

Mikhail Jacob

Human-Centered AI / Computational Co-creativity / Cognitive Architectures

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Pallathusseril House, Anathanam, Manganam PO.
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Education

Georgia Institute of Technology, Atlanta, GA.

Ph.D. in Computer Science, 2013 - Present. GPA – 3.96 / 4.0

Georgia Institute of Technology, Atlanta, GA.

M.S. in Computer Science: Interactive Intelligence, 2011 - 2013. GPA – 4.0 / 4.0

Manipal Institute of Technology, Manipal, India.

B.E. in Computer Science & Engineering, 2007 - 2011. GPA – 8.48 / 10.0

Research Experience

Georgia Institute of Technology, Atlanta, GA 08/2012 - Present

Viewpoints AI Project, Adaptive Digital Media Lab,

Dr. Brian Magerko, http://adam.cc.gatech.edu/?page_id=639

- The Viewpoints AI Project was an effort to create a full-body narrative interactive art experience without pre-authored instancial assets using the Viewpoints framework from theatre and dance that grew into a model of contemporary movement improvisation between a human and AI movement partner.
- Researching, designing, and implementing case-based and imitation-based learning methods to teach an agent contemporary movement improvisation with human collaborators through observation of collaborators.

Georgia Institute of Technology, Atlanta, GA 08/2012 - Present

Computational Play Project, Adaptive Digital Media Lab,

Dr. Brian Magerko, http://adam.cc.gatech.edu/?page_id=278

- The Computational Play Project seeks to model playful behavior computationally in software agents and in robots, in domains ranging from playful task execution to childhood pretend play and object-based play.
- Researching conceptual blending of objects to formally represent object-based pretense within turn-based third-person pretend object play between human and robot or virtual agent.
- Designing a conceptual cognitive architecture called the Co-creative Cognitive Architecture (CoCoA) extending Soar with an emphasis on co-creativity.

Georgia Institute of Technology, Atlanta, GA 12/2011 – 08/2012

Digital Improv Project, Adaptive Digital Media Lab,

Dr. Brian Magerko, http://adam.cc.gatech.edu/?page_id=7

- The Digital Improv Project was part of an effort to understand the human capacity for improvisation, enabling humans and agents to co-creatively perform improvisational theatre on the fly.
- Researched computational reasoning about status & representation of status in Improv Theatre
- Researched automated workflow / process for getting crowd-sourced data on cognitive scripts

Georgia Institute of Technology, Atlanta, GA 09/2011 – 12/2012

Game Adaptive Intelligent Agent Project (GAIA), Design & Intelligence Lab,

Dr. Ashok Goel, <http://www.dilab.gatech.edu/gaia.html>

- GAIA is an agent design system that creates agents containing a model of their own behavior. It combines CAD for agent design with self-adaptive agent intelligence to enable rapid prototyping of agent designs.
- GAIA determined adaptations of its behavior model for future success after a past failure as well as for successful execution in modified scenarios with new rules and game mechanics.
- Implemented models of Tic Tac Toe agents to play variations of Tic Tac Toe such as DrawBridge and Misere.

Publications

- Jacob, M., & Magerko, B. (2015). Interaction-based Authoring for Scalable Co-creative Agents. Conditionally accepted to the *Sixth International Conference on Computational Creativity (ICCC) 2015*, Provo, UT.
- Davis, N., Comerford, M., Jacob, M., Hsiao, C.-P., & Magerko, B. (2015). An Enactive Characterization of Pretend Play. *Proceedings of the 10th ACM conference on Creativity and Cognition (C&C) 2015*. Glasgow.
- Magerko B., Permar, J., Jacob, M., Comerford, M., and Smith, J. (2014). "An Overview of Computational Co-creative Pretend Play with a Human." In the *Proceedings of First Workshop on Playful Virtual Characters at the Fourteenth Annual Conference on Intelligent Virtual Agents 2014*, Boston, MA.
- Jacob, M., Coisne, G., Gupta, A., Sysoev, I., Verma, G., and Magerko, B. (2013). "Viewpoints AI." In the *Proceedings of the Ninth Annual AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE) 2013*, Boston, MA.
- Jacob, M., Zook, A., and Magerko, B. (2013). "Viewpoints AI: Procedural Representation and Reasoning on Gesture Meaning." In the *Proceedings of the Digital Games Research Association (DiGRA) 2013*, Atlanta, GA.

Presentations

- Jacob, M., Anderson, J., Winston, L., Viriyayuthakorn, S., and Magerko, B. (2014). "Viewpoints AI", *STEAM³ Conference, Invited demonstration*. Presented 09/11-13/15.

- Jacob, M., Anderson, T., Tsai, A., and Magerko, B. (2014). "Viewpoints AI", *Georgia Tech TechArts Festival, Invited demonstration on campus*. Presented 02/18/15.
- Jacob, M. (2013). "Once More With Feeling: Cognitive Models of Emotion", *AI Storytelling in Virtual Worlds* graduate course, Georgia Institute of Technology, Atlanta, GA. *Invited Talk*, Presented 10/03/14.
- Jacob, M. (2013). "Intro to Planning and Narrative", *AI Storytelling in Virtual Worlds* graduate course, Georgia Institute of Technology, Atlanta, GA. *Invited Talk*, Presented 08/27, 29/14.
- Jacob, M., Magerko, B. (2014). "Viewpoints AI", *Seventh International Conference on Interactive Digital Storytelling (ICIDS)*, Singapore. *Peer-reviewed public installation*. Presented 11/2-5/14.
- Jacob, M. (2014). "Computational Representations of Pretend Play." *34th Soar Workshop*, Ann Arbor, MI. Presented 06/18/14.
- Jacob, M. (2014). "Viewpoints AI – Improvisational Dance / Contemporary Movement AI." *34th Soar Workshop*, Ann Arbor, MI. Presented 06/18/14.
- Jacob, M., Sysoev, I., Anderson, T., and Magerko, B. (2014). "Viewpoints AI", *Georgia Tech TechArts Festival, Peer-reviewed demonstration on campus*. Presented 02/24-25/14.
- Jacob, M., Sysoev, I., and Magerko, B. (2013). "Viewpoints AI", *The DAEL Windows Project. Invited month-long public installation*. Presented 12/1-31/13.
- Jacob, M. (2013). "Viewpoints AI", *Computational Creativity Club at First PROSECCO Autumn School on Computational Creativity*, Porvoo, Finland, *Peer-reviewed demonstration*. Presented 11/20/13.
- Jacob, M. (2013). "Viewpoints AI", *Georgia Game Developers Association Meeting*, Atlanta, GA. *Invited performance art piece*. Presented 11/12/13.
- Jacob, M. (2013). "Viewpoints AI", *Interactive Narrative* graduate course, Georgia Institute of Technology, Atlanta, GA. *Invited Talk*, Presented 10/20/13.
- Jacob, M., Coisne, G., Gupta, A., Sysoev, I., Verma, G., and Magerko, B. (2013). "Viewpoints AI." *Ninth Annual AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*, Boston, MA. *Peer-reviewed demonstration*. Presented 10/17/13.
- Jacob, M., Zook, A., and Magerko, B. (2013). "Viewpoints AI: Procedural Representation and Reasoning on Gesture Meaning." *Digital Games Research Association (DiGRA) 2013*, Atlanta, GA. *Accepted paper session*, Presented 08/27/13.
- Jacob, M., Magerko B., Riedl, M., Thomaz, A. (2013). "Computational Play.", *GVU Brown Bag Seminar: GVU Research and Innovation Grants Talks*, Georgia Institute of Technology, Atlanta, GA. Presented 04/11/13.

Teaching

- Teaching Assistant, Fall 2014, AI Storytelling in Virtual Worlds (CS 7634)
- Teaching Assistant, Spring 2013, Expressive AI (CS 8803-EAI)

Professional Affiliations

- Association for the Advancement of Artificial Intelligence (AAAI)
- Cognitive Science Society (CogSci)
- Association for Computing Machinery (ACM)
 - Special Interest Group on Artificial Intelligence (SIGAI)
- Institute of Electrical and Electronics Engineers (IEEE)

Relevant Coursework & Projects

Expressive AI, Fall 2012 – Fall 2013:

"Masters' Project: Viewpoints AI"

- Viewpoints AI is a human – AI co-creative improvisational movement-based performance piece that procedurally reasons about the current improvised performance using the Viewpoints framework from theatre and dance.
- Researched and implemented the reasoning module of the agent in SOAR that took in viewpoints data and the human performer's gesture and decided how to respond and what to respond with.

Advanced Game AI, Fall 2012:

"Flame Warz – A Twitter Conflict Game"

- Researched and implemented a procedurally generated game that mined characters and items from twitter using people that were trending on twitter, their 'friends', and items that they liked in quest templates.
- Mined characters and items used in open-world game where the villain's emotion model, combining plan appraisals from EMA and PAD Space Moods from ALMA, controlled the game ending allowing individual conflict resolution styles like diplomacy, aggression, shaming, etc.

Design of Environments, Spring 2012:

"SoundBored – Music Therapy For Stroke Rehabilitation"

- Designed and implemented Microsoft Surface application for stroke survivor rehabilitation using music therapy.
- Users were trained to play increasingly complex generated musical patterns or familiar songs on the device using dynamic difficulty adjustment.

"SmarTiles"

- Designed intelligent floor tiles that could dynamically change from hard to soft in order to absorb impact using camera-based fall detection for trauma prevention in aging adults.

Game AI, Spring 2012:

"Generative Abstract Art Game"

- Designed and implemented Unity-based procedurally generated platformer game that generated an abstract art piece using a genetic algorithm and principles of art for fitness evaluation.
- Elements of game level were visual elements of the art piece.
- Game mechanics were generated with evolving parameters and behavior using simple player modeling.

"Rhythm-based Level Generation for Infinite Mario"

- Designed and implemented Mario level generator based on user selected music in MIDI format.
- Level elements generated to visualize musical elements such as pitch and instrumentation choice.
- Players were modeled according to Bartle personalities and the aspect of the game they were most interested in was customized according to a linear closed loop player model.

"Infinite Mario Coin Collecting AI and Custom Personality"

- Designed and implemented A* agents based on Robin Baumgartner's A* Agent for Infinite Mario game with task of collecting all coins with a custom schizophrenic personality

AI Storytelling In Virtual Worlds, Fall 2011:

"RadVenture"

- Designed and implemented AI generated / controlled Alternate Reality Game (ARG) Engine with quest generation & quest management using Hierarchical Task Network (HTN) planning

Design Game, Fall 2011:

"Evolution!"

- Designed and implemented full-body exer-game using the Kinect to teach concepts of Evolution through two player fighting game between human-controlled species that would evolve according to style of play, survival, and strategies used in fighting

Knowledge Based AI Class, Fall 2011:

"Agent To Solve Raven's Progressive Matrices Propositionally"

- Designed and implemented agent that used abductive & analogical reasoning approach to solve advanced Raven's Progressive Matrices (RPM) problems propositionally and simpler RPM problems visually

"Agent To Solve Miller Analogies Intelligence Test (MAT)"

- Designed and implemented agent that used analogical reasoning approach to solve MAT problems propositionally
- **"IDEAS - Intelligence Development Employing Archetypical Scripts"**
- Designed architecture and high level algorithm for intelligence development agent that would process streams of events and detect & predict noteworthy larger narrative patterns like terrorist plots, gang wars, etc. using scripts

Other Relevant Courses:

Cognitive Psychology, Introduction to Cognitive Science, Expressive AI, Computing Creativity & Design Cognition, Introduction To Robotics Research, Artificial Intelligence, Artificial Neural Networks

Work Experience

Institute for Creative Technologies – Los Angeles, USA

05/19/2015 – 08/11/2015

<http://cogarch.ict.usc.edu/>

Visiting Research Assistant – Sigma Project

- Researched, designed, and integrated appraisal models with the graphical Sigma cognitive architecture in order to improve performance in collaboration with Dr. Paul Rosenbloom.

Georgia Institute of Technology – Atlanta, USA

05/05/2012 - Present

<http://adam.cc.gatech.edu>

Graduate Research Assistant – Adaptive Digital Media (ADAM) Lab

- Researched, designed, and developed human-centered AI systems in the domains of improvisational theatre, contemporary movement improvisation, and object-based pretend play.

Citrix R&D India Ltd – Bangalore, India

01/05/2011 - 06/21/2011

<http://www.citrix.com/netscaler>

Intern Software Development Engineer - Manageability Team, Citrix NetScaler

- Researched, designed, and developed new NetScaler monitoring interface.
- Developed part of NetScaler JavaScript configuration utility replacing current Java implementation.

Microsoft India Development Center – Hyderabad, India

05/31/2010 - 07/30/2010

<http://www.microsoft.com/india/msidc/servertools/rds.aspx>

Intern Software Development Engineer - Remote Desktop - Virtualization Team

- Researched requirements for transition of product from existing management API to new version, did feasibility study for adopting new API, and implemented prototype of product using new API to demonstrate feasibility.

Skills

Programming Languages – Soar, Java, C#, C, C++, JavaScript

Technology Competencies – Soar Cognitive Models, Co-creative Virtual Agents, Cognitive Architectures, Emotion Models, Planning Algorithms, Evolutionary Algorithms, Kinect Programming, and Interactive Art Experiences.