

February 2021

## Knowles Audio Patent List

Patent ID	Country	Status	Title	Appl No	Filing Date	Patent / Pub. No.	Issue Date
A-0001-US	US	Granted	Memory Cell Array for Performing a Comparison	09/356,485	7/19/1999	<a href="#">6198668</a>	3/6/2001
A-0004-US	US	Granted	Computation of Multi-Sensor Time Delays	10/004,141	11/14/2001	<a href="#">6792118</a>	9/14/2004
A-0008-US	US	Granted	Reverberation Removal	10/959,408	10/5/2004	<a href="#">7508948</a>	3/24/2009
A-0009-US-02	US	Granted	Systems and Methods for Audio Signal Analysis and Modification	11/444,060	5/30/2006	<a href="#">8315857</a>	11/20/2012
A-0014-US-02	US	Granted	System and Method for Utilizing Inter-Microphone Level Differences for Speech Enhancement	11/343,524	1/30/2006	<a href="#">8345890</a>	1/1/2013
A-0016-US	US	Granted	System and Method for Processing an Audio Signal	11/441,675	5/25/2006	<a href="#">8150065</a>	4/3/2012
A-0017-US-02	US	Granted	System and Method for Utilizing Omni-Directional Microphones for Speech Enhancement	11/699,732	1/29/2007	<a href="#">8194880</a>	6/5/2012
A-0020-US	US	Granted	System and Method for Adaptive Intelligent Noise Suppression	11/825,563	7/6/2007	<a href="#">8744844</a>	6/3/2014
A-0021-US	US	Granted	System and Method for Providing Single Microphone Noise Suppression Fallback	12/072,931	2/29/2008	<a href="#">8194882</a>	6/5/2012
A-0022-US	US	Granted	System and Method for Adaptive Classification of Audio Sources	12/004,897	12/21/2007	<a href="#">8143620</a>	3/27/2012
A-0023-US-02	US	Granted	System and Method for 2-Channel and 3-Channel Acoustic Echo Cancellation	12/004,899	12/21/2007	<a href="#">8259926</a>	9/4/2012

A-0024-US-02	US	Granted	System and Method for Adaptive Power Control	12/228,034	8/8/2008	<a href="#">8849231</a>	9/30/2014
A-0025-US	US	Granted	System and Method for Providing Voice Equalization	12/004,788	12/21/2007	<a href="#">8180064</a>	5/15/2012
A-0026-US	US	Granted	System and Method for Blind Subband Acoustic Echo Cancellation Postfiltering	12/004,896	12/21/2007	<a href="#">8189766</a>	5/29/2012
A-0028-US	US	Granted	System and Method for Envelope-Based Acoustic Echo Cancellation	12/077,436	3/18/2008	<a href="#">8355511</a>	1/15/2013
A-0029-US	US	Granted	System and Method for Providing Close Microphone Adaptive Array Processing	12/080,115	3/31/2008	<a href="#">8204252</a>	6/19/2012
A-0030-US	US	Granted	System and Method for Providing Noise Suppression Utilizing Null Processing Noise Subtraction	12/215,980	6/30/2008	<a href="#">9185487</a>	11/10/2015
A-0031-US	US	Granted	System and Method for Enhancing a Monaural Audio Signal	12/217,076	6/30/2008	<a href="#">8521530</a>	8/27/2013
A-0033-US-02	US	Granted	Adaptive Power Saving for an Audio Device	12/536,374	8/5/2009	<a href="#">8798289</a>	8/5/2014
A-0034-US	US	Granted	System and Method for Controlling Adaptivity of Signal Modification Using a Phantom Coefficient	12/286,995	10/2/2008	<a href="#">8774423</a>	7/8/2014
A-0035-US	US	Granted	Systems and Methods for Reconstructing Decomposed Audio Signals	12/319,107	12/31/2008	<a href="#">8934641</a>	1/13/2015
A-0036-US	US	Granted	Adaptive Noise Cancellation	12/422,917	4/13/2009	<a href="#">8949120</a>	2/3/2015
A-0037-US-02	US	Granted	Self Calibration of Envelope-Based Acoustic Echo Cancellation	12/435,322	5/4/2009	<a href="#">8472616</a>	6/25/2013
A-0038-US	US	Granted	Reparation of Corrupted Audio Signals	12/493,927	6/29/2009	<a href="#">8908882</a>	12/9/2014

A-0039-US-02	US	Granted	Asynchronous Sample Rate Converter	12/790,552	5/28/2010	<a href="#">8405532</a>	3/26/2013
A-0040-US-02	US	Granted	Multi-Function Floating Point Unit	12/772,146	4/30/2010	<a href="#">9104510</a>	8/11/2015
A-0041 P1-CN	CN	Granted	Directional Audio Capture	2015800713 17.7	12/2/2015	<a href="#">CN1071134 99B</a>	9/18/2018
A-0041 P1-DE	DE	Pending	DIRECTIONAL AUDIO CAPTURE	1120150058 62.1	12/2/2015	<a href="#">DE1120150 05862T5</a>	
A-0041 P1-US	US	Granted	Directional Audio Capture	14/957,447	12/2/2015	<a href="#">9838784</a>	12/5/2017
A-0041-US	US	Granted	Audio Zoom	12/896,725	10/1/2010	<a href="#">9210503</a>	12/8/2015
A-0042-US-02	US	Granted	Systems and Methods for Producing an Acoustic Field Having a Target Spatial Pattern	12/893,208	9/29/2010	<a href="#">8615392</a>	12/24/2013
A-0043-US	US	Granted	Providing Background Audio During Telephonic Communication	12/649,121	12/29/2009	<a href="#">8488805</a>	7/16/2013
A-0044-JP	JP	Granted	Adaptive Noise Reduction Using Level Cues	2012- 550214	1/25/2011	<a href="#">JP5675848</a>	1/9/2015
A-0044-US	US	Granted	Adaptive Noise Reduction Using Level Cues	12/693,998	1/26/2010	<a href="#">8718290</a>	5/6/2014
A-0045-US-02	US	Granted	Low Latency Active Noise Cancellation System	12/950,431	11/19/2010	<a href="#">8848935</a>	9/30/2014
A-0048-US-02	US	Granted	Low Complexity Bandwidth Expansion of Speech	12/895,254	9/30/2010	<a href="#">8700391</a>	4/15/2014
A-0050-US-02	US	Granted	Method for Jointly Optimizing Noise Reduction and Voice Quality in a Mono or Multi-Microphone System	12/832,901	7/8/2010	<a href="#">8473287</a>	6/25/2013
A-0053-US-02	US	Granted	Adaptive Noise Cancellation for Multi-Microphone Systems	12/855,600	8/12/2010	<a href="#">8958572</a>	2/17/2015
A-0055-US-02	US	Granted	Spatial Selectivity Noise Reduction Tradeoff for Multi-Microphone Systems	12/837,340	7/15/2010	<a href="#">8606571</a>	12/10/2013

A-0056-US-02	US	Granted	Robust Noise Suppression System in Adverse Echo Conditions	12/860,428	8/20/2010	<a href="#">9343073</a>	5/17/2016
A-0057-US-02	US	Granted	Systems and Methods for Adaptive Signal Equalization	12/841,098	7/21/2010	<a href="#">8798290</a>	8/5/2014
A-0058-US-02	US	Granted	Wind Noise Detection and Suppression	12/868,622	8/25/2010	<a href="#">8781137</a>	7/15/2014
A-0059-US-02	US	Granted	Spectrum Reconstruction for Automatic Speech	12/860,515	8/20/2010	<a href="#">8880396</a>	11/4/2014
A-0064-US-02	US	Granted	Bandwidth Enhancement of Speech Signals Assisted by Noise Reduction	12/907,788	10/19/2010	<a href="#">9245538</a>	1/26/2016
A-0065-US-02	US	Granted	Noise Suppression Assisted Automatic Speech Recognition	12/962,519	12/7/2010	<a href="#">9558755</a>	1/31/2017
A-0068-US-02	US	Granted	Monaural Noise Suppression Based on Computational Auditory Scene Analysis	12/860,043	8/20/2010	<a href="#">8447596</a>	5/21/2013
A-0069-US	US	Granted	Smart Auto Mute	12/908,746	10/20/2010	<a href="#">8903721</a>	12/2/2014
A-0073-US-02	US	Granted	Systems and Methods for Multi-Channel Dereverberation	12/963,497	12/8/2010	<a href="#">8761410</a>	6/24/2014
A-0074-US	US	Granted	Direction-Aware Active Noise Cancellation System	12/868,417	8/25/2010	<a href="#">8611552</a>	12/17/2013
A-0077-US-02	US	Granted	Systems and Methods for Enhancing Voice Quality in Mobile Device	13/288,858	11/3/2011	<a href="#">8311817</a>	11/13/2012
A-0078-US	US	Granted	Noise Suppression Based on Null Coherence	13/157,238	6/9/2011	<a href="#">8682006</a>	3/25/2014
A-0081-US-02	US	Granted	Post-Noise Suppression Processing to Improve Voice Quality	13/295,981	11/14/2011	<a href="#">8831937</a>	9/9/2014

A-0083-US	US	Granted	Distortion Measurement for Noise Suppression System	13/016,916	1/28/2011	<a href="#">8032364</a>	10/4/2011
A-0084-US-02	US	Granted	Methods and Systems for Enhancing Audio Quality During Teleconferencing	13/414,121	3/7/2012	<a href="#">8606249</a>	12/10/2013
A-0085-US-02	US	Granted	Local Social Conference Calling	13/415,535	3/8/2012	<a href="#">9007416</a>	4/14/2015
A-0087-US-02	US	Granted	Low Latency Active Noise Cancellation System	13/493,648	6/11/2012	<a href="#">8526628</a>	9/3/2013
A-0089-US-02	US	Granted	Noise Reduction Using Multi-Feature Cluster Tracker	13/492,780	6/8/2012	<a href="#">9008329</a>	4/14/2015
A-0090-US-02	US	Granted	Data Directed Scrambling to Improve Signal-to-Noise Ratio	13/565,751	8/2/2012	<a href="#">8378871</a>	2/19/2013
A-0091-US	US	Granted	System and Method for Providing Voice Equalization	13/432,490	3/28/2012	<a href="#">9076456</a>	7/7/2015
A-0099-US-02	US	Granted	Dynamic Bandwidth Change Detection for Configuring Audio Processor	13/734,208	1/4/2013	<a href="#">8750526</a>	6/10/2014
A-0101-US-02	US	Granted	Crosstalk Cancellation Systems and Methods	13/664,299	10/30/2012	<a href="#">8737188</a>	5/27/2014
A-0102-US-02	US	Granted	Image Enhancement Based on Combining Images from Multiple Cameras	13/738,874	1/10/2013	<a href="#">9142010</a>	9/22/2015
A-0103-US-02	US	Granted	Restoration of Noise-Reduced Speech	13/751,907	1/28/2013	<a href="#">8615394</a>	12/24/2013
A-0105-US-02	US	Granted	Sample Rate Conversion Using Infinite Impulse Response Filters	13/797,344	3/12/2013	<a href="#">8618961</a>	12/31/2013
A-0106-US	US	Granted	Method for Jointly Optimizing Noise Reduction and Voice Quality in a Mono or Multi-Microphone System	13/424,189	3/19/2012	<a href="#">8473285</a>	6/25/2013

A-0107-US	US	Granted	System and Method for Adaptive Intelligent Noise Suppression	13/426,436	3/21/2012	<a href="#">8886525</a>	11/11/2014
A-0111-US	US	Granted	System and Method for Utilizing Inter-Microphone Level Differences for Speech Enhancement	13/705,132	12/4/2012	<a href="#">8867759</a>	10/21/2014
A-0113-US-02	US	Granted	Noise Suppression for Speech Processing Based on Machine-Learning Mask Estimation	14/046,551	10/4/2013	<a href="#">9640194</a>	5/2/2017
A-0127-US	US	Granted	Monaural Noise Suppression Based on Computational Auditory Scene Analysis	13/859,186	4/9/2013	<a href="#">9431023</a>	8/30/2016
A-0132-DE-02	DE	Pending	Speech Signal Separation and Synthesis Based on Auditory Scene Analysis and Speech Modeling	1120140033 37.5	7/21/2014	<a href="#">DE1120140 03337T5</a>	
A-0132-US-02	US	Granted	Speech Signal Separation and Synthesis Based on Auditory Scene Analysis and Speech Modeling	14/335,850	7/18/2014	<a href="#">9536540</a>	1/3/2017
A-0134-CO1-US	US	Granted	Adaptively Reducing Noise To Limit Speech Distortion	14/850,911	9/10/2015	<a href="#">9502048</a>	11/22/2016
A-0134-US	US	Granted	Adaptively Reducing Noise While Limiting Speech Loss Distortion	13/888,796	5/7/2013	<a href="#">9143857</a>	9/22/2015
A-0138-US-02	US	Granted	Voice Sensing and Keyword Analysis	14/285,585	5/22/2014	<a href="#">9633655</a>	4/25/2017
A-0142-US	US	Granted	Low Latency Active Noise Cancellation System	13/935,847	7/5/2013	<a href="#">8611551</a>	12/17/2013

A-0144-US	US	Granted	Multi-Microphone Robust Noise Suppression	13/959,457	8/5/2013	<a href="#">9,438,992</a>	9/6/2016
A-0153-US-02	US	Granted	Passive Training for Automatic Speech Recognition	14/573,846	12/17/2014	<a href="#">9,953,634</a>	4/24/2018
A-0164-US	US	Granted	Adaptive Noise Reduction Using Level Cues	14/222,255	3/21/2014	<a href="#">9,437,180</a>	9/6/2016
A-0176-US	US	Granted	Cross-Talk Cancellation	14/279,092	5/15/2014	<a href="#">9049282</a>	6/2/2015
A-0177-US	US	Granted	Adaptive Signal Equalization	14/341,697	7/25/2014	<a href="#">9699554</a>	7/4/2017
A-0194-CN	CN	Granted	Multi-Sourced Noise Suppression	201580045305.7	8/27/2015	<a href="#">CN106797512B</a>	10/25/2019
A-0194-DE	DE	Pending	Multi-Sourced Noise Suppression	112015003945.7	8/27/2015	<a href="#">DE112015003945T5</a>	
A-0194-US	US	Granted	Multi-Sourced Noise Suppression	14/838,133	8/27/2015	<a href="#">9,799,330</a>	10/24/2017
A-0196-US	US	Granted	Adaptive Noise Cancellation	14/591,802	1/7/2015	<a href="#">9,830,899</a>	11/28/2017
A-0225-US	US	Granted	Systems and Methods for Restoration of Speech Components	14/852,446	9/11/2015	<a href="#">9,978,388</a>	5/22/2018
A-0244-CO1-US	US	Granted	STEREO SEPARATION AND DIRECTIONAL SUPPRESSION WITH OMNI-DIRECTIONAL MICROPHONES	15/806,766	11/8/2017	<a href="#">10,257,611</a>	4/9/2019
A-0244-CN	CN	Published	STEREO SEPARATION AND DIRECTIONAL SUPPRESSION WITH OMNI-DIRECTIONAL MICROPHONES	201780026912.8	4/28/2017	<a href="#">CN109155884A</a>	
A-0244-DE	DE	Published	STEREO SEPARATION AND DIRECTIONAL SUPPRESSION WITH OMNI-DIRECTIONAL MICROPHONES	112017002299.1	4/28/2017	<a href="#">DE112017002299T5</a>	
A-0244-US	US	Granted	STEREO SEPARATION AND DIRECTIONAL SUPPRESSION WITH OMNI-DIRECTIONAL MICROPHONES	15/144,631	5/2/2016	<a href="#">9820042</a>	11/14/2017

K-0053-DE	DE	Published	REFERENCE MICROPHONE FOR NON-LINEAR AND TIME VARIANT ECHO CANCELLATION	1120150052 96.8	11/19/2015	<a href="#">DE11201505296T5</a>	
K-0053-US	US	Granted	REFERENCE MICROPHONE FOR NON-LINEAR AND TIME VARIANT ECHO CANCELLATION	14/944,474	11/18/2015	<a href="#">9712915</a>	7/18/2017
K-0289-US	US	Granted	SOFT-TALK AUDIO CAPTURE FOR MOBILE DEVICES	15/886,288	2/1/2018	<a href="#">10,262,673</a>	4/16/2019
K-0298-US	US	Published	ADAPTIVE ACOUSTIC ECHO DELAY ESTIMATION	15/993,944	5/31/2018	<a href="#">10636410</a>	
K-0317-US	US	Published	DATA DRIVEN ECHO CANCELLATION AND SUPPRESSION	16/250,124	1/17/2019	<a href="#">US20190222691</a>	
K-0319-US	US	Granted	DIRECTION OF ARRIVAL ESTIMATION FOR MULTIPLE AUDIO CONTENT STREAMS	16/234,509	12/27/2018	<a href="#">10,455,325</a>	10/22/2019
K-0322-WO	WO	Published	COST EFFECTIVE MICROPHONE ARRAY DESIGN FOR SPATIAL FILTERING	PCT/US2018/051362	9/17/2018	<a href="#">WO2019060251</a>	
K-0378-WO	WO	Pending	SYNTHETIC NONLINEAR ACOUSTIC ECHO CANCELLATION SYSTEMS AND METHODS	PCT/US2019/053446	9/27/2019	<a href="#">WO2020069310A1</a>	
K-0379-US	US	Pending	PREDICTIVE ACOUSTIC ECHO CANCELLATION	16/678,339	11/8/2019	<a href="#">US20200152167</a>	
K-0382-WO	WO	Pending	ACOUSTIC AWARE VOICE USER INTERFACE	PCT/US2019/038060	6/19/2019	<a href="#">WO2019246314A1</a>	
K-0401-WO	WO	Pending	AUDIO LEVEL ESTIMATOR ASSISTED FALSE WAKE ABATEMENT SYSTEMS AND METHODS	PCT/US2019/066504	12/16/2019	<a href="#">WO2020131681A1</a>	
K-0413-US	US	Pending	UNWANTED KEYWORD DETECTION ABATEMENT SYSTEMS AND METHODS	16/720,125	12/19/2019	<a href="#">US20200202843</a>	



K-0425-US	US	Pending	MULTIBEAM KEYWORD DETECTION SYSTEM AND METHOD	16/938,428	7/26/2019		
K-0440-US	US	Pending	INTEGRATED SPEECH ENHANCEMENT FOR VOICE TRIGGER APPLICATION	17/128,172	12/31/2019		
K-0463-US	US	Pending	ADAPTIVE DECODER FOR HIGHLY COMPRESSED GRAPHEME MODEL	17/134,402	1/3/2020		
K-0464-PR1-US	US	Pending	METHODS AND SYSTEMS FOR CONFUSION REDUCTION FOR COMPRESSED ACOUSTIC MODELS	63/033,434	6/2/2020		