

# Isaac Cho, Ph.D.

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## Educations

12/2013	<b>Doctor of Philosophy in Computing and Information Systems</b> <i>University of North Carolina at Charlotte, NC</i> Dissertation: "Bimanual Stereoscopic Interaction for 3D Visualization" Advisor: Dr. Zachary J. Wartell Committee: Dr. William Ribarsky, Dr. Paula Goolkasian, Dr. Mark Faust
02/2007	<b>Bachelor of Science in Computer Science (4.17/4.5)</b> Highest Honors <i>Hallym University, South Korea</i>

## Professional Appointments

8/2018 - Current	<b>Research Assistant Professor</b> , Computer Science Department, <i>University of North Carolina at Charlotte</i>
6/2015 – 7/2018	<b>Research Associate</b> , <i>Charlotte Visualization Center, University of North Carolina at Charlotte</i> , Supervisor: Dr. William Ribarsky, Dr. William Tolone
8/2015 – 8/2018	<b>Instructor</b> , <i>Data Science Initiative, University of North Carolina at Charlotte, Visual Analytics</i>
2/2014 - 5/2015	<b>Postdoctoral Fellow</b> , <i>Charlotte Visualization Center, University of North Carolina at Charlotte</i> , Supervisor: Dr. William Ribarsky
8/2007 – 12/2013	<b>Graduate Research Assistant, Graduate Teaching Assistant</b> , <i>Department of Computer Science, University of North Carolina at Charlotte</i>
Spring 2007	<b>Graduate Teaching Assistant</b> , <i>Department of Computer Science, Hallym University</i>

## Professional Services

2013 – Current	<b>Mailing list moderator</b> , <i>IEEE Virtual Reality (VR)</i>
2019	<b>Program Committee</b> , <i>IEEE Virtual Reality (VR) 2019</i>
2018	<b>Program Committee</b> , <i>IEEE Innovate-Data 2018</i> <b>Program Committee</b> , <i>IEEE Virtual Reality (VR) 2018</i> <b>Program Committee</b> , <i>ACM Spatial User Interface (SUI) 2018</i> <b>Program Committee</b> , <i>IEEE Artificial Intelligence and Virtual Reality (AIVR) 2018</i> <b>Program Committee</b> , <i>International Symposium on Visual Computing (ISVC) 2018</i>
2017	<b>Program Committee</b> , <i>IEEE 3D User Interface (3DUI) 2017</i> <b>Program Committee</b> , <i>ACM Spatial User Interface (SUI) 2017</i>
2016	<b>Program Committee</b> , <i>ACM Spatial User Interface (SUI) 2016</i> <b>Local Arrangement Co-Chair</b> , <i>IEEE Virtual Reality (VR) 2016</i>
2015	<b>Program Committee</b> , <i>ACM Spatial User Interface (SUI) 2015</i>

Reviewer	<b>Poster and Demos Co-Chair, ACM Spatial User Interface (SUI) 2015</b> <i>SPIE Visualization and Data Analysis (VDA), ACM Spatial User Interface (SUI), IEEE 3D User Interface (3DUI), IEEE Visual Analytics Science and Technology (VAST), IEEE Virtual Reality (VR), IEEE Transaction of Haptics, IEEE International Symposium on Mixed and Augmented Reality (ISMAR) IEEE AIVR, ISVC.</i>
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## Teaching

Summer 2018 08/2015-05/2018	<b>Instructor, Visual Analytics (DSBA-5122) University of North Carolina at Charlotte</b> <b>(Co) Instructor, Visual Analytics (DSBA-5122) University of North Carolina at Charlotte</b>
2007-2013	<b>Graduate Teaching Assistant, ITCS 6125/8125 Virtual Environment, ITCS 4121/5121 Information Visualization, ITCS 4120/6120/8120 Computer Graphics</b> <i>University of North Carolina at Charlotte</i>
2005-2006	<b>Graduate Teaching Assistant, Data Structure and Algorithm (Java), Game Development (DirectX with C++), Hallym University, South Korea</b>
2004-2005	<b>Undergraduate Mentor, Computer Graphics (OpenGL), Computer Programming (C++, Java), Undergraduate Mentoring program, Hallym University, South Korea</b>

## Graduate Advising

2011, 2012, 2013	<b>Graduate Mentor:</b> Research Experience for Undergraduates (REU), University of North Carolina at Charlotte <b>Dissertation Committee Member:</b> Jinbo Feng (Ph.D.), Jialei Li (Ph.D.), Ok-Kyun Kim (Ph.D.), Alireza Karduni (MS & Ph.D.), Sashank Santhanam (Ph.D.), Ryan Wesslen (Ph.D.) Armin Amirazar (Ph.D.) University of North Carolina at Charlotte <b>Ph.D. Advisor:</b> Abdullah Al Raihan Nayeem (2018) <b>Summer International Student Intern Advisor:</b> Heena Kwag (2018) UNIST
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## Honors/Awards

2007-2012	<b>Graduate School Dean's Fellowship, University of North Carolina at Charlotte</b>
2007	<b>Highest Honors (GPA 4.17/4.5), Department of Computer Science, Hallym University</b>
2006	<b>Recipient of Korean Government Scholarship (BK 21, NURI)</b> <ul style="list-style-type: none"> <li><i>University of North Carolina at Charlotte, NC, United States, "Video Game Design and Development" summer program</i></li> <li><i>Central Queensland University, Rockhampton, Australia, English training summer program</i></li> </ul>
2002,2005,2006	<b>Recipient of Korean Government Scholarship for Academic Excellence (BK21, NURI), Hallym University</b>
2006	<b>Recipient of the Best Mentor, Undergraduate Mentoring Program, Hallym University.</b>
2005	<b>Recipient of the Best Mentor, Undergraduate Mentoring Program of the Computer Science Department, Hallym University.</b>

## Conference and Workshop Presentations

- 2018 *"Urban space Explorer: a Visual Analytics System for Urban Planning"*, Computer Graphics and Applications (CG&A) session, IEEE Vis 2018. Berlin, Germany
- 2017 *"CrystalBall: A Visual Analytic System for Future Event Discovery and Analysis from Social Media Data"* IEEE Visual Analytics Science and Technology (VAST), Phoenix, AZ
- 2015 *"DemographicVis: Analyzing Demographic Information based on User Generated Content"*, IEEE Visual Analytics Science and Technology (VAST), Chicago, IL.
- 2014 *"Evaluating Dynamic-Adjustment of Stereo View Parameters in a Multi-Scale Virtual Environment"*, IEEE Symposium on 3D User Interface (3DUI'14), Minneapolis, MN
- "HyFinBall: a Bimanual Hybrid User Interface for Cross-Dimensional Visualization"*, SPIE Electronic Imaging, Visualization and Data Analysis (VDA'14), San Francisco, CA
- 2013 *"Volumetric Selection with the HyBall User Interface"*, 1<sup>st</sup> Workshop on Immersive Volumetric Interaction (WIVI'13-Workshop) at IEEE Conference on Virtual Reality, Orlando, FL
- 2012 *"Evaluating Depth Perception of Volumetric Data in Semi-Immersive VR"*, IEEE Conference on Virtual Reality (VR'12-Poster), Orange County, CA

## Research Grants

- 2019 **(Internal) CCI Innovation Fund: "Cognitive Biases on Decision Making in Virtual Reality"**  
 Lead Principal Investigator: Isaac Cho  
 Co-PI: Samira Shaikh, Zachary Wartell  
 Source of Support: University of North Carolina at Charlotte (UNCC)  
 Award Period: 1/1/2019 - 6/30/2019  
 Award Amount: \$26,000
- 2018 **EAGER: Real-Time: Visual Analytics for Enhanced Decision-Making and Situational Awareness in Modern Distribution Systems, with a Focus on Outage Prediction and Management**  
 Lead Principal Investigator: Valentina Cecchi  
 Co-PI: Isaac Cho, Tao Hong, Zachary Wartell  
 Source of Support: National Science Foundation (NSF)  
 Award Period: 10/1/2018 - 9/30/2020  
 Award Amount: \$299,237
- DMD Advanced Visualization and Management of Data**  
 Lead Principal Investigator: Isaac Cho  
 Co-PI: Valentina Cecchi, Zachary Wartell  
 Source of Support: Electric Power Research Institute (EPRI)

	<p>Award Period: 9/1/2018 - 12/31/2018</p> <p>Award Amount: \$23,111</p>
2017	<p><b>A Visual Analytics Approach for the Situationally Aware Distribution System</b></p> <p>Lead Principal Investigator: <u>Isaac Cho</u></p> <p>Co-PI: Valentina Cecchi, Wenwen Dou, Zachary Wartell</p> <p>Source of Support: Electric Power Research Institute (EPRI)</p> <p>Award Period: 9/1/2017 - 8/31/2018</p> <p>Award Amount: \$45,000</p>
2015	<p><b>Critical Infrastructure Breakdown</b></p> <p>Lead Principal Investigator: William Ribarsky</p> <p>Investigator: <u>Isaac Cho</u></p> <p>Source of Support: Department of Home and Security (DHS, VACCINE)</p> <p>Award Period: 10/15/2015 – 6/30/2016</p> <p>Award Amount: \$50,000</p>
	<p><b>Conceptualization and Design for an Internet Scale Messaging System</b></p> <p>Lead Principal Investigator: William Ribarsky</p> <p>Investigator: <u>Isaac Cho</u>, Ramesh Shankar</p> <p>Source of Support: Electric Power Research Institute (EPRI)</p> <p>Award Period: 6/22/2015 – 8/21/2015</p> <p>Award Amount: \$20,000</p>
pending	<p><b>Advanced Systems Integration for Solar Technologies: Solar Situational Awareness and Resilient Solutions for Critical Infrastructure</b></p> <p>Lead Principal Investigator: Robert Cox</p> <p>Co-PI: Valentina Cecchi, <u>Isaac Cho</u>, Badrul Chowdhury, Tao Hong, Madhav Manjrekar, Micheal Mazoola, Fareena Saqub, Weimin Wang, Zachary Wartell, Tiefu Zhao</p> <p>Source of Support: Department of Energy (DOE)</p> <p>Award Period: 7/1/2019 - 6/30/2022</p> <p>Award Amount: \$ 4,213,740</p>

## Invited Talks

2017	<p>[T1] <i>"A Visual Analytics Interface for Situationally Aware Distribution Systems."</i>, <u>Isaac Cho</u> and Zachary Wartell, EPRI Grid Analytics and Power Quality conference and exhibits, Sacramento, CA</p> <p>[T2] <i>"A Visual Analytics Interface for Situationally Aware Distribution Systems."</i>, <u>Isaac Cho</u>, EPRI's Distribution Modernization Demonstration (DMD) advisory meeting, Sacramento, CA</p>
2016	<p>[T3] <i>"Information Bursts and a Twitter-Like Sensor Network "</i>, William Ribarsky and <u>Isaac Cho</u>, EPRI's Distribution Modernization Demonstration (DMD) advisory meeting, Chattanooga, TN</p>

## Publications

Peer-reviewed Journal	[J1]	Karduni, A., <b>Cho, I.</b> , Wessel, G. Ribarsky, W., Sauda, E. and Dou, W. "Urban Space Explorer: A Visual Analytics System for Understanding Urban Social Media Activities", <i>IEEE Computer Graphics and Applications (CGA)</i> , 2017.
	[J2]	<b>Cho, I.</b> , Li, J. and Wartell, Z. "Multi-Scale 7DOF View Adjustment", <i>IEEE Transactions on Visualization and Computer Graphics (IEEE VAST TVCG-track)</i> , 2017.
	[J3]	Ko, S., <b>Cho, I.</b> , Afzal. S., Yau, C., Chae, J., Malik, A., Beck, K., Jang Y., Ribarsky W., and Ebert D. "A Survey on Visual Analysis Approaches for Financial Data", <i>Computer Graphics Forum</i> , 2016.
	[J4]	<b>Cho, I.</b> , Dou, W., Wang, X., Sauda, E. and Ribarsky, W. "VAiRoma: A Visual Analytics System for Making Sense of Places, Times, and Events in Roman History", <i>IEEE Transactions on Visualization and Computer Graphics (TVCG)</i> , 2015.
	[J5]	Jeong, D. H., Kim, Y. R., <b>Cho, I.</b> , Kim, E. J., Lee, K. M., Jin, K. W., and Song, C. G., "Real-time Image Scanning System for Detecting Tunnel Cracks Using Linescan Cameras." <i>In journal of Korea Multimedia Society</i> , Vol. 10, No. 6, 2007
Peer- reviewed Conference	[C1]	Karduni, A., <b>Cho, I.</b> , Wessel, G., Sathanam, S., Volkova, S., Arendt, D., Shaikh S., and Dou, W. "Vulnerable to Misinformation? Verifi!", <i>ACM Intelligent User Interfaces (IUI) 2019</i> , To appear.
	[C2]	Bhattacharjee, S., Tolone, J., Mahabal, A., Elshambakey, M., <b>Cho, I.</b> , and Djorgovski, S. "Context-Aware Deep Sequence Learning with Multi-View Factor Pooling for Time Series Classification", <i>IEEE BigData 2018</i> , To appear
	[C3]	Li, J., <b>Cho, I.</b> , and Wartell, Z. "Evaluation of Cursor Offset on 3D Selection in VR", <i>ACM Spatial User Interaction (SUI) 2018</i> ,
	[C4]	Lawanson, T., Karandeh, R., Cecchi, V., Wartell, Z., and <b>Cho, I.</b> , "Improving Power Distribution System Situational Awareness Using Visual Analytics", <i>IEEE SoutheastCon 2018</i> .
	[C5]	Karduni, A., Wesslen R., Santhanam, S., <b>Cho, I.</b> , Volkova, S, Arendt, D., Shaikh, S. and Dou, W. "Can You Verifi This? Studying Uncertainty and Decision-Making About Misinformation in Visual Analytics", <i>the International AAAI Conference on Web and Social Media (ICWSM) 2018</i> .
	[C6]	<b>Cho, I.</b> Wesslen R., Volkova, S. Ribarsky W. and Dou W. "CrystalBall: A Visual Analytic System for Future Event Discovery and Analysis from Social Media Data" <i>IEEE Visual Analytics Science and Technology (VAST)</i> , 2017.
	[C7]	<b>Cho, I.</b> Wesslen R., Karduni A. Santhanam S. Shaikh S. and Dou W. "The Anchoring Effect in Decision-Making with Visual Analytics", <i>IEEE Visual Analytics Science and Technology (VAST)</i> , 2017.
	[C8]	Talukder, A., Elshambakey, M., Wadkar, S., Lee, H., Cinquini, L., Schlueter, S, <b>Cho, I.</b> , Dou, W. and Crichton, D.. "VIFI: Virtual Information Fabric Infrastructure for Data-Driven Discoveries From Distributed Earth Science Data", <i>IEEE Conference on Cloud and Big Data Computing (CBDCOM)</i> , 2017.

- [C9] Eaglin, T. **Cho, I.** and Ribarsky, W. "Space-time kernel density estimation for real-time interactive visual analytics". In *System Sciences (HICSS)*, 2017 50th Hawaii International Conference on
- [C10] Dou, W., **Cho, I.**, ElTayeb, O., Choo, J. Wang, X. and Ribarsky, W. "DemographicVis: Analyzing Demographic Information based on User Generated Content", *IEEE Visual Analytics Science and Technology (VAST)*, 2015.
- [C11] Feng, J., **Cho, I.**, and Wartell, Z. "Comparison of Device-Based, One and Two-Handed 7DOF Manipulation Techniques.", *ACM Spatial User Interface (SUI)*, Los Angeles, CA, August, 2015.
- [C12] **Cho, I.**, and Wartell, Z. "Evaluation of a Bimanual Simultaneous 7DOF Interaction Technique in Virtual Environments.", *IEEE 3D User Interface (3DUI)*, Arles, France, March, 2015.
- [C13] Li, J., **Cho, I.** and Wartell, Z. "Evaluation of 3D Virtual Cursor Off set Techniques for Navigation Tasks in a Multi-Display Virtual Environment.", *IEEE 3D User Interface (3DUI)*, Arles, France, March, 2015.
- [C14] **Cho, I.**, Li, J. and Wartell, Z. "Dynamic Adjustment of Stereoscopic View Parameter for a Multi-Scale Virtual Environment.", *IEEE 3D User Interface (3DUI)*, Minneapolis, MN, March, 2014.
- [C15] **Cho, I.**, Wang, X. and Wartell, Z. "HyFinBall: a Two-Handed, Hybrid 2D/3D Desktop VR Interface for Multi-Dimensional Visualization.", *SPIE 9017, VDA (Visualization and Data Analysis)* Feb, 2014, San Francisco, CA., USA
- [C16] **Cho, I.**, Wartell, Z., Dou, W., Wang, X. and Ribarsky, W. "Stereo and Motion Effect on Depth Judgment for Volumetric Dataset.", *SPIE 9011, Stereoscopic Displays and Applications XXV (SD&A)* Feb, 2014, San Francisco, CA, USA
- [C17] **Cho, I.**, Dou, W, Wartell, Z. Ribarsky, W. and Wang, X. "Evaluating Depth Perception of Volumetric Data in a Semi-Immersive VR." In *Proceedings of the International Working Conference on Advanced Visual Interfaces (AVI '12)*, ACM, New York, NY, USA, 266-269.
- Peer-reviewed Book Chapter [B1] Karduni, A., **Cho, I.**, Wessel, G. Dou, W. Ribarsky, W., and Sauda, E. "Urban Activity Explorer: Visual Analytics and Planning Support Systems", *Planning Support Science for Smarter Urban Futures*, 65-76, Springer International Publishing, 2017.
- Peer-reviewed Workshop [W1] Aboufoul, M., Wesslen, R., **Cho, I.**, Dou, W., and Shaikh, S. "Using Hidden Markov Models to Determine Cognitive States of Visual Analytic Users", *Machine Learning from User Interaction for Visualization and Analytics*, An IEEE VIS 2018 workshop
- Workshop [W2] **Cho, I.**, and Wartell, Z. "Volumetric Selection with the HyBall User Interface." *1st Workshop on Immersive Volumetric Interaction (WIVI 2013) at IEEE VR Workshop*, Orlando, FL. 2013
- Peer-reviewed Poster [P1] **Cho, I.**, Dou, W., Wartell, Z., Ribarsky, W. and Wang, X. "Evaluating Depth Perception of Volumetric Data in Semi-Immersive VR.", *IEEE Virtual Reality (VR)* 2012.
- [P2] Elshambakey, M., Khalefa, M., Tolone, W., Bhattacharjee, S., Lee, H., Cinquini, L., Schlueter, S, **Cho, I.**, Dou, W. and Crichton, D.. "Towards a

## Technical Report

- distributed infrastructure for data-driven discoveries & analysis*", IEEE Conference on Big Data, 2017.
- [P3] Lawanson, T., Karandeh, R., Cecchi, V., Wartell, Z., and **Cho, I.**, "*Advancing the Use of Advanced Metering Infrastructure (AMI) Data through Visual Analytics*", DistribuTECH 2018.
- [R1] Wang, X., Butkiewicz, T., **Cho, I.** and Wartell, Z. "*Towards Utilizing Heterogeneous Analytics Interfaces in Coastal Infrastructure Management.*" Charlotte Visualization Center: Technical Report UNCC-CVC-12-15, University of North Carolina at Charlotte. March 2012.
- [R2] Afzal S., **Cho I.**, Yau C., Chae J., Ko, S., Malik A., Beck K., Ribarsky W., and Ebert D. "*Anomaly Exploration and Visual Analytics in Financial Data*", VACINNE, Purdue university. 2015
- [R3] Radnia, N., Karduni, A., **Cho, I.**, Wartell Z., Sauda E., *Augmented: Reality:: Architecture: Interface*, Charlotte Visualization Center:University of North Carolina at Charlotte, 2017