Kyu Han Koh

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EDUCATION

- **University of Colorado at Boulder**, Boulder, CO — May 2014
  - Ph. D. in Computer Science and Cognitive Science
    - Graduate Certification in Cognitive Science, April 2011
      Institute of Cognitive Science, University of Colorado at Boulder
  - Thesis
    - *Computational Thinking Pattern Analysis:*
      A Phenomenological Approach to Compute Computational Thinking
  - Advisor: Dr. Alexander Repenning
- **Auburn University**, Auburn, AL — May 2007
  - M.S. in Computer Science
  - Thesis
    - *PINEHILL: A Novel Approach to Computer Aided Language Learning*
  - Advisor: Dr. Cheryl D. Seals
- **Soongsil University**, Seoul, South Korea — February 2004
  - B.S. in Computer Science

HIGHLIGHTS

- Earned joint Doctoral Degree in Computer Science and Cognitive Science
- Awarded Chancellor's Award for Excellence in STEM Education
- Chosen as Semi-Finalist (Top 4 and Top 5) at Student Research Competition at ACM Special Interest Group on Computer Science Education Conference (SIGCSE 2012, 2013, and 2014)
- Co-authored three funded NSF grant proposals
- Worked as the sole computer science research assistant for several multimillion-dollar projects
  - Built several cyberlearning infrastructure systems including the world's first automated real time programming assessment tools which have served more than 20,000 students across 29 different states.

RESEARCH INTERESTS

- Human-centered computing
- Computer supported collaborative learning
- Educational data mining
- Visual data analytics
- Intelligent tutoring systems

HONORS AND AWARDS

1. **Research Award** 2014
   Institute of Cognitive Science, University of Colorado at Boulder
2. **Chancellor's Award for Excellence in STEM Education** 2013
   University of Colorado at Boulder
3. **Research Award** 2013
   Institute of Cognitive Science, University of Colorado at Boulder
4. **Research Award** 2011
   Institute of Cognitive Science, University of Colorado at Boulder
5. **University Fellowship** Fall 2007
   University of Colorado at Boulder
6. **University Fellowship** Spring 2008
   University of Colorado at Boulder
7. **STARS Student Leadership** 2007
   Auburn University
8. **Academic Excellence Scholarship** 2003
   Soongsil University
9. **Academic Excellence Scholarship** 2001
   Soongsil University

PROFESSIONAL EXPERIENCE

A. Research Experience

1. **Postdoctoral Associate: OpenDSA Project**
   Virginia Polytechnic Institute and State University, Blacksburg, VA 7/2015 – present
   - Data Analytics/Visual Data Analytics:
     - Designing and developing data analytics tools and data visualization tools.
   - Intelligent Tutoring Systems Design:
     - Designing and implementing intelligent tutoring systems.

2. **Research Associate: Scalable Game Design Project**
   University of Colorado, Boulder, CO 6/2014 – 6/2015
   - Data Analytics/Visual Data Analytics:
     - Designed and developed data analytics tools and data visualization tools.
3. **Research Assistant: Scalable Game Design Project (iDREAMS, CT4TC, and oDREAMS)**
   Funded by NSF ($5 million)

University of Colorado, Boulder, CO 1/2009 – 5/2014

- Visual Data Analytics:
    - Designed, built, and validated Computational Thinking Pattern Analysis: the world's first real time automated computational thinking assessment tool.
    - Designed, built, and validated data visualization/data analytics tools based on Computational Thinking Pattern Analysis.
- Cyberlearning Infrastructure Design:
    - Designed, constructed, and maintained Scalable Game Design Arcade and Wiki for web support and computer mediated collaborative learning.
- Professional Development:
    - Supervised curriculum design, along with teacher and class observation

4. **STARS Student Leadership: Students & Technology Academia Research & Service (STARS) Alliance**

Auburn University, Auburn, AL, 1/2007 – 8/2007

Used Languages : Alice 3D, Squeak

- This project has conducted with third to fifth grade school students in Auburn, Alabama. I, along with other colleagues, taught them how to create their own computer simulations with end user programming languages, such as Alice 3D and Squeak. Through this project, we have tested the usability of those end user programming tools and observed how children cope with the limitations of those tools.

B. Teaching Experience

1. **Graduate Teaching Assistant: CSCI 1300 Computer Science 1**

University of Colorado, Boulder, CO 1/2008 – 5/2008

- Taught and graded programs in Python and C++.
- Served as a lab monitor and aided students in learning programming concepts.

2. **Instructor: Comp 1000 Personal Computer Applications**

Auburn University, Auburn, AL 1/2007 – 5/2007

- Lab Instructor: Introduced personal computers and software applications, including word processing, spreadsheets, databases, and presentation of graphics.
- Taught generation and retrieval of information using the Internet and the integration of data among applications.

3. **Graduate Teaching Assistant: Comp1210 Fundamentals of Computing**

Auburn University, Auburn, AL 8/2006 – 12/2006

- Taught and graded programs in Java.

- Acted as a lab monitor and aided students in learning programming concepts.

C. Academic Publication Reviews

- Peer-to-Peer Networking and Applications (Invited Reviewer) 2015
- ACM Special Interest Group on Computer Science Education Conference 2015
- ACM Creativity & Cognition 2011
- ACM CHI 2011 Conference on Human Factors in Computing Systems 2011
- International Symposium on End-User Development 2011
- IEEE International Symposium on Visual Languages and Human-Centric Computing 2010

D. Editorial Supervision

- High School Textbook on Information, Visang Education, Seoul, South Korea 2015-2016
- Middle School Textbook on Information, Visang Education, Seoul, South Korea 2015-2016

E. Student Supervision

- Digital Education Research Group at Virginia Polytechnic Institute and State University
- Ph.D. Student
    - Hilarie Nickerson, University of Colorado at Boulder
    - Mohammed Seddik, Virginia Polytechnic Institute and State University
    - Ayaan Kazerouni, Virginia Polytechnic Institute and State University
- Master's Student
    - Muyang Song, University of Colorado at Boulder
    - Hossameldin Shahin, Virginia Polytechnic Institute and State University

PUBLICATIONS

Peer-Reviewed Journal Paper

1. Repenning, A., Webb, D., ***Koh, K. H***., Nickerson, H., Miller, S., Brand, C., Her Many Horses, I., Basawapatna, A., Gluck, F., Grover, R., Gutierrez, K., and Repenning, N., Scalable Game Design: A Strategy to Bring Computer Science Education to Schools through Game Design, ACM Transactions on Computing Education (TOCE), 15, 2, Article 11 (April 2015), ACM, New York, NY, USA.
2. ***Koh, K. H***., Fouh, E., Farghally, M. F., Shahin, H., and Shaffer. C. A., 2016. Learner Analytics Data Quality for an eTextbook System, Journal of Data and Information Quality (*Under Review*)

Peer-Reviewed Conference Papers

3. Fouh, E., Farghally, M. F., Hamouda, S., ***Koh, K. H***., and Shaffer. C. A., Investigating Difficult Topics in a Data Structures Course Using Item Response Theory and Logged Data Analysis, International Conference on Educational Data Mining (EDM2016), Raleigh, North Carolina, USA, June 29 - July 2, 2016 (accepted)
4. Basawapatna, A., Repenning, A., ***Koh, K. H***., Closing The Cyberlearning Loop: Enabling Teachers To Formatively Assess Student Programming Projects, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2015), Kansas City, Missouri, USA, March 4-7, 2015.
5. ***Koh, K. H***., Basawapatna, A., Nickerson, H., Repenning, A., Real Time Assessment of Computational Thinking, IEEE International Symposium on Visual Languages and Human-Centric Computing, Melbourne, Australia, July 28-Aug 1, 2014
6. ***Koh, K. H***., Nickerson, H., Basawapatna, A., Repenning, A., Early Validation of Computational Thinking Pattern Analysis, ITiCSE '14: Annual Conference on Innovation and Technology in Computer Science Education, Uppsala, Sweden, June 23-25, 2014
7. Basawapatna, A., Repenning, A., ***Koh, K. H***., Saviganano, M., The Consume - Create Spectrum: Balancing Convenience and Computational Thinking in STEM Learning, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2014), Atlanta, Georgia, USA, March 5-8, 2014.
8. Basawapatna, A., Repenning, A., ***Koh, K. H***., Nickerson, H., The Zones of Proximal Flow: Guiding Students through a Space of Computational Thinking Skills and Challenges, ICER '13: International Computing Education Research Conference, San Diego, California, USA, August 12-14, 2013.
9. Bennett, V., ***Koh, K. H***., Repenning, A., Computing Creativity: Divergence in Computational Thinking, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2013), Denver, Colorado, USA, March 6-9, 2013.
10. ***Koh, K. H***., Repenning, A., Nickerson, H., Endo, Y., Motter, P., Will it Stick? Exploring the Sustainability of Computational Thinking Education Through Game Design, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2013), Denver, Colorado, USA, March 6-9, 2013.
11. Webb, D. C., Repenning, A., ***Koh, K. H***., Toward an Emergent Theory of Broadening Participation in Computer Science Education, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2012), Raleigh, North Carolina, USA, February 29 - March 3, 2012.
12. Bennett, V., ***Koh, K. H***., Repenning, A., CS Education Re-Kindles Creativity in Public Schools, ITiCSE '11: Annual Conference on Innovation and Technology in Computer Science Education, Darmstadt, Germany, June 27-29, 2011.

13. Ioannidou, A., Bennett, V., Repenning, A., ***Koh, K. H***., Basawapatna, A., Computational Thinking Patterns, the 2011 Annual Meeting of the American Educational Research Association (AERA), New Orleans, Louisiana, USA, April 8-12, 2011.
14. Basawapatna, A., ***Koh, K. H***., Repenning, A., Webb, D., Marshall, K., Recognizing Computational Thinking Patterns, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2011), Dallas, Texas, USA, March 9-12, 2011.
15. ***Koh, K. H***., Bennett, V., Repenning, A., Inspiring Collaborative Benefits: An Interaction between a Virtual and a Physical Group Learning Infrastructure, Western Canadian Conference on Computing Education (WCCCE 2010), Okanagan, B.C., Canada, May 7-8, 2010.
16. ***Koh, K. H***., Basawapatna, A.,Bennett, V., Repenning, A., Towards the Automatic Recognition of Computational Thinking, IEEE International Symposium on Visual Languages and Human-Centric Computing, Leganés-Madrid, Spain, September 21-25, 2010.
17. Basawapatna, A., ***Koh, K. H***., Repenning, A., Using Scalable Game Design To Teach Computer Science From Middle School to Graduate School, ITiCSE '10: Annual Conference on Innovation and Technology in Computer Science Education, Ankara, Turkey June 26-30, 2010.
18. Repenning, A., Basawapatna, A., and ***Koh, K. H***., Making University Education More Like Middle School Computer Club: Facilitating The Flow of Inspiration, the 14th Western Canadian Conference on Computing Education, Burnaby, British Columbia, Canada, May 01 - 02, 2009.
19. ***Koh, K. H***., Gopalaswamy, S., Srirangarajan, A., Jin, J., Seals, C. D., Usability of AgentSheets for Creating Educational Simulation, ISCA 19th International Conference on Computer Applications in Industry and Engineering Conference, Las Vegas, Nevada, USA, November 2006.

Peer-Reviewed Conference Posters

20. Bennett, V., ***Koh, K. H***., Repenning, A., Can Learning Acquisition be Computed?, IEEE International Symposium on Visual Languages and Human-Centric Computing 2011, Pittsburgh, PA, USA, September 18-22, 2011.
21. ***Koh, K. H***., Bennett, V., Repenning, A., Computing Indicators of Creativity, ACM Creativity & Cognition 2011, The High Museum of Art · Atlanta, Georgia, USA, November 3-6, 2011.
22. Farghally, M. F., Fouh, E., Hamouda, S., ***Koh, K. H***., and Shaffer. C. A., Visualizing Algorithm Analysis Topics. In Proceedings of the 47th ACM Technical Symposium on Computing Science Education (SIGCSE '16). ACM, New York, NY, USA, 687-687

Doctoral Consortium

23. ***Koh, K. H***. Computing Computational Thinking, IEEE International Symposium on Visual Languages and Human-Centric Computing 2011, Pittsburgh, PA, USA, September 18-22, 2011.

Student Research Competition

24. ***Koh, K. H***. Computing Computational Thinking, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2014), Atlanta, Georgia, USA, March 5-8, 2014. (*semi-finalist*, Top 4)
25. ***Koh, K. H***. Real-Time Automated Computational Thinking Assessment Tool, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2013), Denver, Colorado, USA, March 6-9, 2013. (*semi-finalist*, Top 4)
26. ***Koh, K. H***. Computing Computational Thinking, ACM Special Interest Group on Computer Science Education Conference, (SIGCSE 2012), Raleigh, North Carolina, USA, February 29 - March 3, 2012. (*semi-finalist*, Top 5)

NSF Grant Proposal Writing: Co-authored NSF Grant Proposals.

1. SBIR Phase I: REACT: Fostering Computational Thinking through Real-time Classroom Learning Assessment *(Funded: $150,000)*: *The proposed system is based on my dissertation research.*
2. oDREAMS: Promoting Computational Thinking through Game & Simulation Design *(Funded: $2 million)*
3. CT4TC - Computational Thinking for Teaching Computing: Validating a Theory of Broadening Participation *(Funded: $1.5 million)*: *One of the two project outcomes is included in my dissertation research.*

INVITED TALKS

1. **Computational Thinking Education and Assessment** February 5, 2014
   Purdue University, West Lafayette, IN
2. **Computational Thinking Pattern Analysis: A Phenomenological Approach to Compute Computational Thinking** November 17, 2014
   University of Cincinnati, Cincinnati, OH
3. **Towards the Automatic Recognition of Computational Thinking for Adaptive Visual Language Learning** November 3, 2011
   Auburn University, Auburn, AL
4. **Csíkszentmihályi meets Vygotsky: Early thoughts on adaptive learning balancing creativity with scaffolding** November 3, 2010
   Life Long Learning and Design Lab, University of Colorado, Boulder, CO
5. **Scalable Game Design: iDREAMS Project** July 27, 2010
   Korea University, Seoul, South Korea

6. **Exploring output filter mechanism to provide convenient and trustworthy service for Google 3D warehouse users** March 19, 2008
   Life Long Learning and Design Lab, University of Colorado, Boulder, CO

GUEST LECTURES

1. **Computing Computational Thinking in Real-Time** November 19, 2013
   Educational Game Design Class, the Atlas Institute, University of Colorado, Boulder, CO
2. **Computing Computational Thinking** January 14, 2013
   Educational Game Design Class, the Computer Science department, University of Colorado, Boulder, CO
3. **Computing Computational Thinking** March 13, 2012
   Educational Game Design Class, the Computer Science department, University of Colorado, Boulder, CO

STUDENT SYMPOSIUMS

1. **Computing Computational Thinking in Real-Time** September 23, 2013
   The 5th Annual Symposium for STEM Learning, University of Colorado, Boulder, CO
2. **Computing Computational Thinking in Real-Time** February 26, 2013
   Graduate Student Colloquium, the Computer Science Department, University of Colorado, Boulder, CO
3. **Computational Thinking Pattern Analysis for Adaptive Visual Language Learning in Scalable Game Design Arcade** April 29, 2011
   ICS Fiesta and Poster Session, Institute of Cognitive Science, University of Colorado, Boulder, CO

COMPUTER SKILLS

- **Software**: Visual Programming Environments (AgentSheets, Alice, Squeak, Scratch), Rational Rose, Visual C, Microsoft Access/Visual Basic, DreamWeaver, Photoshop, Illustrator
- **Hardware**: NT, SUN Workstations. IBM, IBM compatibles, and Macintosh PCs
- **Languages**: C/C++, JAVA, Python, HTML, SQL, PHP, XML, and Javascript