Proximity, complex Boolean with proximity, command line searching, wildcards, truncation

Search Aids

- Normalized Assignee Names for Top 3000 companies
- Looking up Matching Assignee /Inventor names
- Semantic Search Suggester
- Integrated Corporate Tree
- Search History, Saved Searches and Alerts

Search Result Handling

- Collapse results by family or de-duplicate Patent and Applications from results
- Multiple Views (Tabular/Standard/Standard+Family), Custom View, Detailed Record View
- Multiple Detailed view of a records can be opened in separate window tabs to allow for easy comparison

Analysis

- Analyze search results via charts (column/line/pie/area/bubble/heatmap/geographical map)
- Unique Chart Layering technology allows for Multi and Cross Dimensional charting

Exports

- Export upto 20K records at a time in Word/Excel/CSV format
- Charts can be also included in Word and Excel exports

Projects

- Save and analyze upto 50K records in a project
- Custom Fields, Hierarchical Categories, Comments, Flags, Scoring
- Patent Dashlets™ - A different dashboard for each collaborating member



About Gridlogics

- Established in 2004
- Launched Patent iNSIGHT Pro in Jan 2006 and gained quick market acceptance to achieve more than 400 users across 100+organisations globally
- Track record for customer satisfaction from product and post-sales support services.
- Strong Customer references in key IP verticals such as Pharmaceutical, Biotech, Electronics, Medical Devices, IP services and Research Labs.
- Strong Focus on R&D and continuous product enhancements that solve greater challenges and needs of IP professionals



Thank you !

<http://patseer.com>