

# AJAY KAPUR

## address

24911 Ironwood Drive  
Valencia, CA 91355

tel (203) 807-2529  
email [ajay@karmetik.com](mailto:ajay@karmetik.com)  
web [www.ajaykapur.com](http://www.ajaykapur.com)

LinkedIn /Ajay-Kapur  
Twitter @Ajay\_Kapur  
Instagram @karmetik  
Facebook /digitalraja

## Education

### University of Victoria, Victoria, BC, Canada

Doctor of Philosophy in Interdisciplinary Studies combining Computer Science, Electrical and Computer Engineering, Mechanical Engineering, Music & Psychology, November 2007

- Ord and Linda Anderson Interdisciplinary Fellowship. (GPA:A+)
- Dissertation: Digitizing North Indian Performance: Extension and Preservation Using Multimodal Sensor Systems, Machine Learning & Robotics.

### Princeton University, Princeton, NJ, USA

Bachelor of Science and Engineering in Computer Science, June 2002

- Graduated with Honors in Computer Science (CS GPA: A-)
- Elected to the Society of Sigma XI for excellence in research.
- Senior Thesis: Invented the Electronic Tabla MIDI Controller. Received the Calvin Dodd MacCracken Senior Thesis/Project Award.

## Entrepreneurship

### Kadenze, Inc. Valencia, CA Mar 2013 - March 2018

President + CEO - Education Technology, Digital Learning for Arts and Creative Technology, Customized Virtual Learning Environment, Instructional Design & Online Education Business Development, Social Learning powered by Artificial Intelligence

### KarmetiK LLC Valencia, CA Sep 2006 - Present

Founder, CEO - Consulting, Artificial Intelligence and Machine Learning, Mechatronics, Robotic Design, Digital Signal Processing, Circuit Board Design, Interactive Entertainment Systems, Customized Software Solutions, Education Technology.

## Academic Positions

### California Institute of the Arts Valencia, CA Sept 2007 - Present

Professor/Director of Music Technology: Interaction, Intelligence and Design in School of Music.  
Associate Dean for Research and Development in Digital Arts, Office of the President  
Associate Provost of Creative Technologies

### Victoria University of Wellington Wellington, New Zealand, July 2009 - Present

Senior Lecturer of Sonic Arts in the New Zealand School of Music and Engineering School  
Director of Sonic Engineering Labs for Creative Technology

### Massey University Wellington, New Zealand July 2008 - Aug 2008

Adjunct Lecturer in Multimedia Engineering

### Simon Fraser University Vancouver, Canada July 2007 - Dec 2007

Post Doctoral Fellow in Interactive Computer Music Composition

## Patents

### Feature Extraction and Machine Learning for Evaluation of Image-Or Video-Type, Media-

### Rich Coursework Ajay Kapur, Perry Raymond Cook, Jordan Hochenbaum, Colin Bennett

Honigman, Owen Skipper Vallis, Chad A. Wagner, Eric Christopher Heep, July 31, 2013. USA  
Patent Number: US20150066820A1

### Feature Extraction and Machine Learning for Evaluation of Audio-Type, Media-Rich

### Coursework Ajay Kapur, Perry Raymond Cook, Jordan Hochenbaum, Owen Skipper Vallis,

Chad A. Wagner, Eric Christopher Heep. July 31, 2013. USA Patent Number:

US20150039541A1



**Self Organizing Maps (SOMS) for Organizing, Categorizing, Browsing and/or Grading Large Collections of Assignments for Massive Online Education Systems** Jordan N. Hochenbaum, Ajay Kapur, Owen S. Vallis, Perry R. Cook, Colin Honigman, Chad Wagner. October 25, 2013. USA Patent Number: US20150147728A1

**Multimedia educational content delivery with identity authentication and related compensation model** Perry Raymond Cook, Ajay Kapur, Owen S. Vallis, Jordan N. Hochenbaum. March 14, 2014. USA Patent Number: US20150262496A1

**User Identity Authentication Techniques for On-Line Content or Access** Perry Raymond Cook, Ajay Kapur, Owen S. Vallis, Jordan N. Hochenbaum. May 19, 2014. USA Patent Number: US20150379253A1

### Awards & Grants

**Google Research Grant** *Citygram: Visualizing Urban Acoustic Ecology*. CalArts and NYU collaboration. Co-Principal Investigator. Feb 2013. (\$59,000 USD)

**Korean Creative Contents Agency (KOCCA)** *2012 Global Experts Linkage Project Education Program*. International Expert on Technology and Culture. Dec 2012. (\$30,000 USD)

**National Science Foundation** *Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (TUES) Program* "A New Curriculum to Teach Computer Science Principles to Students in Digital Media Arts." Principal Investigator. April 2012. (\$111,000 USD)

**Canada Council of the Arts / National Sciences and Engineering Research Council of Canada** *New Media Initiative* "Intelligent Human-Computer Interaction in Multimedia Performance" Co-Principal Investigator. October 2009. (\$258,000 CAN)

**University Research Fund New Zealand** *Victoria University of Wellington* "Large Scale Multi-touch Interface for Expressive Musical Interaction" Principal Investigator. November 2010.

**University Research Fund New Zealand** *Victoria University of Wellington* "Robotic Musical Design" Principal Investigator. November 2009. (\$27,000 NZD)

**Durfee Foundation Artists' Resource for Completion Grant** "Machine Orchestra at SCREAM Festival 2010" Principal Investigator. December 2009. (\$3,500 USD)

**Subito: American Composers Forum Advancement Grant** "KarmetK Machine Orchestra at SCREAM Festival 2010" Principal Investigator. December 2009. (\$1,500 USD)

### Selected Talks

"Bringing Technology, Culture and Storytelling in Interactive Live Performances". *If So, What? Art and Design Event 2018*. The Palace of Fine Arts, San Francisco, CA. April 28, 2018. [Invited Keynote Speaker](#)

"Creative Education Leads to Innovation: Building an Accessible Global Network for Arts Education" *EduTECH Philippines* Manila, Philippines, February 2018. [Invited Keynote Speaker](#).

"Digital Learning for the Masses" *MOOC Maker Conference* Antigua, Guatemala, November 2017. [Invited Keynote Speaker](#).

"Online Creative Education for the Masses: A United Coalition for Creative Education", *Symposium of the Association of Independent Colleges of Art and Design*, Sarasota, Florida, November 2016. [Invited Keynote Speaker](#).

"An Asian Perspective to Design: How we use Technology to enable Musical Expression", *International Conference on New Interfaces for Musical Expression*, Daejeon, South Korea, May 2013. [Invited Keynote Speaker](#).

"The Magic Conductor" [Invited TEDx Speaker](#), REDCAT Walt Disney Concert Hall Complex, March 2013.

"21st Century Ethnomusicology", *Music and the Asian Diaspora*, Princeton, New Jersey, April 2006. [Invited Keynote Speaker](#).

## Publications (Research, Innovation & Inventions)

### PUBLISHED BOOKS

Kapur, A., Cook, P. R., Salazar, S., & G. Wang, *Programming for Musicians and Digital Artists: Creating Music with ChuckK*, Manning Publication Company, 2014 . ISBN: 9781617291708.

Kapur, A., *Digitizing North Indian Music: Preservation and Extension using Multimodal Sensor Systems, Machine Learning and Robotics*. VDM Verlag Dr. Muller, Germany, 2008. ISBN-13: 978-3639060973.

### PUBLISHED BOOK CHAPTERS

A NIME Reader: Fifteen Years of New Interfaces for Musical Expression" Published by Springer, Edited by Alexander Refsum Jensenius & Michael J. Lyons. Chapter by Ajay Kapur: "The Electronic Sitar Controller", March 2017.

"Musical Robots and Interactive Multimodal Systems" Published by Springer, Edited by Jorge Solis & Kia Ng, Chapter by Ajay Kapur entitled: "Multimodal Techniques for Human/Robot Interaction", November 2011.

### REFEREED JOURNAL PAPERS

Long, J., Murphy, J., Carnegie, D. & A. Kapur, " Loudspeakers Optional: A history of non-loudspeaker based electronic music," *Organized Sound* 22 (2), 2017.

Zareei, M. H., McKinnon, D., Carnegie, D. A., and A. Kapur, "Sound-based Brutalism: an emergent aesthetic," *Organised Sound* 21 (1), 2016.

J. Murphy, P. Mathews, J. McVay, A. Kapur, and D. A. Carnegie, "Expressive Robotic Guitars: Developments in Musical Robotics for Chordophones," *Computer Music Journal*, Vol. 39, No. 1, Pages 59-73. MIT Press, 2015.

Zareei, M. H., Carnegie, D. A., Kapur, A. "Physical Glitch Music: A Brutalist Noise Ensemble," *Leonardo Music Journal* 25, 2015.

Zareei, M. H., Carnegie, D. A., Kapur, A., and McKinnon, D. "Rippler: a Mechatronic Sound-sculpture," *Journal of Comparative Media Arts* 1, 2015.

J. He, Kapur, A., Carnegie, D. Contemporary Practices of Extending Traditional Asian Instruments using Technology. (Special Issue) *Organized Sound*, 19(2), 2014.

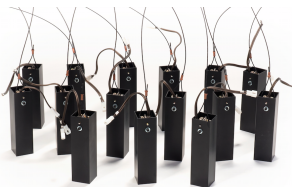
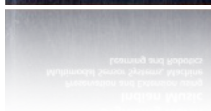
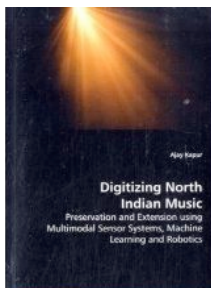
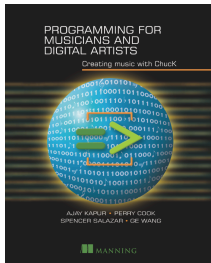
Murphy, J., Kapur, A., & D. Carnegie, "Musical Robotics in a Loudspeaker World: Developments in Alternative Approaches to Localization and Spatialization", *Leonardo Music Journal*, Vol 22, pp. 41-48, November 2012.

Vallis, O., Diakopoulos, D., Hochenbaum, J., Kapur, A. "Building on the Foundations of Network Music: Exploring Interaction Contexts and Shared Robotic Instruments." *Organised Sound*, 17 (1). February 2012.

Kapur, A., Darling, M., Diakopoulos, D., Murphy, J., Hochenbaum, J., Vallis, O., & C. Bahn, "The Machine Orchestra: An Ensemble of Human Laptop Performers and Robotic Musical Instruments," *The Computer Music Journal*, Vol. 35, issue 4, November 2011.

Vallis, O. & A. Kapur, " Community Based Design: The Democratization of Musical Interface Construction" *The Leonardo Music Journal*, Vol 21, issue 4, November 2011.

Tindale, A., Kapur, A., & G. Tzanetakis, "Training Surrogate Sensors in Musical Gesture Acquisition Systems," *IEEE Transactions on Multimedia*. 13 (1):50-59. Jan 2011.





Kapur, A., Eigenfeldt, A., Bahn, C. & W.A. Schloss, "Collaborative Composition for Musical Robots", *CITAR Journal of Science and Technology of the Arts*. Porto, Portugal, 1(1) pp. 48-52, 2009

Tzanetakis, G., Kapur, A., Schloss, W. A., & M. Wright, "Computational Ethnomusicology", *Journal of Interdisciplinary Music Studies*. 1(2), pp. 1-24, 2007.

Kapur, A., Wang, G., Davidson, P., & P.R. Cook, "Networked Performance: A Dream worth Dreaming?", *Organised Sound*, 10(3), pp. 209-219, October 2005.

Kapur, A., Davidson, P., Cook, P.R., Driessen, P.F. & W.A. Schloss, "Preservation and Extension of Traditional Techniques: Digitizing North Indian Performance", *Journal of New Music Research*, 34(3), pp. 227-236, September 2005.

Kapur, A., Davidson, P., P.R. Cook, P.F. Driessen, & W.A. Schloss, "Evolution of Sensor-Based ETabla, EDholak, and ESitar", *Journal of ITC Sangeet Research Academy*, vol. 18, Kolkata, India, November 2004.

Kapur, A., Essl, G., Davidson, P. & P. R. Cook, "The Electronic Tabla Controller", *Journal of New Music Research*, 32(4), pp. 351-360, 2003.

#### REFEREED CONFERENCE PAPERS

Macionis, M. J. and A. Kapur, "Where Is The Quiet: Immersive Experience Design Using the Brain, Mechatronics, and Machine Learning" in Proceedings of the International Conference on New Interfaces for Musical Expression, Porto Alegre, Brazil, 2019

Turczan, N., Kapur, A., Ho, N., Honigman, C., & D. Shepherd, "The Scale Navigator: A System for Networked Algorithmic Harmony" in Proceedings of the International Conference on New Interfaces for Musical Expression, Porto Alegre, Brazil, 2019

Reid, S., Sithi-Amnuai, S. And A. Kapur, "Woman Who Build Thing: Gestural Controllers, Augmented Instruments, and Musical Mechatronics" Proceedings of the International Conference on New Interfaces for Musical Expression. June 2018.

Yépez, J.P. , Hochenbaum, J. Salazar, S. & A. Kapur, "Redesigning Music Education Through Laptop Ensembles" *International Computer Music Conference (ICMC)*. 2018.

Macionis, M. J. and A. Kapur, "Sansa: A Modified Sansula for Extended Compositional Techniques Using Machine Learning" in Proceedings of the International Conference on New Interfaces for Musical Expression, Blacksburg, Virginia, USA, 2018.

Shaw, N., Salazar, S. & A. Kapur, "The Machine Lab: A Modern Classroom to Teach Mechatronic Music" *International Computer Music Conference (ICMC)*. Shanghai, China, October 2017.

Johnson, B.D. & A. Kapur, "Assessment Techniques for New Mechatronic Instruments as Applied to Speaker.Motion" *International Computer Music Conference (ICMC)*. Shanghai, China, October 2017.

He. J. Murphy, J., Kapur, A. And D. Carnegie, "Investigating Guqin Left Hand Modulation Techniqies" *International Computer Music Conference (ICMC)*. Shanghai, China, October 2017.

Johnston, B., Kapur, A., Murphy, J. & M. Norris, "Extending/Appending The Perceptual Apparatus: A History of Wearable Technology in Art", Proceedings of the International Symposium on Electronic Art, Manizales, Columbia, June 2017.

He. J. Murphy, J., Kapur, A. And D. Carnegie, "Towards Related-Dedicated Input Devices for Parametrically Rich Mechatronic Musical Instruments", Proceedings of the International Conference on New Interfaces for Musical Expression, Copenhagen, Denmark. May 2017.





Long, J. Murphy, J., Carnegie, D., & A. Kapur, "Closed-Loop Control Strategies for Robotic Hi-Hats", Proceedings of the International Conference on New Interfaces for Musical Expression, Copenhagen, Denmark. May 2017.

Reid, S. , Gaston, R., Honigman, C., & A. Kapur. "Minimally Invasive Gesture Sensing Interface (MIGSI) for Trumpet." *In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)*. Australia. June 2016.

Long, J., Kapur, A., & D. A. Carnegie. "An Analogue Interface for Musical Robots." *In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)*. Australia. June 2016.

Long, J., Kapur, A. & D. A. Carnegie. "The Closed-Loop Robotic Glockenspiel: Improving Musical Robots Using Embedded Musical Information Retrieval." *In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)*. Australia. June 2016.

Johnson, B., Norris, M., & A. Kapur, "speaker.motion: A Mechatronic Loudspeaker for Live Spatialisation." *In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)*. Australia. June 2016.

Long, J., Murphy, J. W., & D. A. Carnegie, A. Kapur. "Improving the Accuracy of Musical Robots with Programmable Logic Circuits," *In Proceedings of the Electronics New Zealand Conference (ENZCon)*. November 2016.

B. Johnston, Johnson, B., & A. Kapur. "A New Framework for the Interactive Control of Mechatronic Instruments," *In Proceedings of the Electronics New Zealand Conference (ENZCon)*. November 2016.

Murphy, J., Carnegie, D. A., & A. Kapur, " Using Expressive Musical Robots: Working with and Ensemble of New Mechatronic Instruments," *In Proceedings of the International Symposium of Electronic Art (ISEA)*. Hong Kong. 2016.



Zareei, M. H., Carnegie, D. A., Kapur, A. "NOISE SQUARE: Physical Sonification of Cellular Automata through Mechatronic Sound-sculpture," *In Proceedings of the International Symposium on Electronic Art (ISEA)*, Vancouver, Canada, 2015.

T. Barraclough, D. A. Carnegie, and A. Kapur, "Musical Instrument Design Process for Mobile Technology," *Proceedings of the International Conference on New Interfaces for Musical Expression*, Baton Rouge, Louisiana, June 2015.

Wiley, J., Lepley, A. "NODE - A Reactive Audiovisual Installation", *Proceedings of the International Conference on New Instruments for Musical Expression*, Baton Rouge, Louisiana, 2015.

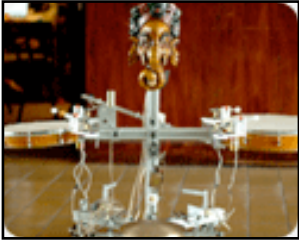
T. Barraclough, D. A. Carnegie, and A. Kapur, "Pyxis Minor: App Design for Novel Social Music Experiences," *Proceedings of the International Symposium on Electronic Art (ISEA)*, Vancouver, Canada, August 2015.

Johnston, B., Norris, M., Johnson, B., Kapur, A. "Carme: A Multi-Touch Controller for Real Time Spatialisation of Gestural Behaviour", *Proceedings for the Australasian Computer Music Conference*, Sydney, Australia, 2015.

Zareei, M. H., Kapur, A., Carnegie, D. A. "Rasping Music: Remodelling Early Minimalist Music through Mechatronic Sound-sculpture," *In Proceedings of the 2015 International Computer Music Conference (ICMC)*, Denton, TX , 2015.

J. Long, J. W. Murphy, D. A. Carnegie, and A. Kapur, "A Comparative Evaluation of Percussion Mechanisms for Musical Robotics Applications," *Proceedings of the 6th International Conference on Automation, Robotics and Applications (ICARA)*, Queenstown, New Zealand, February 2015.





J. Long, J. W. Murphy, D. A. Carnegie, and A. Kapur, "A Methodology for Evaluating Robotic Striking Mechanisms for Musical Contexts," Proceedings of the International Conference on New Interfaces for Musical Expression, Baton Rouge, Louisiana, June 2015.

J. Long, "Augmenting Virtual Worlds with Musical Robotics," Proceedings of the International Symposium of Electronic Art (ISEA), Vancouver, Canada, August 2015.

J. Long, J. Bailey, J. McVay, D. A. Carnegie, and A. Kapur, "Improving the Musical Expressiveness of Tesla Coils with Software," Proceedings of the International Computer Music Conference (ICMC), Denton, Texas, September 2015.

J. He, A. Kapur, and D. A. Carnegie, "Developing a Physical Gesture Acquisition System for Guqin Performance," Proceedings of the International Conference on New Interfaces for Musical Expression, Baton Rouge, Louisiana, June 2015.

J. He, A. Kapur, and D. A. Carnegie, "Characterizing Guqin Zou Shou Yin: Analyzing physical gesture data of Guqin performers to categorize sliding tones," Proceedings of International Symposium on Performance Science (ISPS), Kyoto, Japan, September 2015.

J. He, "Re-Visioning Guqin Performance," 19th International CHIME Meeting: The New Face of Chinese Music, Haute école de musique de Genève, Switzerland, October 2015.

D. Siwiak, A. Kapur, and D. A. Carnegie, "Micro-timing as a Feature for Investigating Musicality," Proceedings of 2015 International Symposium on Performance Science (ISPS), Kyoto, Japan, September 2015.

Kapur, A., Cook, P. R., Bryant, M., "Delocalized Pedagogy through Digital Music Programming Instruction," In Proceedings of the International Symposium for Electronic Arts, Dubai, 2014.

Kapur, R., Kapur, A., Darling, M., & J. Jahnke, "Samsara: A Digital Medium for Theatrical Storytelling Using Animation, Robotics, and Immersive Technology," In Proceedings of the International Symposium for Electronic Arts, Dubai, 2014.

Kapur, A., Cook, P. R. "Getting Artists up to steAm: Teaching Computer Science to Art School Students." MOOCs in STEM: Exploring New Educational Technologies. 2014.

Carnegie, D.A., Kapur, A., Gouws, G., and Watterson, C., "Student Retention in a Mechatronics Programme: Motivating Engineers to Learn Through Music and Creativity." Proceedings of the 15th International Workshop on Research and Education in Mechatronics (REM), El Gouna, Egypt, 9 – 11 September 2014. ISBN 978-1-4799-3028-9

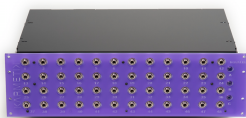
Murphy, J., Carnegie, D.A., and Kapur, A., "Little Drummer Bot: Building, Testing, and Interfacing with a new Expressive Mechatronic Drum System.", Proceedings of the International Computer Music Conference (ICMC), Athens, Greece, September 2014.

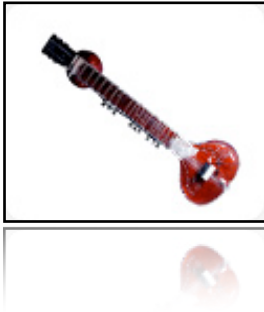
M. H. Zareei, D. A. Carnegie, A. Kapur, and D. McKinnon. "Mutor: Drone Chorus of Metrically Muted Motors." Proceedings of the International Computer Music Conference (ICMC), Athens, Greece, September 2014.

B. Johnson, M. Norris and A. Kapur "tactile.motion: An iPad Based Performance Interface For Increased Expressivity In Diffusion Performance" Proceedings of the International Computer Music Conference (ICMC), Athens, Greece, September 2014.

B. Johnson, M. Norris and A. Kapur, "Diffusing Diffusion: A History of the Technological Advanced in Spatial Performance" Proceedings of the International Computer Music Conference (ICMC), Athens, Greece, September 2014.

Murphy, J., Kapur, A., and Carnegie, D.A., "Mechatronic Keyboard Music: Design, Evaluation, and Use of a New Mechatronic Harmonium.", Proceedings of the International Computer Music Conference (ICMC), Athens, Greece, September 2014.





D. Siwiak, A. Kapur, and D. A. Carnegie, "Music Technology's Influence on Flute Pedagogy: A Survey of their Intersection," Proceedings of the International Computer Music Conference (ICMC), Athens, Greece, September 2014.

D. Siwiak, A. Kapur, and D. A. Carnegie, "Pitch Interval Detection and Classical Flute Pedagogy: An 'Elementary' Connection," Proceedings of Australasian Computer Music Conference (ACMC), Melbourne, Australia. July 2014.

B. Johnson, M. Norris and A. Kapur, "Modularity and Protocol in New Diffusion Systems" In the Proceedings of the Australasian Computer Music Conference (ACMC). Melbourne, Australia. 2014.

Murphy, J. Kapur, A. Carnegie, D. A., 'Robot! Tune Yourself: Musical Robotic Self-Tuning.' Proceedings of the International Conference on New Interfaces for Musical Expression. London, UK. June 2014.

M. H. Zareei, D. A. Carnegie, and A. Kapur. "Rasper: A Mechatronic Noise-Intoner." In Proceedings of the International Conference on New Interfaces for Musical Expression. London, UK. June 2014.

Honigman, C., Hochenbaum, J. & A. Kapur. "Techniques in Swept Frequency Capacitive Sensing: An Open Source Approach." Proceedings of the International Conference on New Interfaces for Musical Expression. London, UK. June 2014.

Mathews, P. Murphy, J. Kapur, A. Carnegie, D. A., 'Tangle: A Flexible Framework for Performance with Advanced Robotic Musical Instruments.' Proceedings of the International Conference on New Interfaces for Musical Expression. London, UK. June 2014.

B. Johnston, H. Dengate Thrush, J. Murphy, T. Molata, & A. Kapur, 'Polus: The Design and Development of a New, Mechanically Bowed String Instrument Ensemble.' Proceedings of the International Conference on New Interfaces for Musical Expression. London, UK. June 2014.

Barraclough, T. Murphy, J. Kapur, A., 'New Open Source Interfaces for Group Based Participatory Performance of Live Electronic Music.' Proceedings of the International Conference on New Interfaces for Musical Expression. London, UK. June 2014.

M. H. Zareei, D. McKinnon, A. Kapur, and D. A. Carnegie. "Complex: Physical Re-Sonification of Urban Noise." In Proceedings of the International Conference on Auditory Display, New York, USA, 2014

Kapur, A., Cook, P. R., Bryant, M. "Creative Coding: A Unique Pedagogical Model for Teaching Computer Science to Artists." International Conference on New Perspectives in Science Education. Bergamo, Italy. 2014

J. He, Hochenbaum, J. and Kapur, A. V I E: an automata sequencer. eContact!, 16(2), 2014.

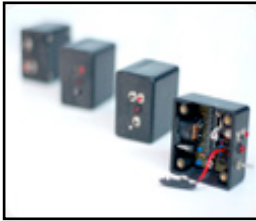
Christopher, K., He, J., Kapur, A. and Carnegie, D. Interactive Sound Synthesis Mediated through Computer Networks. eContact!, 16(2), 2014.

Christopher, K., Kapur, A., Carnegie, D A., Grimshaw, G M., "Implementing 3D Visualizations of EEG Signals in Artistic Applications." Proceedings of the 28th International Conference on Image and Vision Computing New Zealand, IEEE Press., 2013.

Christopher, K., Grimshaw, G M., Kapur, A., Carnegie, D A., "Towards Effective Neurofeedback Driven by Immersive Art Environments." ACNS-2013 Australasian Cognitive Neuroscience Society Conference, Frontiers, 2013.

He, J., Hochenbaum, J. and Kapur, A. , "V I E: An Automata Sequencer." Proceedings of Symposium on Sound and Interactivity. Singapore. November 14-16, 2013.

Christopher, K., He, J., Kapur, A., Carnegie, D A., "Interactive sound synthesis mediated through computer networks." in Proceedings of Symposium on Sound and Interactivity, 2013.



Kapur, A., Cook, P., & M. Bryant, "Teaching Computer Science to Digital Artists through Music and Sound," In Proceedings of the International Computer Music Conference. Perth, Australia, August 2013.

Park, T.H., Kapur, A., Turner, J., Jacoby, C., Marse, A., Musick, M., & J. He, "Locative Sonification: Playing the World through Citygram," In Proceedings of the International Computer Music Conference. Perth, Australia, August 2013.

Murphy, J., Kapur, A., & D. A. Carnegie, "Swivel: Analysis and Systems overview of a New Robotic Guitar," In Proceedings of the International Computer Music Conference. Perth, Australia, August 2013.

Johnson, B., Murphy, J., & A. Kapur, "Designing Gestural Interfaces for Live Sound Diffusion," In Proceedings of the International Computer Music Conference. Perth, Australia, August 2013.

Zareei, M., Kapur, A., & D. A. Carnegie, "Noise on the Grid: Rhythmic Pulse in Experimental and Electronic Noise Music," In Proceedings of the International Computer Music Conference. Perth, Australia, August 2013.

Arar, R. and A. Kapur, "A History of Sequencers: Interfaces for Organizing Pattern-Based Music". Proceedings of the Stockholm Music Acoustics Conference and Sound and Music Computing Conference, Stockholm, Sweden. August 2013.

Kapur, A., Kim, Dae-Hong, Kapur, R., & K. Eom, "New Interfaces for Traditional Korean Music and Dance", In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

Murphy, J., McVay, J., Carnegie, D.A., & A. Kapur, "Designing and Building Expressive Robotic Guitars", In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

Christopher, K., He, J., Kapur, R., & A. Kapur, "Kontrol: Hand Gesture Recognition for Music and Dance Interaction", In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

Diakopoulos, D. & A. Kapur, "Netpixl: Towards a New Paradigm for Networked Application Development", In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

Hochenbaum, J. & A. Kapur, "Towards the Future Practice Room: Empowering Musical Pedagogy through Hyperinstruments," In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

Johnson, B. & A. Kapur, "MultiTouch Interfaces for Phantom Source Positioning in Live Sound Diffusion", In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

He, J. and Kapur, A., "Formalization Using Organic Systemization for Musical Applications." Proceedings of the International Conference on Computation, Communication, Aesthetics and X. Bergamo, Italy. June 27-28, 2013.

Honigman, C., Walton, A., & A. Kapur, "The Third Room: A 3D Virtual Music Paradigm", In Proceedings of the International Conference on New Interfaces for Musical Expression. Daejeon, South Korea. May 2013.

Hochenbaum, J., Kapur, A. "Nuance: A Software Tool for Capturing Synchronous Data Streams From Multimodal Musical Systems." In Proceedings of the International Computer Music Conference. Ljubljana, Slovenia. September 9-15, 2012





Hochenbaum, J., Kapur, A. "Improving Onset Detection Accuracy in Non-Percussive Sounds Using Multimodal Fusion" In Proceedings of the Australasian Computer Music Conference. Brisbane, Australia. July 12-15, 2012.

Johnston, B. & A. Kapur, "EZither: Extended Techniques for Customised Digital Bowed String Instrument" In Proceedings of the Australasian Computer Music Conference. Brisbane, Australia. July 12-15, 2012.

Hochenbaum, J., Kapur, A. "Drum Stroke Computing: Multimodal Signal Processing for Drum Stroke Identification and Performance Metrics." In Proceedings of the International Conference on New Interfaces for Musical Expression. Ann Arbor, Michigan. May 21-23, 2012.

Murphy, J., Kapur, A., and Carnegie, D. "Better drumming through calibration: Techniques for pre-performance robotic percussion optimization." In Proceedings of the International Conference on New Interfaces for Musical Expression, Ann Arbor, Michigan. May 21-23, 2012.

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#### DISSERTATION

Kapur, A. "Digitizing North Indian Music: Preservation and Extension Using Multimodal Sensor Systems, Machine Learning and Robotics." *Doctor of Philosophy*, Interdisciplinary combining Departments of Computer Science, Electrical Engineering, Mechanical Engineering, Music & Psychology, University of Victoria, November 2007.

#### SENIOR THESIS

Kapur, A. "The Electronic Tabla Controller." *Senior Thesis*, Computer Science Department, Princeton University, May 2002. [Winner: Calvin Dodd MacCracken Senior Thesis/Project Award.](#)

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Davidson, P., Kapur, A., & P. R. Cook, "A System for Generating Real-Time Visual Meaning for Live Indian Drumming", *Refractory: A Journal of Entertainment Media, Special Edition: The Sounds of Vision, Spectatorship and Aural Perception*, 2004.

#### Discography

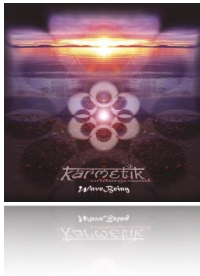
**Samsara** KarmetiK Machine Orchestra Live at Walt Disney Hall, Los Angeles, KarmetiK Records, January 2015.

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#### Selected Festival / International Performances and Interactive Installations

**"Inaaya"** at Machines and Strings, Composed by Ajay Kapur, Performed by: Isaura Quartet and KarmetiK Machine Orchestra, REDCAT Walt Disney Concert Hall Complex, Los Angeles, California, October 24, 2018





**"T.A.P. But don't Touch"**, IfSoWhat Festival, Palace of Fine Arts, San Francisco, California. Commissioned by Porsche North America. April 25-28, 2018

**"Samsara"**, REDCAT Walt Disney Concert Hall Complex, Los Angeles, California, Directed by Ajay Kapur & Michael Darling. KarmetiK Machine Orchestra. April 12-13, 2012.

**"GanaPati 4.0 - Interaktive Klanginstallation"**, PACT Zollverein, Essen, Germany, w/ Michael Darling & Colin Honigman, September 29, 2011.

**"MISTIC Concert V: Robotics and Music"**, Open Space, Victoria, Canada, w/ Trimpin, Arne Eigenfeldt & Andrew Schloss, January 23, 2011.

**"Human and Robot Music"**, Simon Fraser University, Vancouver, Canada, w/ Trimpin, Arne Eigenfeldt & Andrew Schloss, January 21, 2011.

**"KarmetiK Collective in Mumbai"**, Blue Frog, Mumbai, India, w/ Shamik, December 25, 2010.

**"Symbiotic Human/Machine Orchestra"**, 01SJ Biennial Digital Arts Festival, San Jose CA, w/ Curtis Bahn, Tomie Hahn, Carl Burgin & Jim Murphy. September 17, 2010.

**"The Machine Orchestra: Ganapati Sessions"**, Fridays at Five Series, Wellington, New Zealand, w/ Curtis Bahn, Tomie Hahn, Owen Vallis, Jordan Hochenbaum, & Jim Murphy, August 20, 2010.

**"KarmetiK Machine Orchestra at SCREAM Festival"**, REDCAT Walt Disney Concert Hall Complex, Los Angeles, California, Directed by Ajay Kapur & Michael Darling, With Ustad Aashish Khan, Nyoman Wenten, Curtis Bahn, Perry Cook, Carl Burgin, Dimitri Diakopoulos, Jordan Hochenbaum, Jim Murphy, Owen Vallis, Meason Wiley. January 27, 2010.

**"The MahaDeviBot Sessions: KarmetiK Collective"**, The Western Front, Vancouver, BC Canada, with Ajay Kapur, Curtis Bahn & Arne Eigenfeldt. March 13, 2009.

**"Concert of NID"**, National Institute of Design, Bangalore, India, with Ajay Kapur (ESitar) & Curtis Bahn (ESitar, EDilruba), December 19, 2008.

**"Rajas Gunas"**, International Conference on Digital Arts, Porto, Portugal, November 7, 2008.

**"Twilight"**, Australasian Computer Music Conference, Sydney, Australia, July 12, 2008.

**"KarmetiK Collective"**, International Jazz Festival, Victoria, BC, Canada, with Ajay Kapur (ESitar, MahaDeviBot), Curtis Bahn (ESitar, EDilruba), Jesse Brown (AstroPhonics), Manj Benning (Drums), June 28, 2008.

**"MahaDeviBot Sessions"**, NUS International Arts Festival, Singapore, with Ajay Kapur (ESitar, MahaDeviBot), Curtis Bahn (ESitar, EDilruba), & Arne Eigenfeldt (KinetiK Engine), February 24, 2008.

**"MahaDeviBot with E-Sitar & E-Dilruba"**, Carnival of e-Creatiity & Change-Agents Conclave, New Delhi, India, with Ajay Kapur (ESitar, MahaDeviBot) & Curtis Bahn (ESitar, EDilruba), February 16, 2008.

**"Anjuna's Digital Raga"**, International Computer Music Conference, Copenhagen, Denmark, with Ajay Kapur (ESitar), August 27, 2007.

**"KarmetiK Underground with the MahaDeviBot"**, International Jazz Festival, Victoria, BC, Canada, with Ajay Kapur (ESitar, MahaDeviBot), Satnam Minhas (Guitar, Sitar), Jesse Brown (AstroPhonics), Manj Benning (Drums, Bass), & Emily Brown (Vocals), June 30, 2007.

**"Digital Sankirna for MahaDeviBot, ESitar and EDilruba"**, International Conference for New Interfaces for Musical Expression, New York City, NY, USA, with Ajay Kapur (ESitar, MahaDeviBot) & Curtis Bahn (ESitar, EDilruba), June 9, 2007.

**"Digital Sankirna"**, NUS International Arts Festival, *Singapore*, with Ajay Kapur (ESitar, MahaDeviBot), March 11, 2007.

**"Saraswati's ElectroMagic"**, International Conference for New Interfaces for Musical Expression, *Hamamatsu, Japan*, with Ajay Kapur (ESitar) Philip Davidson (Interactive Visuals), & Ari Lazier (Electronics), June 4, 2004.

**"Saraswati's ElectroMagic"**, Listening in the Sound Kitchen International Computer Music Festival, *Princeton, NJ, USA*, with Ajay Kapur (ESitar) Philip Davidson (Interactive Visuals), & Ari Lazier (Electronics), November 14, 2003.

**"Gigapop Ritual:"** A Live Networked Performance Between Princeton University and McGill University, International Conference for New Instruments for Musical Expression, *Montreal, Canada*, with Ajay Kapur (Sitar, EDholak), Perry Cook (DigitalDoo), Ge Wang (EDholak), Philip Davidson (Interactive Visuals), Dan Trueman (Violin, RBow), Tae Hong Park (bass), & Manjul Bhargava (Tabla), May 23, 2003.