Joseph L. Gabbard, PhD

Associate Professor of Human Factors, Department of Industrial & Systems Engineering
Faculty, Center for Human-Computer Interaction
Virginia Polytechnic Institute and State University (Virginia Tech)
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Professional Preparation

2008	Ph.D. in Computer Science (AR & HCI), Virginia Tech, Blacksburg, VA
1997	M.S. in Computer Science (VR & HCI), Virginia Tech, Blacksburg, VA
1995	B.S. in Computer Science, Minor: Mathematics, Virginia Tech, Blacksburg, VA
1993	B.A. in Sociology, Virginia Tech, Blacksburg, VA

Professional Appointments

2013 – Present	Associate Professor, Virginia Tech, Blacksburg, VA
2015 – Present	Associate Professor of Computer Science, by courtesy, Virginia Tech, Blacksburg, VA
2015 – 2016	Technical Advisor to NATO (North Atlantic Treaty Organization) on Augmented Reality Head-up Displays for Surface Combat Vehicles, Prague, Czech Republic
2014 – Present	Fellow, Virginia Tech Institute for Creativity, Arts, and Technology, Blacksburg, VA
2000 – 2013	Research Assistant Professor, Virginia Tech, Blacksburg, VA

Areas of Teaching and Research Specialization

Perception, Attention & Cognition in Augmented & Virtual Reality, Human-Computer Interaction, Usability Engineering, Cognitive Human Factors, User-Centered Design & Evaluation

Selected Recent Funding

- *Methods to Assess Automotive Augmented Reality Head-up Display Effects on Driver Performance, (pending)* National Science Foundation, $499,921, August 2017 – July 2020, 100%, PI Joseph L. Gabbard.
- *Virtual Reality Social Environments*, Facebook, $380,000, April 2017 – April 2018, 80%, PI Joseph L. Gabbard, Co-PIs Doug Bowman, Thomas Tucker, Todd Ogle.
- *Human Performance Studies for Automotive Volumetric Augmented Reality Head-up Displays,* Honda Research Institute, $138,000, July 2016 – August 2017, 100%, PI Joseph L. Gabbard.
- *Collaborative Analysis of Large-scale Mixed Reality Data*, Microsoft Research, $100,000, December 2015 – December 2016, 100%, PI Joseph L. Gabbard, Co-PI Doug Bowman.

Selected Publications (Note: ‡ denotes graduate student, † denotes undergraduate student)

- Joseph L. Gabbard, Divya Gupta Mehra & Edward J. Swan II, "Effects of AR Display Focal Depth and Object Distance on Human Performance", IEEE Transactions of Visualization & Computer Graphics (in review), 2017.
- Missie Smith‡, Nadejda Doutcheva†, Gary Burnett & Joseph L. Gabbard, "The Effects of Augmented Reality Head-Up Displays on Drivers' Eye Scan Patterns, Performance, and Perceptions." *International Journal of Mobile Human Computer Interaction (IJMHCI)* vol. 9, no. 2, pp. 1-17. 2017.
- Michele Gattullo, Antonio E Uva, Michele Fiorentino, Joseph L. Gabbard, "Legibility in Industrial AR: Text Style, Color Coding, and Illuminance". *Computer Graphics and Applications, IEEE, 35*(2), 52-61, 2016.
- Coleman Merenda†, Missie Smith‡, Joseph L. Gabbard, David Large & Gary Barnett, "Effects of Real-world Backgrounds on User Interface Color Naming and Matching in Automotive AR HUDs", Workshop on Perception and Cognition in Augmented Reality, IEEE Virtual Reality, 2016, pp. 1-6, IEEE, 2016.
- Missie Smith‡, Nadejda Doutcheva†, Joseph L. Gabbard & Gary Burnett, "Optical See-Through HUDs Effect on Depth Judgments of Real World Objects." In IEEE Perception and Cognition in Augmented Reality Workshop @ IEEE Virtual Reality Conference. Arles, France, 2015.

- Joseph L. Gabbard, "Visuoperceptual Design Considerations for Mobile Headworn Applications", *2014 Human-Computer Interaction Consortium*, Watsonville, CA, USA, June 22 – 26, 2014.
- Joseph L. Gabbard, Gregory M. Fitch and Hyungil Kim‡. "Behind the Glass: Driver Challenges and Opportunities for AR Automotive Applications." *Proceedings of the IEEE* 102.2, pp. 124-136. 2014.
- Joseph L. Gabbard, J. Edward Swan II, and Adam Zarger†. Color Blending in Outdoor Optical See-through AR: The Effect of Real-world Backgrounds on User Interface Color. In *Proceedings of IEEE Virtual Reality 2013 Short Papers and Posters*, in press, March 2013.
- Joseph L. Gabbard, J. Edward Swan II, "More Than Meets the Eye: An Engineering Study to Empirically Examine the Blending of Real and Virtual Color Spaces", *Technical Papers, Proceedings of IEEE Virtual Reality 2010*, Waltham, Massachusetts, USA, March 20-24, pages 79–86.
- Joseph L. Gabbard, J. Edward Swan II, "*Usability Engineering for Augmented Reality: Employing User-Based Studies to Inform Design*", IEEE Transactions on Visualization and Computer Graphics, vol. 14, no. 3, pp. 513-525, May/June, 2008.
- Joseph L. Gabbard, J. Edward Swan II, Deborah Hix, "The Effects of Text Drawing Styles, Background Textures, and Natural Lighting on Text Legibility in Outdoor Augmented Reality", *PRESENCE: Teleoperators and Virtual Environments*, Volume 15, Number 1, Spring 2006, pages 16–32.
- Doug Bowman, Joseph L. Gabbard, Deborah Hix, "A Survey of Usability Evaluation in Virtual Environments: Classification and Comparison of Methods", *Presence: Teleoperators and Virtual Environments*, Volume 11, Number 4, 2002, pages 435-455.
- Joseph L. Gabbard, Deborah Hix & J.E. Swan II. User-Centered Design and Evaluation of Virtual Environments. *IEEE Computer Graphics & Applications, 19*(6), 51-59. 1999.

Synergistic Activities

- **Professional Tutorials**: Since 2004, Gabbard has organized and taught 12 separate tutorials on the topics of Conducting Human-Subject Experiments with Virtual and Augmented Reality, at *IEEE Virtual Reality*, and Experimental Design and Analysis for Human-Subject Visualization Experiments, at *IEEE VisWeek.*

- **Service to the scientific and engineering community outside employing organization**:
  - *IEEE ISMAR Program Committee*: 2017
  - *IEEE Virtual Reality Program Committee*: 2012, 2013, 2014, 2017
  - *ACM International Conference on Automotive User Interfaces (AutoUI) Co-Chair,* 2016 & 2015
  - *Associate Editor: Journal, PRESENCE: Teleoperators and Mixed Reality,* 2015-present